INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 7, Issue 3 - V7I3-1475)
Available online at: https://www.ijariit.com

Robot Automation Framework for Implementing and Developing the Requirements of Network Elements

Yashaswini H. R.
yashaswinihr.sit19@rvce.edu.in
R V College of Engineering, Bengaluru, Karnataka

Poornima Kulkarni
poornimapk@rvce.edu.in
R V College of Engineering, Bengaluru, Karnataka

ABSTRACT

Telecommunication industry is growing exponentially with the network elements and its operation. As a result, managing network elements and its behaviors has become a challenging task and even time consuming. Integrating and verifying the network elements manually requires more time and human efforts to perform, therefore to increase the efficiency and decrease the efforts, time and errors, robot automation can be used. In this paper, the process, usage and importance of robot automation for network elements is explained. This keyword driven framework is highly extensible with reusable keywords, simple library packages are available in both python and java. In the output of the process, a detailed report and log files are generated in XML format for easy understanding and analysis. These features of robot framework help in getting quick and efficient result. The primary integration process is performed in the NetAct application that can be used for monitoring, analyzing and managing the network element operation and functionality verifications in all the phases. In this context, summary of robot automation framework utilization for integrating and verifying different types of network elements is discussed.

Keywords— *Network elements, Integration, NetAct, Robot automation framework*

1. INTRODUCTION

Network management is playing a very important role in telecommunication industry. Nowadays mobile networks are more complex because of enhancing technologies like 2G,3G,4G,5G as network technologies are growing network functionalities, feature and number of network elements are also increasing. Integrating and maintaining of network elements is becoming more challenging and time consuming. To overcome this, automation can be used.

There are different ways of automation which are easily accessible and open source, however few are appropriate for black box testing. Many of accessible apparatuses are generally appropriate for the unit tests, functional verification and integration testing performed by the engineers. Automation testing are very modern and utilize existing or restrictive coding dialects. Efforts to mechanize existing manual tests into automation scripts by utilizing a coding language or the keywords to perform the task is the only minimal human effort or interaction required. But to perform the network operation first one should understand the process of telecommunication network and network elements and how it can be integrated and monitored using the NetAct application using robot automation framework. These are explained in detail in the further sections.

A. Telecommunication Network

A Telecommunications network is a gathering of hubs interconnected by links that are utilized to trade messages between the hubs. The connections may utilize an assortment of advancements dependent on the approaches of circuit exchanging, message exchanging, or bundle exchanging, to pass messages and signals.

Telecommunication management network framework is for developing the interconnectivity and communication for more systems and networks in telecommunication. It is for maintaining communication network of open systems based on OSI specifications in the recommendation series.

Telecommunication management network architecture as follows:

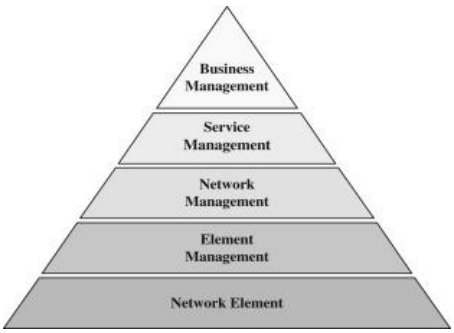

Figure 1: Telecommunication Management Network Architecture

© 2021, www.IJARIIT.com All Rights Reserved

Telecommunication management network architecture has mainly five layers: Network element, element management, network management, service management and business management. A network element is a logical unit of the telecommunication network which helps in performing functionalities in the network. Element management layer is the lower level of TMN architecture which is to manage the elements and operations of network elements.

The focus is on next layer which is network management. Network management has components like fault management where it manages the alarm handling of network element, trouble detection, log detection and respond to fault conditions. And next component is configuration management, it is to track and control which devices are on and off, inventory, backup and database system configuration management. And Accounting which is to monitor the resource usage for records and billings and service level agreement. Another component is performance management where it measures data collection and reports, data analysis and control traffic messages and overall performance monitoring. Next is security management it is for authentication and authorization of user and policy access control, network element access control and logs.

Then coming to next layer service management, helps in managing the services like monitoring, maintaining, ordering and problem handling. Next layer is business management layer it is the top most layer it is to manage the business and for customer interaction.

B. NetAct

Network development used in other applications is most of a straight forward approach which meets the requirements of local area network. But Nokia NetAct meets those difficulties because of the reality it is easily versatile, no longer least difficult would it be able to deal with developing innovation, however furthermore local area increments and adjustments in transporter providing.

NetAct is the platform which helps in integrating, managing and monitoring the network elements. NetAct gives the overall view of network elements and its functionalities. It provides non-stop, ongoing scenarios of network elements, giving assistance vendors more prominent perceivability into network circumstances at any factor on schedule too, answers the most vital requesting circumstances of both the customer side information about the integrated network element functionalities including configuring, monitoring and performance reporting with the northbound and southbound interfaces APIs and command line interface.

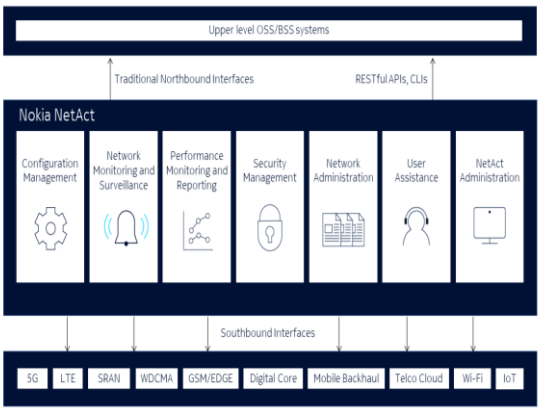

Figure 2: NetAct Architecture

As mentioned nokia NetAct has two bounds namely south bound interface and northbound interfaces as shown in the figure 2, where south bound consists of 5G, LTE, SRAN, WDCMA, GSM, tele cloud etc. which are communication to upper-level OSS to give the required functionality for nokia NetAct such as configuration management which includes common functionalities and process of upload and download of data, network monitoring and surveillance is used for detecting the faults in the network, performance monitoring and reporting is used to check the overall performance and generates the report, security management provides security for network, data etc., network administration is the main connection that manages the network and backup the features, user assistance is like giving descriptions and information's to the login user, NetAct administration helps in giving an overall view for monitoring and managing the network elements. In other words, NetAct can be used to integrate, verify and validate the network elements in the telecommunication network. To achieve this robot automation framework can be used.

2. ROBOT AUTOMATION FRAMEWORK

Robot Automation framework is an open-source automation and used mainly for acceptance level of testing. It has built-in keywords, behavior and data along with external plugins. This is a keyword driven software; it is implemented in both python and java. Robot Framework offers great help for outer libraries, apparatuses that are open source and can be utilized for computerization. The most famous library utilized with Robot Framework is Selenium Library used for web advancement and UI testing. It follows modular architecture and can prepare customizable reports.

Robot automation framework is a software released under apache license 2.0 and it is initially developed by Nokia in 2008. The main features of this are tabular format for test case, keywords, variables, libraries, resources, data driven test case, test case tagging, report and logs.

Robot automation framework architecture follows modular architecture flow. It is comprised of its bundled and self-made libraries. It comprises of data, robot framework, libraries, tools and target system as shown in figure 3.

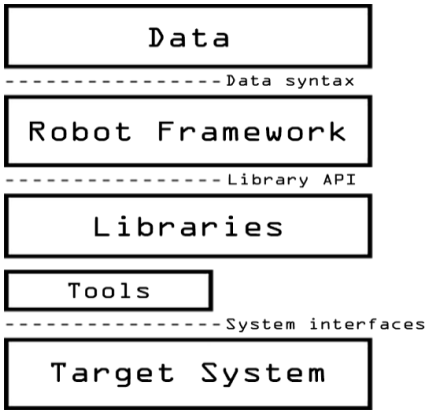

Figure 3: Robot Automation Framework Architecture

Data is defined according to the syntax in the form of files, it contains test scripts, suites and directories suited for the suites. Once data is ready it will send to the framework to process it and this framework works well with command line and uses the required libraries, keywords, tools and drivers to provide the output. The output is recorded or reported in logs in the HTML or XML formats.

© 2021, www.IJARIIT.com All Rights Reserved

3. METHODOLOGY

The NetAct integration for network element can be implemented completely through automation and even the adaptation of meta data, node creation and all the functionalities like fault management, configuration management, accountability, performance management and security management together called as FCAPS can be performed and verified through the robot automation.

The network element will be integrated to NetAct database for data uploading and downloading. The main focus of the NetAct will be on the service management layer and NetAct management layer, configuration management, alarm upload, performance management all gives overall report of network element and its operations. Therefore, the goal is to achieve the successful integration of network element and verification of all FCAPS functionalities through robot automation framework.

This approach will ease the problems, which is to make scripts that will give prompt compensation back. That is, make scripts that will not take a lot of time to execute and yet will successfully complete the required automation process. This clearly will save manual testing time consumption for execution and, more significant, by making the contents you will study the device's usefulness and figure out how to configuration stunningly better scripts. Since Robot Framework depends on keywords, furthermore, blend of keyword can frame another client approachable process script with the built-in or user defined resources.

The customized scripts should take care of all the dynamicity of the application. The scripts can be customized and be easily understandable. This robot framework is based on python, the script can be created efficiently by using the keywords that are either java based or python-based plugins which can be imported through built-in libraries, packages or resources or even a user can create his own keywords with required arguments. This justifies the statement of robot automation is a keyword driven framework.

The main libraries are SSH library which is basically used for connecting multiple different hosts to login or configuring, encoding as per the connection required. Next one is remote swing library is used for java application or java swing user interfaces. These library keywords are used for handling events with GUI components like buttons, checkboxes and text fields and keywords are documented in RIDE. Next one is Sikuli library, this can be used as an extending support for remote swing library to handle the operations of applications through automation. And other frequently used library is selenium to establish a particular session request and to execute and return the test case value by selenium server to robot framework.

In robot framework or RIDE test suit and test case creation are the important aspects of robot automation process to execute and perform the integration. Test suit is a collection of test cases that can be used in the software program. Any number of test cases can be batched according to the network element operations and even the test suites can be executed as a complete test plan by the help of tags. And test cases can also be executed parallelly and batch wise. Built-in libraries, user defined libraries, keywords and variables can be imported for a particular test suite creation in the RIDE. The pre-requisite and ending part of the execution can be saved as setup and teardown part or it can be stored in test case level too. The suite can be written either in robot format, HTML format or TSV format.

Test cases are the expectations of the results and comparison of actual result. It can be executed through RIDE GUI interface directly and through the command line execution. Using command line execution, continuous integration test case and verification can be easily automated as this robot framework is command line tool. After the complete execution of the test suite, a report in HTML format is generated with the statistics of the pass and failed test case. The statistics are categorized and given by the tag and suite along with the total stats and summary with the time stamp. Log files are generated with the detailed description of the input parameters, output parameters and keywords. For further more analysis XML output file is also generated. These detailed report and log file generated are very useful for analyzing and debugging the errors for the failed testcase as shown in figure 4 and 5.

Figure 4: Test suite report

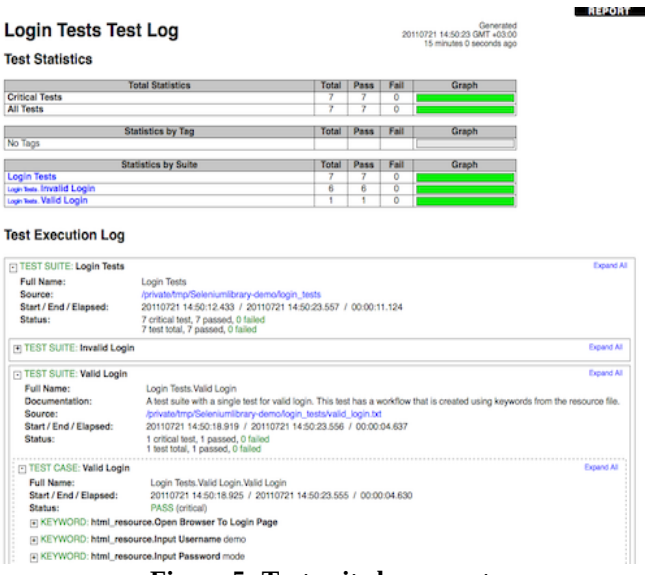

Figure 5: Test suite log report

4. CONCLUSION

To integrate and verify the network elements which is required for the functionalities of the telecommunication network, robot automation framework is used. It is highly reliable and feasible framework to write and verify the test cases. This framework is

© 2021, www.IJARIIT.com All Rights Reserved

keyword driven and also easy to implement because it follows the regular process of verification like writing test cases based on the situation, actions related to it, verification parameters and clearing the errors along with this it has easy library extensions and tool to use. Once test case is given, verification perform automatically and generates the report where it leads to less time consumption. The generated report and log files help in analysis and debugging the errors quickly. The cost of this also can be measured with the help of manual tests. Integration in the NetAct using robot framework reduces the human intervention time and efforts with good efficiency.

5. REFERENCES

[1] Poornachandra Tejasvi T M and K R Prakash "Automation of NetAct Integration using Robot Framework" 2019, IJERT publications.

[2] Godasu Swetha, T Ramaswamy and S P V Subha Rao "Automation of telecom networks by using Robot Framework" 2019, IJRTE publications.

[3] Mandara Nagendra, C N Chinnaswamy and Dr. T H Sreenivas "Robot Framework: A boon for Automation" 2018, ISSN publications.

[4] Hassan Ahmed and Ladislav Hudec "Role based Network Security model: A forward step towards Firewall Management" 2018.

[5] Bhuvaneshwari and Hemanth Kumar A R "Automation for configuration of Mobile networks using Robot framework 2017.

[6] Monica and Sanket N Shettar "Survey on Robot Framework" 2017, IJERT publications.

[7] Jiya Johnson and Aarathi Elizabeth Jai "Netact Based Test-Automation Framework Development for Ims Cmrepo" 2017 IEEE Publications.

[8] Shankar and Dr. Shantharam Nayak "Performance management in Network Management Sysem" 2013, IJSR publications.

[9] R Saji Kumar, J M Suri and IT division "eMS-NMS Architecture in Telecom Management Systems" 2013, Government of India.

[10] Nokia CUDO Documents.

[11] Stanislav Stresnjak and Zeljko Hocenski "Usage of Robot Framework in Automation of Functional Test Regression" 2011, ICSEA publications.

© 2021, www.IJARIIT.com All Rights Reserved