5G Registers UDM Product Performance Automation

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Abstract: To perform the efficient subscriber data management for the GSM and the IMS subscribers, the telecom operators must consolidate the data. The functionality of HSS is to perform as a central storage network element that contains the information about the subscriber data for given home network. Dimensioning of the HSS is to be as specified by the third-generation partnership project forum. It would be difficult to install repeatedly packages required for satisfying this criterion therefore automation comes to picture to reduce the serving time. Automating this procedure includes the depth knowledge of the manual procedures along with the knowledge of software agent tools required for the same. This paper gives a brief idea about how the automation of these installation or upgradation procedures for a server node of the home subscriber system can be achieved using appropriate tools.

Index Terms **- IMS-HSS, Jenkins, NETACT**

I. INTRODUCTION

The substantial development of technology in the field of wireless communication reflects in the increase of multitudinous of services. With the number of subscribers accessing these telecommunication services being expanded drastically over the past decade, the essential management of subscriber data crucial role to rate of growth. The initial drawback faced by telecom industry is the subscriber data management. Thus, a strategic data consolidation of the subscriber data is necessary which requires the knowledge of customer preferences for different services

HSS is basically a scalable approach of storing the information related to subscriber in a unified manner. The management of these networks including the 2G,3G and 4G individually would be a tedious task thus a solution for this would be centralized platform can be used for performing the managerial task related to the data which can be a server that automatically performs installation and upgradation for the hardware used as an HSS node.

Two phases in evolution of this solution would be formerly the partitioning of the hardware as in the front end and back end server and integrating it with the appropriate software tool that performs continuous integration of the Installation and the NETACT procedures would be the latter one. Considering the HP Hardware of CMS series, it provides the IMS related functions of the logical entity HSS as defined by the 3GPP.

IMS describes the predetermined specifications, thus provides a single network that qualifies packet switched and circuit switched network with the network elements like P-CGCF, S-CGCF, I-CGCF. Front end server and back-end server can communicate using suitable interface like LDAP. LDAP is a light weight client server protocol used for accessing directories supported by X.500. Back-end application server can be used optimally for the storage of the information related to the subscribers. services with the use of TCP/IP connection-oriented services. Front end service is to be designed in a manner that it qualifies the subscriber data including the Upgradation and deletion of the user profile data.it ensures the logical correlation between the provisioning system and the back-end application. This paper mainly focuses on reduction of serving time by automating the manual procedures involved in the server bring up as a part of the Front-end application server which forms the base operating system for the node.

The paper is formulated as follows Section II briefs about the concepts on IMS-HSS and the software tools that can be made use of, for the implementation of this scenario, Section III briefly describes about the methodology of how the continuous integration is achieved with the tools like Jenkins and the NETACT. Section IV gives the outline of Results along with the discussion on it Section V covers the Conclusion and the future work

II. CONCEPTS ON HOME SUBSCRIBER SYSTEM AND IP MULTIMEDIA SUBSYSTEM

A. IMS

IP Multimedia Subsystem is a functional framework related to the architecture to support the communication of Voice over Long-Term Evolution and the other multimedia service. It is based on Etsi standard like Session initiation Protocol for interface among architectural element. The IMS is having a layered architecture approach which results that transport service and communication in a network are separated. IMS was initially designed and owned by the 3rd Generation Partnership Project which is a wireless standard. IMS (IP Multimedia subsystem) is key feature in 3g architectural view which makes this possible to provide wireless cellular access to all the service that Internet is able to provide. This is considered as a connector between cellular network and public network. To meet the necessity of various multimedia and external service as well as interface. In this work it is characterized by empowering the access to remote servers by making the electronic advances such as assembly of ongoing administrator information, it is to be noted that because of this feature it provides a bland engineering for VOIP administrators. The IMS includes several functional elements which includes Call Session Control Functions. Home subscriber server. Media gateway control functions (MGCF), Broadcast Gateway Control Function (BGCF). Multimedia Resource Functions (MW) and Media Gateways (MG). This network intends to provide the circuit-switched network subscribers with services that is built and based on the Internet applications, services and protocols. The intention of IMS network is to provide convergence and access to various service such as data information, analog signals, messaging, video and ethernet related technologies to both fixed-line subscribers and wireless users in general so that growth whether with respect to services provided, quality of service results with the usage of enhanced telecommunication usage

Fig 1 Jenkins as an orchestrator tool

B. Home Subscriber System

The HSS is the part of 4G which contains details of subscription for providing support to the network entity which handles call/sessions. It also provides support for the call control server in order to complete the routing or the roaming procedures by solving authentication, authorization, naming or addressing resolution, location dependencies, etc. Along a side it also gives the information regarding the user security for mutual authentication, integrity check for communication and ciphering actions[3]. Depending on the collected user data information. the HSS support's the session and call management entities of the various domain and the subsystems of the operators. HSS is the super set of the 3G HLR, which extends its support to the PS related domain entities like such as sgsn and identifiers take the form of a SIP URL, because of which each subscriber will be identified as unique having different service profiles. The internal architecture of HSS system consists of the Legacy Application Subsystem and the Operation and maintenance Subsystems. LAS consist of Transaction Capability application protocols and Mobile application protocol modules of SS7 standard stack for establishing connection with PS/CS domain. It communicates to all other subsystem mainly Mobile application service subsystem for the generation and delivery of the IMS authentication information details. for the TPS, OMS consist of the transmission managing modules and the stack managing modules subsystem controlling. Message queue is nothing but the internal communication method for each subsystem. This offers protocol conversion from the internal communication method of each subsystem is the internal message queue method for the TCP/IP socket communications, which is the method to external OMP processor. from the perspective of service provision and the signalling protocol test the validation of the HSS functionalities plays a vital role. Thus, the testing environment is required for verifying the HSS system, that is the base system validation for the front-end server node which includes the Installation and Upgradation procedures.

III. PROPOSED WORK

This section briefs out about the formulation and proposed design required for the test environment including the discussion about the tools required. From the literature survey[4], it is observed that Dimensioning of HSS requires modelling of the system requirements so that the time required for this is efficiently decreased and its integration with Jenkins results in the expediency in creating the testing environment for the HSS.

A. Overview of JENKINS

Jenkins is an Open Source (OSS) Continuous Integration Platform, which has been dedicated to the automation of the build and test processes as a preliminary goal. Java language is used for the build system completely and which is easily flexible. With the internal use of its plugins structure and the extension points as used as the object model. These make uses of Jenkins as a highly customizable and flexible tool, with the ability of covering many possible scenarios and requirements, thousands of plugins are being developed by its huge Open-Source Jenkins Community. Fig 1 narrates the Jenkins as orchestrator tool, Jenkins community people build the jenkins infrastructure orchestrated by Puppet and Jenkins with a goal of continous delivery pipeline. Continues integration would bring a revolutionary change the telecom industries view with respect to the Build Managaement, Deployment Automation, and Test orchestration. Using CI as a automation tool in the development phase of the QA would enhance the delivery process providing a graphical visualisation to monitor the different steps with their aggregated view along with the execution of the pipeline observing the results of the execution.

B. NETACT system analysis

NETACT is a single system used functions like for configuring, measuring and monitoring the services and network. For future network technologies it provides an Open and well documented bridge of communication for the additions of new technology and the emerging open source software applications. With the increase in scalability and versatility to handle technology lifecycle requirements along with its growth of network and services, and to adopt NetAct. In order to meet the business processes requirement, it is accompanied by customer specific extension. It also supports shelve integration and Extensive multi-vendor integration capability, for more than 60 different versions third-party network elements. Through the process of selection and measurement and correction of work, quality control can be maintained. In integration type of testing the preliminary type of testing is the software testing [1]. These product is a main innovation of Nokia networks and solutions, which is widely used in the telco market because of its efficient usage of storage. with the help of cloud structures, it provides the repository for the back-end servers. For these reasons NetAct answers most of the major challenges with the increase in the use of data storage access, data scrutiny and its delivery to the users. It is also has very user-friendly interface which in turn provides the flexibility to the software tool.

This paper discusses the approach of installation and upgradation procedure, by performing an automated continuous delivery for the node bring up for the HSS application using tools like the Jenkins and the NetAct. Python being a growing language for the automated test suite scripting, one can use python for the creation of the test suite framework.

C. Design

This work focuses on providing a layered architectural framework of the installation and Upgradation with the help of virtualized environments initially. For the base platform installation some of the virtual tool boxes are Vbox, VMware. This framework makes use of Vbox for performing the base installation processes along with meeting the standardization of Telco cloud which includes Decouple equipment with programming from virtual system capacity administration layer. The Key functionalities of this layer are the Service and the Network Orchestrators which ensures the VNF chief capabilities. This VNF is handled by the cloud application manager, this cloud application manager ensures the Versatility in the administration of the NetAct ,and as well as described in section II. After the successful base installation upon this structured storage repository applications like HSS are installed. The IMS cloud architecture ensures separating of application from the fundamental equipment that is the platform so that storage system is protected even though installation of application fails along with which it ensures that the application can be shifted to other concurrent platforms as well.

The design is formulated as shown in the fig 2. This flowchart gives an overview of the methodology involved in performing the automated continuous integration for the server node bring up by developing the test suite as discussed below. Firstly, the latest packets that is required for the base application installation is downloaded using the centralized repository that is the telco cloud that will have the database of the predefined packets according to the 3GPP specifications. Next step would be the automation if the manual procedures that is being followed for the installation and running the test suite. This automation includes the hotfix installations as well, then running this suite via the Jenkins to provide continuous delivery system and then integrating it with the NetAct. It includes steps as follows,

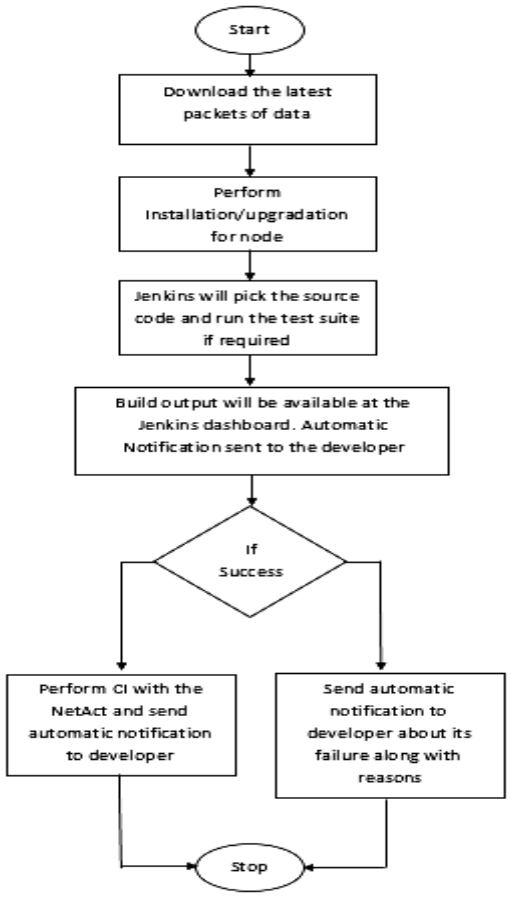

Fig 2. Flowchart demonstrating the methodology

Step1: Downloading the latest packets required for the server node to be established that is the HSS application.

Step2: Perform Installation or upgradation of the Hardware associated with the node server for the appropriate version of it.

Step3: Run the test suite with the Jenkin tool by creating a job along with the necessary plugins required for the test environment to build the project by selecting the appropriate source code

Step4: As a result, from Jenkins, build output will be available at the Jenkins dashboard, user can either login to their dashboard to check the results or send automatic notification for the completion of the jobs triggered.

Step5: Monitor the result status of the Jenkins and if it successful send the mail to the administrator stating the status and perform the continuous integration with the NetAct to update the dynamic allocation of the server node notifying the Upgradation of the version of the base operating system. Validating the test suite is done by sending mail to the administrator with the details of the installation, packets used and the status of CI.

IV. RESULTS AND DISCUSSION

Table 4.1 shows a sample of serving time comparison, which includes the platform installation and the HSS application installation for a single type of version of HP CMS series hardware. Fig 3 gives a brief description of how this is monitored, with the creation of different jobs in Jenkins as a part of test environment. Fig 4 shows the view of the different test case scenario being executed simultaneously as a pipeline which represents the continuous integration feature of the Jenkins and its delivery using the NetAct tool. It is to be noted that application installed using this framework provide high accessibility to the HSS not by the means of geographic repetition, it makes use of the coordinated safe guard convention stacks. This enables the application to be used to the fullest in terms of message exchange handling and the subscriber organization in the subscriber repository.

Fig 3. Jenkins output console

A Manual testing pass percentage will be little higher than automation testing as the testing is done with very little data than the automation testing, the failure in manual testing was percentage was approx. 20%. In Modular we were able to find out few testcase fails and it was little higher manual testing i.e., approx. 40%. In Hybrid Modular Approach the failure percentage is very higher than the modular approach which is approximated between 70% - 80%.

Table 4.1: User time comparison

Serving time		
HSS APPLICATION	**Manual time**	**Automated**
Platform installtion	100 minutes	32 minutes
HSS application	240 minutes	70 minutes

Fig 4. Jenkins dashboard

V. CONCLUSION AND FUTURE WORK

In this Project, with results observed in the real time scenario we can understand how 3GPP in telecommunication is vital for the release and as well as the evaluation of public network that is the Internet and other data network, Telecom initially has been known for the word telephone. Without this telecommunication, world cannot be imagined, people to communicate at any distance by voice. The ability to evaluate real time characteristics of the prototype is measured with the reduction of serving time. Problems or error identified in components that is made use of for the testing scenarios, third-party tools and the prototype are identified as future enhancements.

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