Analysis of Emerging Automation Tools in Industry

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Abstract— The increasing demand of speed and accuracy for software testing in the industry requires advanced testing tools. Efficient software testing can only be done by utilizing necessary and appropriate testing methods and frameworks. High quality development can be achieved by using effective automation testing. This paper compares various software testing tools and will aid professionals and researchers in this field.

Keywords— Software Testing, Test Automation Tools, Software Automated Testing.

I. INTRODUCTION

Software testing is the process of verifying whether a product or application delivers the expected outcome. It is done to prevent bugs, improve efficiency of the product and reduce costs. The main intent of software testing is to find faults and errors [1], so as to solve them before the end product reaches the customer. Testing can be done manually as well as by using automated tools. Manual testing and automated testing are the two methods of testing. Manual testing is also called as static testing. It is carried out by the tester. Automated testing is also called as dynamic testing [2]. Manual testing and automated testing both are important testing methods but, in most cases, automated testing is considered better than manual testing.

The purpose of this paper is to provide an extensive study on various automation tools available in the market. A number of testing tools are explained in the study along with their pros and cons. The paper is divided as follows: Section 1 is the introduction, Section 2 describes automated testing, Section 3 discusses about Test Automation Tools Categories, Section 4 provides brief descriptions of automation tools along with their advantages and disadvantages, Section 5 presents a comparative analysis of various automation testing tools, Section 6 concludes the study.

II. AUTOMATED TESTING

Automated testing is the process of using software to compare the actual outcomes of the product with the expected outcomes. Automated tests are conducted in such a way that they do not require human intervention [4].

Automated testing can be used in many areas instead of manual testing but it cannot replace manual testing completely. Both testing methods work together to give desired results. The benefits of automation testing over manual testing are as follows:

- Higher Testing Efficiency
- Greater Accuracy and Reliability
- Reusability and Repeatability of Test Scripts
- Improved Test Coverage
- Simulation of User Environment
- Boost in Team Morale
- Higher ROI: Saves Time and Costs
- Volume and Simultaneity
- Early Detection of Bugs [3]

Advantages	Disadvantages
It is more efficient and does testing quickly.	Expensive than manual testing.
Increases number of tests as various tools can run simultaneously.	Choosing the right tools takes time and workforce.
Bugs can be found quickly.	Proficiency in languages for scripts is needed.
Results are more accurate than manual testing.	Knowledge of tools is required.

III. TEST AUTOMATION TOOLS CATEGORIES

Software testing automation tools are categorized as follows: Unit Testing Tools, Test Management Tools, Code Coverage Tools, Functional Testing Tools and Performance Testing Tools.
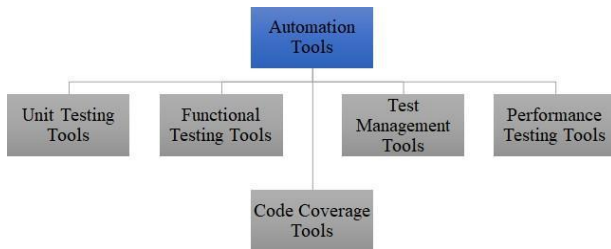

Fig1 : Categories of Test Automation Tools

1. Test Automation Tools

An automation tool is a software itself with the help of which the actual software in focus can be tested, in other words, the automation tool helps and serves as a means in doing software testing [5]. Following is the description of some common testing automation tools available for use:

1. LambdaTest

LambdaTest is an automation testing tool used for desktop and web applications. It can run selenium test automation on desktop, android and iOS mobile browsers in languages like Python, Java, JavaScript, etc. It allows integrated developer tools to help debug issues in live testing, local hosted web testing and geolocation testing.

Advantages	Disadvantages
Variety of frameworks to choose from.	There is no native app testing.

It supports TestCafe, Cypress, Puppeteer, Selenium and Playwright for automated cross browser testing.	It supports only emulators and simulators and not real devices.

Advantages	Disadvantages
Wide range of device and OS supported.	Not able to execute end-to- end and regression testing.
Does not need additional dependencies.	Cannot produce real world conditions to test against.

5. Avo Assure

Avo Assure is a 100% no-code and intelligent test automation tool. It enables technical as well as business users to test across multiple platforms like mobile, web, desktop, mainframes etc.

Advantages	Disadvantages
It is a scriptless automation tool.	Updating an existing mind map is difficult.
Easy to learn and user friendly. Need to learn programming languages is eliminated.	Report size is big which makes it difficult to debug.

2. Katalon Studio

Katalon Studio is used for automation testing for API, desktop, mobile and web. It is an end-to-end automation platform built for continuous testing and bringing solutions for every industry. It is quick to adopt, powerful to scale and has seamless Agile and CI/CD Integration.

Advantages	Disadvantages
No licensing and maintenance fees required.	Poor community support.
Built on Selenium framework but does not need advanced programming skills.	Lack of support of programming languages. Supports only Java/Groovy.

3. Subject7

Subject7 is a cloud-based and truly codeless test automation tool. It is easy to use integrates easily with DevOps/ Agile tooling using native plugins, open API's and in-app integrations.

Advantages	Disadvantages
Features like cloud test execution, multi browser testing, database, connection, REST callsare available.	UI is not that user friendly.
Does not require extensive knowledge of programming languages.	Less online resources available.

6. IBM Rational Functional Tester

The main purpose of this tool is regression testing and automated functional testing. It can perform GUI and data-driven testing. IBM RFT supports a variety of terminal emulator- based and web-based applications.

Advantages	Disadvantages
Quick response and good support. IBM releases frequent updates to fix issues.	Very less support of browsers other than Internet Explorer.
There is no set up fees.	Uses a lot of memory.

7. Test Studio

Test Studio is a test automation solution suited for GUI, performance, load and API testing. It uses languages like C# and VB.NET, a central object repository andcontinuous integration with source control.

Advantages	Disadvantages
It comes with extensive support for data-driven testing.	It is not a free tool and is a bit costly.
Without writing a single line of code, automated tests can be run on devices and emulators.	It needs powerful computers to run all its capabilities.

8. TestComplete

TestComplete is a GUI automation testing tool used to testdesktops, web applications and mobile applications. Made for technical as well as non-technical users. It uses modern languages like Python, JavaScript and VBScript.

Advantages	Disadvantages
Allows to choose a variety of scripting languages.	Additional cost for extra modules and add-ons.
It requires only basic programming skills.	Licensing and maintenance fees are needed.

4. Kobiton

Kobiton's scriptless test automation makes testing easy by creating automated tests from manual tests. It creates scripts which execute on over 350 devices. It supports XCUI, Selenium, Appium etc. for scripting.

IV. COMPARATIVE ANALYSIS OF VARIOUS AUTOMATION TESTING TOOLS

There a lot of Automation Tools available in the market. The selection of the best tool for one's necessity is the difficult task. To reduce the labour of searching for the best tool, below is a detailed comparison of the various automation solutions.

4.1 On basis of price and platform

4.2 On basis of languages, coding skills and tested apps Languages are sometimes necessary in automated testing assome software work using coding. Necessary skills are required by user for the proper working of these tools. The skillset may range from minimum skills to good/advanced level. The following is the comparison according to theseparameters:

Tools	Price (Annually)	Platform
LambdaTest	Free/Paid plansavailable	Windows/Linux/Mac
Test Complete	$3000/$5000	Windows
KatalonStudio	Free/Paid plansavailable	Windows/Mac
Subject7	Given exclusivelyby software provider	Windows
Kobiton	$4000/$9000	Windows/ Linux /Mac
AVO Assure	Given exclusivelyby software provider	Windows/Mac
IBM RFT	Given exclusivelyby software provider	Windows/Linux/Mac
Test Studio	$2500/$3500	Windows

Tools	SupportedLanguages	CodingSkills	TestedApps
LambdaTest	Java/ Python/ Ruby/ PHP/ C#	Good skills needed	Web
TestComplete	VB/ JavaScript/C++/ C#/ Delphi/ Angular/ Rubyon Rails/ PHP	Minimumskills	Web/ Mobile/ Desktop
Katalon Studio	Java/ Groovy	Minimumskills	Web/ Mobile
Subject7	Codeless automation	Minimum/No skills	Web
Kobiton	C#/ Java/ Ruby/NodeJS/ PHP/ Python	Good skills needed	Web
AVO Assure	Codeless automation	Minimum/No skills	Web/ Android/ iPhone/ iPad
IBM RFT	HTML/ Java/Windows/ .NET/ Visual Basic/ Silverlight/ Eclipse/ SAP/Siebel/ Flex/ Ajax/ Dojo/ GEF/ PowerBuilder	Good skills needed	Web/ Desktop
Test Studio	HTML/ AJAX/ Silverlight/ ASP.NET MVC/ JavaScript/ WPF/ Angular/React/ Blazor	Good skills needed	Web

V. CONCLUSION

There are many automation tools in the market. The main purpose of these tools is to reduce time and workload for completing a task. Unfortunately, the features discussed in this study do not alone meet the requirements of the industry. Each tool has its own unique features and can be used effectively if chosen wisely for particular tasks. This study provides detailed explanation of various automation tools so as to ease the selection of automation tool and framework by professionals

Includes Complete Guidelines, Checklists, and Templates, Third Edit. 2007.

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