Cloud Computing and NFV Fundamentals

– A Tester's Perspective

INTERNSHIP PROJECT

REPORT

Submitted by

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ABSTRACT

Cloud computing is an emerging technology used for effective networking and a means for storing and accessing data and programs over the Internet instead of your computer's hard drive. It is also called as on-demand computing since it provides shared processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. Network functions virtualization (**NFV**) is an initiative to virtualize the network services that are now being carried out by proprietary, dedicated hardware. If successful, **NFV** will decrease the amount of proprietary hardware that's needed to launch and operate network services.

OpenStack is a free and open-source software platform for cloud computing, mostly deployed as an Infrastructure-as-a-Service (IaaS). The software platform consists of interrelated components that control hardware pools of processing, storage, and networking resources throughout a datacenter. The basic methodology used here is to create and deploy VMs in a secured manner on a network topology. Users either manage it through a web-based dashboard, through command-line tools or through a RESTful API.

. **Business analytics** (BA) is the practice of iterative, methodical exploration of an organization's data, with an emphasis on statistical analysis. **Business analytics** is used by companies committed to data-driven decision-making. Patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software.

Data analytics is the process of examining large and varied data sets -- to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful information that can help organizations make more-informed business decisions.

Automated testing tools are capable of executing tests, reporting outcomes and comparing results with earlier test runs. Tests carried out with these tools can be run repeatedly, at any time of day. The method or process being used to implement automation is called a test automation framework.

Performance Testing is a type of testing to ensure software applications will perform well under their expected workload. Features and Functionality supported by a software system is not the only concern. A software application's performance like its response time, reliability, resource usage and scalability do matter. The goal of Performance Testing is not to find bugs but to eliminate performance bottlenecks.

Cloud Computing

Objectives:

- Cloud computing: Basic Terminologies
- SaaS, PaaS & IaaS
- Public, private and hybrid cloud
- OpenStack Fundamentals
  - Introduction
  - Overview of Components :
    - NOVA(Compute)
    - CINDER(Block Storage)
    - GLANCE(Image Service)
    - NEUTRON(Networking)
    - HORIZON(Dashboard)
    - HEAT(Orchestration)
  - Various Deployment Models
  - OpenStack MIRANTIS
- Ericsson Cloud Manager (ECM)
- Network Function Virtualization (NFV)

Key Learnings and outcomes:

Cloud Computing and its evolution from the conventional on-premise Sever has been understood. Different type of cloud offerings based on nature of service like SaaS, PaaS, IaaS and based on the type of resource pooling i.e. Public, Private and Hybrid. Terminologies like Tenants, Availability Zones and Cloud Bursting were clarified and understood. Introduction to OpenStack along with its components was given and various deployment models were studied. Further, the importance of open source software and along with a contribution by Ericsson was explained. A Demo on the workflow of an order in Ericsson Cloud Manager was given. Execution of test cases associated with a live project that involves the above-mentioned components was explained and studied. A hands-on session regarding the complete Lifecycle of NFV (Instantiation to Termination) was given.

Outcomes:

Successfully Completed '**CloudU Certification'** offered by Rackspace

Tableau: Data Visualization tool

Objectives:

- Business Intelligence
- Data Visualization: Necessity and Importance
- Coursera Course: Fundamentals of Visualization with Tableau
- Report Preparation From Business Perspective
- Proof of Concept(POC's): (Internal Work)

Key Learnings:

Business Intelligence is essentially timely, accurate, high-value, and actionable business insights and the work processes and technologies used to obtain them. Visualization of data will help in better understanding and correct decision-making process in all organizations. It is user-friendly and gives the results very quickly than other tools. Tableau is for anyone who wants to tell stories with interactive data on the web With Tableau Public we can create amazing interactive visuals and publish them quickly, without the help of any programmers or IT professionals. Tableau has optimized direct connections for high-performance databases, cloud data source and Hadoop. It enables you to work with your data directly to create reports, dashboards and stories. With the in-memory analytical engine, Tableau lets you connect to live data. It boosts the productivity of the managers to understand and analyze the reports and help them gain sales and market intelligence. Coursera course "Fundamentals of Visualization with Tableau" helped us to understand the workflow of the tool and get started to develop trivial reports using sample data sources shared in the course.

Outcomes:

Hands-on Experience: Generating reports to visualize the performance of the testing team based on the extracts from given Rally Database.

Introduction to Analytics

Objectives:

- Probability Theory: Fundamentals
- Introduction to Statistics
- Regression and Classification Problem
- Introduction to R Programming
- Commonly used Syntax
- Data Preprocessing: Significance

Key Learnings:

Data analytics examines large amounts of data to uncover hidden patterns, correlations and other insights. With today's technology, it's possible to analyze your data and get answers from it almost immediately – an effort that's slower and less efficient with more traditional business intelligence solutions. With Cost reduction and Faster/ better decision making it is possible to launch new products and services. Topics like Bayes Theorem, Mean, Variance, Various Distributions, Regression Problem, Classification Problem and other fundamental concepts were learned. Introduction R Language – Explained basic usage of commonly used to syntaxes along with use cases. A sample demo with a real-world dataset was given and the process data cleaning/preprocessing was explained in great detail along with its significance. It was made clear that data cleaning is mandatory and drastically affects the performance of the model developed.

Outcomes:

The significance of analytics in Business was understood and various use cases were explored. Got Hands-on experience, working on toy datasets with R programming exercises.

Fundamentals of Software Testing

Objectives:

- Software Testing- Introduction
- Fundamental Principles of Testing
- Software/System Development Life Cycle (SDLC)
- Software Testing Life Cycle (STLC)
- Waterfall Model
- V- Model

Key Learnings:

Software testing is an activity to check whether the actual results match the expected results and to ensure that the software system is Defect-free. Typically Testing is classified into three categories namely Functional Testing, Non-Functional Testing or Performance Testing and Maintenance (Regression and Maintenance). Various stages of SDLC and STLC was studied with examples. The V model of testing was developed where for every phase, in the Development life cycle there is a corresponding Testing phase. The left side of the model is Software Development Life Cycle – SDLC and right side of the model is Software Test Life Cycle – STLC. Waterfall model is a sequential model divided into different phases of software development activity. Each stage is designed for performing the specific activity during SDLC phase. Testing phase in waterfall model starts only after implementation of the system is done. Testing is done within the SDLC. Testing in V-model is done in parallel to SDLC stage.

SDLC: Sequence of activities carried out by Developers to design and develop high-quality software.

STLC: Consists of series of activities carried out by Testers methodologically to test your software product

Outcomes:

Understood the basic workflow of software testing and commonly followed testing models.

Automation Testing: Training

Objectives:

- Basics of Robot Framework.
- Libraries in Robot Framework.
- Reports & Logs
- Basics of Xpath.
- Excel Sheet Integration
- Bulk Data Creation
- Custom Library and Keywords

Key Learnings:

Robot Framework is a generic test automation framework for acceptance testing and acceptance test-driven development. Its testing capabilities can be extended by test libraries implemented either with Python or Java, and users can create new higher-level keywords from existing ones using the same syntax that is used for creating test cases.

Commonly Used Libraries:

Builtin, StringSceenshot, DateTime, OperatingSystem, HTTPLibrary, Selenium2Library, SwingLibrary, DatabaseLibrary, AutoItLibrary, SSHLibrary,

Tasks like Excel Sheet Integration, How to use/develop custom libraries, Bulk Data Creation and Using Robot Framework for API Testing(SOAP & Restful web services) was explained in great detail and assignments followed by the training was given to get hands-on experience of the same.

Outcomes:

Understood the workflow, Design Etiquette followed for projects and process involved in setting up the tool. Further, I have gained expertise to develop automation script when the test case is given.

Performance Testing: Training

Objectives:

- Performance Testing concept and architecture
- Introduction – Load runner & Its components
- Vuser Basics and Script recording concepts & Practice
- Parameterization Concepts in Vuser Scripting & Practice
- Correlation in Vuser Recording & Practice
- Controller - Script Sanity & Executions with Practice
- Controller - Load Test Execution Continue With Practice

Key Learnings:

Performance testing, a non-functional testing technique performed to determine the system parameters in terms of responsiveness and stability under various workload. Performance testing measures the quality attributes of the system, such as scalability, reliability and resource usage. Different types of Performance Testing:

Load testing - It is the simplest form of testing conducted to understand the behavior of the system under a specific load

Stress testing - It is performed to find the upper limit capacity of the system and also to determine how the system performs if the current load goes well above the expected maximum.

Spike testing - Spike testing is performed by increasing the number of users suddenly by a very large amount and measuring the performance of the system.

HP LoadRunner - is the most popular performance testing tools on the market today. This tool is capable of simulating hundreds of thousands of users, putting applications under real life loads to determine their behavior under expected loads. LoadRunner features a virtual user generator which simulates the actions of live human users.

Outcomes:

Hands-on Experience in parameterization and correlation of dynamic values. Understood various performance testing scenarios and associated parameters that are monitored.

Conclusion

After the completion of the sequence of trainings, it was very clear that the world of technology has advanced rapidly since the past decade. My perception about the testing domain has changed significantly as my exposure and knowledge has widened after completion of training that I took. The hands-on trainings and Knowledge Transfer Sessions gave an overview of multiple verticals in testing domain which will give me a head start to adapt to future opportunities. I am grateful to have worked with some brilliant trainers, spending their valuable time for Knowledge transfer sessions.