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# ACHIEVING QUALITY IN AUTOMATION of SOFTWARE TESTING USING AI BASED TECHNIQUES

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*Abstract: Software testing is an important half within the development method of code. Software testing is the prime techniques to get consumers assurance in the software. It is a process to assess the usability or attributes of the program or a system to measuring that the developed system or product meets its quality. Software testing is a very important technique for assessing the standard of a software item. Various artificial intelligence approaches are used to optimize the testing resources. These approaches are used in numerous processes of testing a software, to check reliability and quality in terms of automation of testing, generation of test sequence etc.*

*Keywords—Software testing; quality; artificial intelligence; automation*

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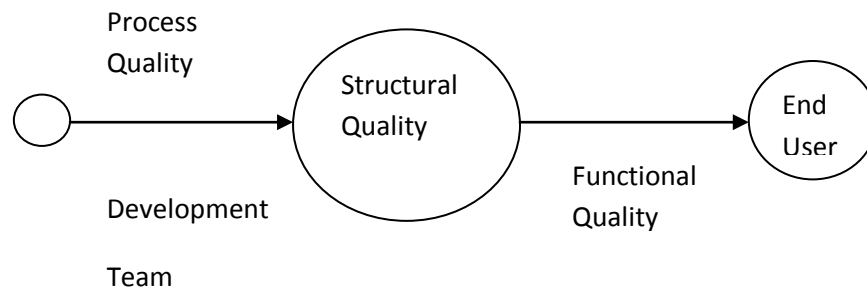
## I. INTRODUCTION

Software testing is a procedure to make out all bugs that are available in the software artifact. It is the way toward assessing the segments of software to approve that it fulfills exact prerequisites or to arrange distinction among unsurprising and clear outcomes. The testing process also helps in achieving the quality of the software. Quality refers to the value of product, process, service, information and system. So, the quantifiable uniqueness is achieved from the user's requirement. Quality refers to those areas of an item which address the issue of clients and gives item clients fulfillment [1].

Testing can be coordinated at different focuses in the advancement procedure relying on the apparatuses and approach utilized. In software development process, the testing process starts from the first level i.e. requirement phase. At a unit level stage, it begins in conjunction with coding; whereas at integration level, it starts once coding is finished. Testing procedure can be performed either manual or automation.

Software quality depends upon the developers, the end users and the sponsors. The aspect of the quality in these groups isn't the same but they all are responsible to attain it in their own way [2]. The software's users defined as the person who applies the software to some problem to achieve the goals.

- The development team is responsible for creates the software. The development strategy changes over the thought into programming bundle ·
- The backers of the venture are the individuals who paying for the formation of these product bundles.



## II. AUTOMATED TESTING PROCESS

There are two ways to perform the testing process. First is, manual testing which is a procedure to test the product physically to find the bugs. Manual testing is performed while not utilizing any testing tool. To perform manual testing, a test plan is used that clear up the exact and organized approach of testing an item application. Manual testing is not appropriate for extensive projects due to the requirement of indefinite time and assets. Second is, automated testing is a procedure where testing tools are utilized to execute a pre outlined scripts on software to find defects.

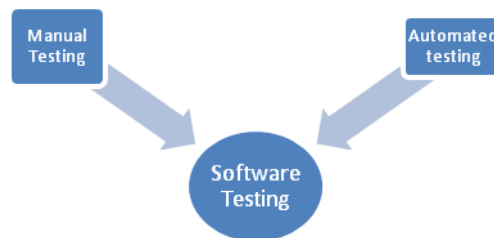


Fig: Methods of Software Testing

Test automation interface provides a single platform on which multiple testing tools are incorporated [3]. Test automation mechanism is used to enhance the adaptability and productivity to keep up the test scripts. Automation platform incorporates an Interface Engine to execute the test scripts, the Interface Environment that comprises framework and project library and Object Repository that are assortment of application object data.

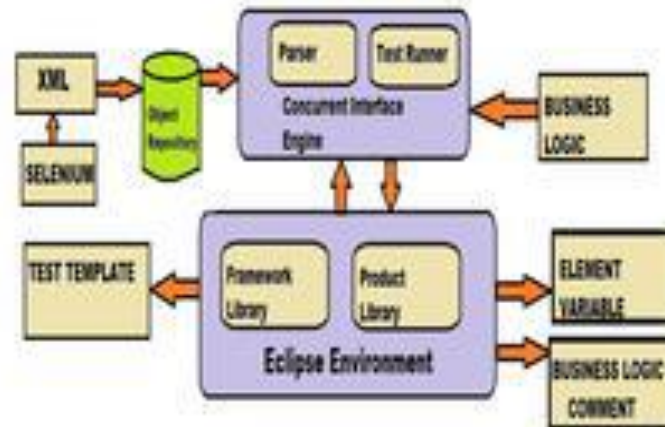


Fig: Automation interface[3]

### III. AIBASED TECHNIQUES FOR SOFTWARE TESTING

#### a) Ant Colony Optimization(ACO)

ACO is a metaheuristic optimization approach stimulated from the search behavior of ants. Ant system was the first technique of Ant Colony Optimization. This strategy used the idea of the ability of ants to find the shortest path from the destination to the food source. This approach is used to create test sequences automatic by using the UML artifacts to perform testing based on states. This approach helps in achieving maximum coverage of software with minimal redundancy.

#### b) Genetic algorithm

GA is a heuristic search system fundamentally in view of the transformative thoughts of hereditary decisions. GA represent an approach to perform arbitrary inquiry inside a characterized seek space to determine an issue. The genetic approach is utilized as a part of programming testing for era of test information utilizing a weighted control stream chart (CFG). The efficiency of the testing can be improved using the genetic algorithm by automatically generating the test cases for full path coverage area using the graph theory concept.

#### c) Tabu Search

Tabu search is a metaheuristic algorithm which helps to solve optimization issues. In this searching method, the concept of memory structure is used which stores the information concerning the visited solutions and set of rules. It is used for automatic generation of structural software testing and tabu search is a cost effective approach to optimize the expenditure of software testing process by providing maximum code coverage in terms of paths, conditions and loops coverage.

#### d) Bee Colony

Bee Colony algorithm approach is extracted from the honeybees foraging activities. It is a continuous and combinatorial optimization approach which is utilized to carry out the search on neighborhood consolidated with global search. It is likewise utilized for automatic generation of structural software test for the small information areas. This strategy creates optimal number of test cases for execution on programming under test.

e) *Data Mining*

Data mining is a process of mine the valuable information and knowledge from a huge database which is further useful for decision making. Data mining algorithms can be used for automation of tested systems. Mined tools like Pr-Miner, PARSE Web, mined exception-handling rule are used on software data which includes source code, traces of execution path process, history of the code for revision, bugs reports, documentation etc.

#### IV. TESTING AUTOMATION TOOLS

The numerous tools are used to perform automated testing. The testing tool depend upon the nature of the application on which testing is to be performed like Graphical User Interface testing, web application testing [6, 7].

*Selenium*: Selenium is an open source web testing tool to test the web browsers across different platforms. It includes four components: First is, Selenium IDE, Second Selenium Remote Control, Third Web Driver and Forth, Selenium Grid.

*Watir*: It is an open source tool used to perform automating test on web browsers. It supports Internet Explorer on Window, Firefox and Opera. The test scripts composed with watir are easily readable and maintainable. Watir supports numerous browsers on various platforms.

*Ranorex*: Ranorex tool is used for testing the desktop, web and mobile applications since it has GUI automation test framework. Test cases that are generated with ranorex are easily modified and can be reused again. These test cases are easy to execute with the executable files.

*Test Complete*: test complete tool is used to create the automated tests. These automated tests are utilized to test different applications like web, android etc. for this purpose, test complete tool kit is utilized to execute tests like unit testing, functional testing, GUI testing and regression testing.

*Windmill*: It provides a platform to execute automated test for web applications. The idea of windmill is to create test writing which is portable and easier. The created test cases are executed on various platforms. Windmill support various web browsers like Opera, Chrome, Firefox, and Safari.

*Sahi*: Sahi is an open source tool for testing web applications automated. The scripts supported by the Sahi are written in Java and Java Scripts and this tool provides a feature of playback and recording of these scripts.

*Quick Test Professional*: Quick Test Professional (QTP) is a tool to test the functionality of the software automated. To perform automated testing on applications, Visual Basic Scripting is used. QTP tool is used for desktop and web applications to find the bugs and errors.

*Tellurium*: Tellurium is a platform for test automation for web based application. It is an open source testing platform. This framework was designed from Selenium concept. With tellurium easy maintainable and reusable tests can be written.

#### V. CONCLUSION

Software testing is that the method of verification and validation of the software package. Effective automated software testing will provide the reliable and quality assured software products to the users. Without measuring the quality, we can't make certain of the estimation of the product. High quality product means better software from the user's point of view. To achieve the quality many meta heuristic approaches are used in software testing process for test sequence generation, automation of testing, measuring quality, checking reliability.

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