

Robot Framework Integration with Jenkins: A Blessing for Automation

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Abstract - In this fast-paced world, an age when time is money, automation is the firm requirement in all disciplines. Be it Health & Medicine, Agriculture & Food Services, Automobiles, Manufacturing, etc. Automation is a firm requirement of the hour with Software Testing being no exception. Automation testing is a way where tools, software and scripts are used to perform test cases by the repetition of pre-defined actions. The whole process of manual testing consumes and wastes a lot of time. Further adding to that, because of its repetitive nature, regression testing is highly error-prone, so automation becomes a necessity. This paper will review and discuss the usage of Jenkins an open source automation server along with Robot Framework leading to Continuous Integration and Continuous Deployment giving rise to the widely used idea of DevOps. The advantages of Robot Framework being powerful yet simple and easily extensible tool making use of the keyword driven testing approach will be emphasized in this paper. The later part of the paper consists of an elaborate comparison between Automation and Manual Testing based on different parameters

Key Words: Automation, Software Testing, Jenkins, Robot Framework, CI/CD pipeline, DevOps

1. INTRODUCTION

Testing the code or software is very essential stage in software development process. By developing an automation model for the testing software or quality check of the product company or developer can assess the quality of the product. Jenkins being an open source, independent Automation Server, can be used for building, testing and deploying the software. Robot framework being a generic test automation framework can be used for acceptance testing and acceptance test-driven development (ATDD). Integrating the test cases written in Robot Framework with Jenkins can aid in the creation of very efficient and powerful automation testing tool which can be widely used for regression testing. The main task of Jenkins is to execute the job at pre-defined interval of time, the time interval could be set before-hand considering the days in which the regression tests should run thus leading to minimal or zero human intervention in the complete software test life cycle. This also assists in Continuous Integration and Continuous Deployment which is the need of the hour. Henceforth, encouraging the idea of DevOps where Development and Operation both lie in a single segment instead of being two different phases in the complete software lifecycle. The remainder of the paper reviews and discusses the benefits

and the ease with advantages of using robot framework along with Jenkins leading to complete test automation, the ease of writing test cases using robot framework with the keyword driven approach with simple human readable form. In this paper an attempt has also been made to compare automated and manual testing based on various parameters.

1.1 Jenkins as CI/CD server

Jenkins is a very powerful platform independent application facilitating continuous integration and continuous delivery of projects. One of the advantages while using Jenkins comes from fact that it can handle any kind of continuous integration or build also it is free source. It permits Continuous Integration and Continuous Deployment environment for nearly all language combinations as well source code repositories using pipelines, also automates other routine development tasks. Though Jenkins doesn't eliminate the necessity of creating scripts for each pf the individual steps, but it does assess with a faster and more robust way of integrating the entire chain of test, build and deployment tools that can be built easily. For supporting the automation of different varieties of development tasks, Jenkins provide with around 1,600 plugins.

The entire software development process can be accelerated at a much faster rate by using Jenkins, as it helps in build automation and testing at a quicker rate. Jenkins help in continuously testing the project builds and reflect the errors in early stages of development. The projects can be built periodically considering the days we want to run the test suite. It also provides the feature of editable Email notification allowing the developer to get an idea if the deployment was a success or failure.

1.2 Robot Test Automation Framework

Robot Framework is widely known as a generic framework which is also defined as acceptance level test automation framework. It is simple, powerful and easily extensible tool which utilizes the keyword driven testing approach. Ability to create re-usable high-level keywords from existing keyword ensures easy extensibility and re-usability. Its testing capabilities can be extended by test libraries implemented either with Python or Java and users can create new higher- level keywords using the existing ones using the same syntax used for creating test cases. One of the major advantages of robot framework is it is Operating System and Platform independent. It also aids in robotic process automation. Test cases are written in keyword style in a tabular format. The command line interface and XML based output files ease integration into existing build

infrastructure, for example continuous integration systems. All these features ensure that robot framework can be used to automate Test cases.

2. Robot Framework integrated with Jenkins (A boon for automation)

What is needed is a tool simple enough to make fast automation and in the same time powerful so these tests can be extended and produce less error prone. The tool should be platform independent. And Robot Framework satisfies all these requirements very efficiently and effectively. Robot -Framework starts with processing the test data, then it executes test cases and at the end logs and reports are generated. Apart from all the Test Libraries and all the core functionalities Robot-Framework provides with a very user-friendly Graphical User Interface which is known as 'RIDE'. It stands for 'Robot Integrated Development Environment' and assists in managing and writing test cases along with keywords written in Resources Files.

```

***Settings***
Library SeleniumLibrary

***Test Cases***

Hello World
    Log To Console    Hello Robot

Login Test
    Open Browser    ${appURL}
    Enter Username
    Enter Password

***Variables***

${appURL} http://www.example.com/

***Keywords***

Enter Username
    Input Text    id:txtUsername    admin

Enter Password
    Input Text    name:txtPassword    admin123
    
```

Fig -1: Robot Framework Test Cases

What is needed is a Continuous Integration and Deployment Server that can help in integration of Test Cases written in robot framework to run the test cases periodically and automatically. Jenkins is a Continuous Integration as well as open-source server which is written using Java to achieve Continuous Integration in an automated fashion by orchestrating a chain of different actions. Jenkins takes care of everything starting from building to testing, then documenting the software, deploying, etc. that is basically the complete software development life cycle. Automated build and test process reduce defects and also help in saving a lot of time.

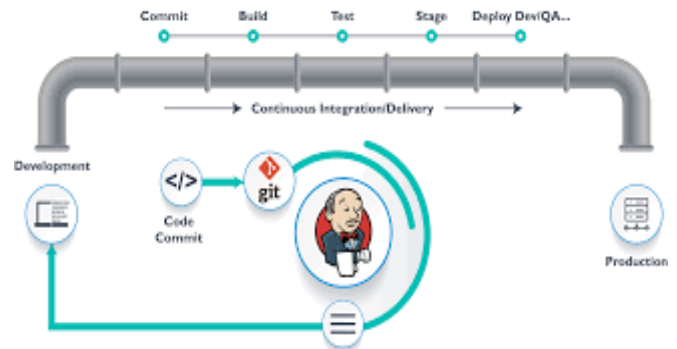
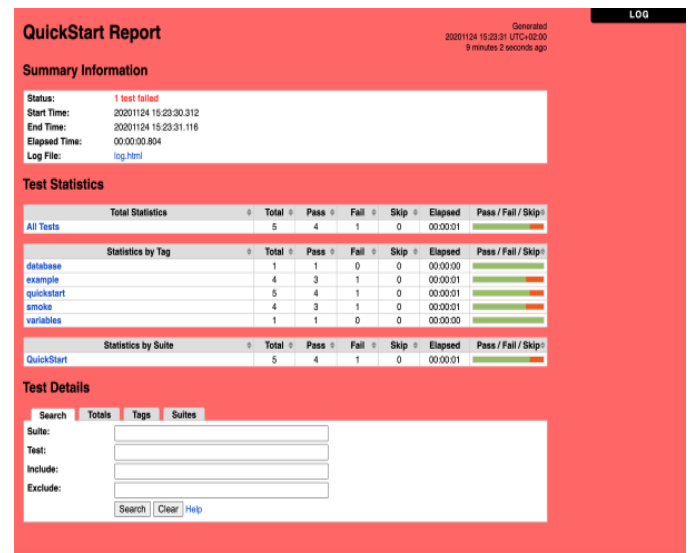


Fig-2: Jenkins CI/CD flow

After the execution of test cases robot framework reports are generated also with the integration of Jenkins those reports could be mailed automatically to the developer for them to realize and investigate the failing test cases. The complete process of integrating robot framework test cases in Jenkins pipeline make the complete software test process much effective and efficient.



QuickStart Report

Generated: 20201124 15:23:31 UTC+02:00
9 minutes 2 seconds ago

Summary Information

Status: 1 test failed
 Start Time: 20201124 15:23:30.312
 End Time: 20201124 15:23:31.116
 Elapsed Time: 00:00:09.904
 Log File: log.html

Test Statistics

All Tests	Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
database	1	1	0	0	00:00:00	1 / 0 / 0
example	4	3	1	0	00:00:01	3 / 1 / 0
quickstart	5	4	1	0	00:00:01	4 / 1 / 0
smoke	4	3	1	0	00:00:01	3 / 1 / 0
variables	1	1	0	0	00:00:00	1 / 0 / 0
QuickStart	5	4	1	0	00:00:01	4 / 1 / 0

Test Details

Search: Totals: Tags: Suites:

Suite:
 Test:
 Include:
 Exclude:

Search Clear Help

Fig-3: Robot Framework reports

Advantages of using robot framework is that everything is checked in an automated fashion and all reports are automatically generated and published on the web pages. This saves a lot of time making the complete process more efficient. Likewise, the Jenkins pipeline helps in Continuous Integration and Continuous deployment where the jobs could be built periodically. The cost of automating a test is measured by the number of manual tests prevented from running and the bugs it will therefore cause to miss and this is probably the biggest strength of using Robot Framework with Jenkins.

3. Why DevOps?

DevOps is an evolution of the agile movement. It basically involves efforts from different disciplines within an

organization which is done in a collaborative fashion for automating continuous delivery of new software versions without compromising in reliability as well as correctness. It is a set of practices that works to automate and integrate the processes between software developments and IT teams, so they can build, test and release software faster and more reliably.



Fig - 4: Development & Operations (DevOps)

DevOps allow both development and operation to go together hand in hand instead of dividing them into two different segments. This assists in improved collaboration and communication thus resulting in more stable operating environments as well as faster delivery of features. The developers instead of waiting till the end to deploy their code instead are able to deploy with every single change made in the code segment to check its efficiency and effectiveness. It gives the assurance that with every small change made that the software is able to perform what it is intended to perform. Needless to mention both Jenkins and robot framework aids in achieving the idea of DevOps. The Jenkins integrated with test cases written in robot framework gives a boon in achieving the practices of DevOps.

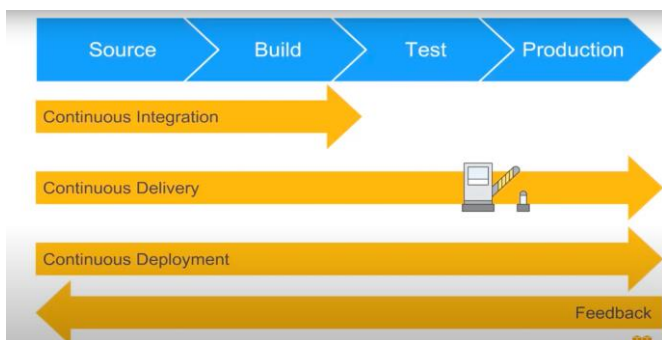


Fig - 5: DevOps leading to early feedback mechanism

4. Is automated testing really required?

Apart from the initial investments once the creation is complete automated testing could be achieved at a much faster rate also it could run over and over again without adding to its costs i.e. with no additional costs. There are several advantages of automated testing. A brief comparison

with manual testing taking various parameters into consideration is discussed in the table below:

Table -1: Manual Testing V/s Automated Testing

Information	Manual Testing	Automated Testing
Initial Investment	Lesser in manual testing	Comparatively more in automated testing.
Cumulative Cost saving	It requires additional cost in almost every cycle.	Apart from initial investment there is no additional cost
Test Efficiency	Less efficient and more time consuming	More efficient and less time consuming
Resources	Requires human resource in large numbers.	Instead of human resources. Tools made use of.
Test Coverage	Sufficient test coverage is difficult to ensure.	Covers greater amount of test also its easy to ensure.
Test Execution	QA testers do the test execution manually	Automation scripts and tools are used to do the test execution automatically.
Probability of errors	As it is done manually by humans it is more prone to errors	As tools and frameworks automate the complete task, it is less prone to errors.



Chart -1: Manual V/s Automated Testing

5. CONCLUSIONS

This paper provides the insights on integrating robot framework with Jenkins pipeline to allow the process of DevOps with all the benefits of automated testing. Benefits of using robot framework is that writing test cases follow natural working flow with test case precondition, action, verification and finally cleanup. Jenkins as a Continuous Integration and Continuous deployment server is a boon for automation. Test cases written in robot framework when integrated with Jenkins can lead to the widely used idea of DevOps. DevOps is a practice of having both development

and operation lie in the same segment of software lifecycle leading to early feedback and corrective measures. This not only generate reports of test cases but also notify the developer regarding any success or failure scenarios. The jobs in Jenkins pipeline can be built periodically leading to zero or no human intervention in the complete software testing process. This provides all the advantages of automated testing as discussed in this paper.

The cost of automating a test is measured by the no. of manual tests prevented from running and the bugs it will cause to miss and this is probably the biggest strength of this complete process of using Robot framework, Jenkins with the idea of DevOps.



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REFERENCES

- [1] Sikender Mohsienuddin Mohammad; 'Continuous Integration and automation', International Journal of Creative Research Thought (IJCRT), April 2020.
- [2] Arpitha R & Mrs. Kavitha S N, 'Automation Using Jenkins: Plugins, Test Design, Test Execution and Reporting,' Imperial Journal of Interdisciplinary Research (IJIR), 2017.
- [3] Neha S Batni; Jyoti Shetty; 'A Comprehensive Study on Automation using Robot Framework', International Journal of Science and Research (IJSR), July 2020.
- [4] M. N. Rakshith; Shivaprasad Nagappa; 'Build Optimization Using Jenkins,' Research Gate, January 2020.
- [5] Masahiro Terauchi; Kohei Watabe; Kenji Nakagawa; 'Model-Less Approach of Network Traffic for Accurate Packet Loss', IEEE 26th International Conference on Network Protocols (ICNP), 2018.
- [6] Anand Singh Gadwal; Dr. Lalji Prasad; 'Comparative review of the literature of automated testing tools', Research Gate, 2020.
- [7] Preeti Rai; Madhurima; Saru Dhir; Madhulika; Anchal Garg; 'A prologue of JENKINS with comparative scrutiny of various software integration tool', IEEE 2nd International Conference on Computing for Sustainable Global Development, 2015.
- [8] Monica; Sanket N Shettar; Survey on Robot Fraework, International Journal of Engineering Research & Technology, 2017.

BIOGRAPHIES



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