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A Survey on Manual and Automation Testing

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Abstract: In the current digital world, Software Development is growing rapidly, testing has become a major activity in the software development life cycle in order to produce and deliver reliable and quality software. Testing involves finding bugs and errors in the early stages of the development process. Testing is very crucial and important activity that has to be carried out for detecting faults in the application that affect the performance. This paper focuses on manual testing and its limitations. Discussion about automation testing, its advantages, scenarios on when to automate and how to automate is shown. The Paper also briefs about the drawbacks of manual testing and the effectiveness of automation testing.
Keywords: manual testing, automation testing, GUI testing, Testing tools, Software testing.

I. INTRODUTION

With the advent in software development and production in recent years, it has led to major concern over security and reliability of the application [2]. Software testing has become an important and crucial stage in the software development life cycle. Life critical applications needs to be highly reliable and accurate for it to deliver services. This accuracy is achieved by carrying out the best practices in testing the software. By employing effective testing techniques quality software can be delivered to the customer.

GUI (Graphical User Interface) testing is the process of testing the Graphical User Interface of the application to ensure that the stated requirements in the business requirement document are satisfied [1]. Graphical User Interface is the most essential and eminent parts of the software used in today's Information Technology [1].

Graphical User interface testing is carried out using various testing tools that generate the user interface events such as mouse clicks and keystrokes and observe the changes in the user interface and compare the results obtained with the expected behaviour and success or failure is reported. GUI testing tests the various controls on the screen like menus, buttons, icons, toolbar, menu bar, windows and dialog boxes, etc..

GUI testing can be carried out in two ways, manual testing and the automation-based testing.

Manual testing is carried out by humans where a person or tester sits in front of a computer and manually executes each step given in the test plan tediously whereas in automated testing the tests are carried out automatically by test automation tools .

Manual testing is carried out by a tester, who plays the role of an end user to check if all the features of the application are functioning properly. Manual testing finds any of the bugs or errors in the software application [3]. The application is manually tested by a tester to see if it is conforming with the requirements stated in the business specification document.

Automation Testing involves testing the various elements of the software application using automation tools and testing frameworks. Automation testing is the best way to carry out the UI testing as it improves tests coverage, increases test coverage, saves time and resources .

This paper discusses about the manual testing and its disadvantages and test automation techniques.

II. LITERATURE SURVEY

A Claus Klammer and Rudolf Ramler proposed 'A Journey from Manual Testing to Automated Test Generation in an Industry Project' [6]. This paper discusses on how software testing techniques has evolved from manual testing to test automation. The paper focuses on different phases involved in testing the software and pros and cons involved in each of the techniques. The first phase is manual testing, the unit tests are written, and GUI level testing is carried out manually [6]. The unit tests written form the foundation for test automation.

The pros of manual testing are that it helped understand the requirements specified as user stories and refine them. The cons of manual testing are most of the bugs that were found while carrying out the unit tests manually are related to GUI. This becomes a problem when a new feature is added in the development lifecycle. The bugs were not found while manual explanatory testing is conducted via GUI [6].

The second phase is Automated test execution where the automated test scripts are developed using testing technologies. The development, execution and maintenance of the GUI tests is straightforward. The tests scripts written can be executed any number

of times eliminating the repetitive tasks and reducing the human effort. Automated test execution eliminates the laborious of running the tests. This method also reduces the risk when a new feature is added in the development lifecycle [6].

Ritu Patidar, Anubha Sharma and Rupali Dave proposes a 'Survey on Manual and Automation Testing strategies and Tools for a Software Application' [2]. This paper focuses on theoretical aspects software testing techniques and various testing tools. This paper discusses about manual testing and its disadvantages and automation testing [2]. Manual testing is the process of executing the tests plans manually by a human sitting in front of computer carrying out each step specified in the plan. Some of the disadvantages of testing manually are: costs more for human resources, tedious and repetitive tasks which is time consuming, test coverage is less.

Automation testing is the process of testing the software using test automation framework or test automation tools. Several industries have adopted automation testing techniques for testing their products. Pros of automation testing is: overall efficiency is increased, test coverage is better when compared to manual testing, bugs related to GUI can be found easily when compared to manual testing [2].

Samiksha R. Rahate and Uday Bhave proposes 'A Survey on Test Automation'. This paper focuses on different methodologies and approaches used for automation testing [5]. Opinion of when to automate is given. Usually software testing is carried out after the implementation phase of Software development lifecycle [5]. Automation testing can be carried out at the beginning of implementation phase of Software development lifecycle. Test automation is carried out in the following scenarios: Regression testing, frequently changing requirement specification, for measuring the performance with many users, Critical applications.

This paper also discusses about the automation frameworks used by most of the enterprises [5]. There are four automation frameworks:

Data driven framework, module-based framework, hybrid-based framework and keywork based framework. Explanation, advantages and disadvantages of each of the frameworks is discussed in detail. The various tools used for automating are: web testing tools regression testing tools, unit testing tools, Functional testing tools, Database Testing Tools, Security testing tools, Performance Testing Tools, Requirement Management Tools and Communication Testing Tools [5].

III. MANUAL TESTING

The UI testing is the process of testing the GUI of an application to ensure that it fulfils the written specification. Manual based testing approach is currently used for validating the user interface of the RLN application.

Manual testing is the of testing the software application manually by the tester. The tester play an important role of an end user to ensure that all the application's features are behave correctly.

The application is manually tested by a tester to see if it is conforming with the requirements stated in the business requirements document. The tester need to understand the business requirements document. It is the main step carried before executing the test plans. Manual testing is done to ensure that the software being tested is error-free and bug free [2].

A. Limitations

1) Manual testing is often prone to errors
2) less accurate as the test cases are manually carried out
3) It is very tedious process as same tests need to be executed repetitively and requires more time and resources
4) With manual testing all the workflows and negative scenarios cannot be covered and therefore less test coverage in this method when compared to automation testing.
5) In few development life cycles, it requires performing the same tests repeatedly. This leads to waste of time, money and effort.

B. Test Case

A test that tests the functionality or working of an object or a specific feature of the application. It is a description of what types of data can be given, what is to be tested and what are the activities to be done to check the actual result against the expected result. An input describing the component of application is given and the actual output is observed against the expected result [2].

1) The characteristics of a good test case are:

Effective:-Finding faults
Exemplary:- represent others
Evolvable:- easy to maintain
Economic:- cheaper

2) Structure of Test Case

A test case has the following parameters:

a) Test case identifier: identifies the test case uniquely
b) Test Case name
c) Description of test case
d) Pre-requisites or reconditions
e) Steps to be followed
f) Expected output
g) Actual output

Test Case ID	Test Case Name	Objective /Description	Pre-Requisite /Precondition	Steps to be Followed	Expected Result	Actual Result

A Sample test case

IV. AUTOMATION TESTING

Automation testing is the process of testing the application using test automation tools, techniques or frameworks. The procedure is being used to implement the test automation is called a test automation framework. There are several automation frameworks that have been developed over time.

A. Advantages of Automation testing

1) Improves the overall efficiency of testing
2) Reduces time and effort
3) Saves resources and cost involved
4) Using the tests across different platforms
5) Improves the test coverage of application
6) Bug detection is easy and accurate

B. When to Automate?

Usually software testing is carried out after the implementation phase of Software development lifecycle. Automation testing can be carried out at the beginning of implementation phase of Software development lifecycle.

Test automation is carried out in the following scenarios:

1) Regression testing
2) frequently changing requirement specification
3) for measuring the performance with many users
4) Critical applications.

C. How to Automate?

Automation process works in following steps [5]:

1) Identify which part of the application needs automation testing.
2) There are different automation tools for each type of testing, choose the appropriate tools by considering the tool configuration and requirements.
3) Write the test scripts using tools.
4) The test suite is created using test scripts which forms a test case.
5) Execute the test cases and note down the results.
6) Compare the obtained result with the actual report.
7) Identify the potential bugs that affect the performance.

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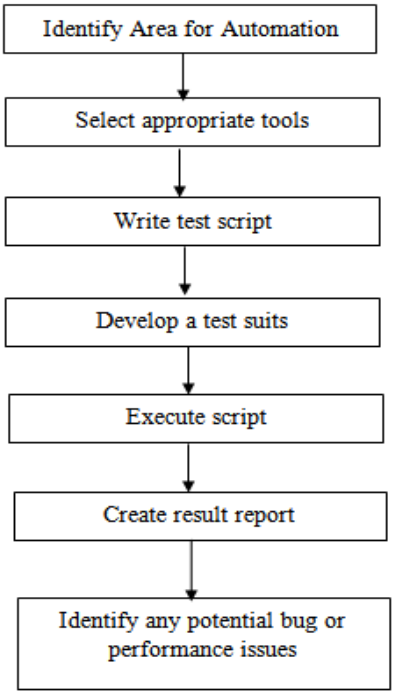

Fig.4 Steps for automation testing

V. CONCLUSION

This paper discusses about the manual testing and its limitations and about automation testing. In this paper we can conclude saying that automation testing is more efficient when compared to manual testing. The effort and overhead involved with manual testing is more. Bug and error detection is easy with automation testing. In case of GUI testing when manual testing is employed, most of the bugs that adversely affect the performance of the application go undetected. Automation testing is best suited for testing the Graphical User Interface (GUI) of the application. Scenarios of when to automate and how to automate is discussed in this paper. Automation testing is gaining focus in the current IT industry. More enterprises are moving and deploying automation testing for testing their application. There is enormous scope for automation in current trends in IT.

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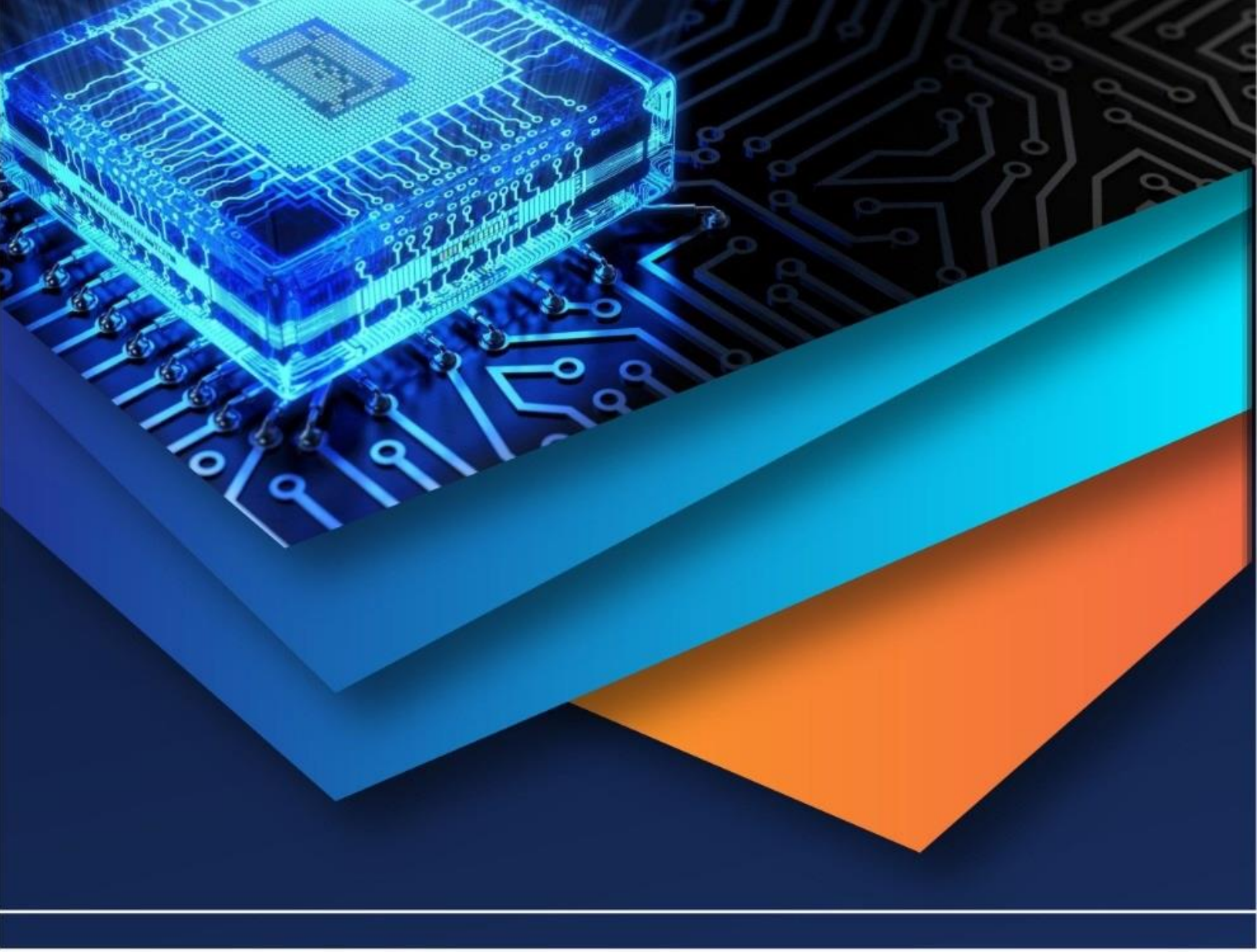

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