# SUMMARY

# Study, Analysis and Design of Adaptive Software Algorithms For Applied Automated System Development and Testing Patterns in The Area of High Performance Run Time Dynamic Storage in Network Cloud Environment

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| \* Vikas Kumar Choudhary  (Research Scholar) | \*\* Dr. Dilendra Hiran  \*\* Prof. Sanjay Chaudhary  (Supervisors) |

Adaptive Lifecycle Management is a structured methodology geared toward ensuring successful implementation of automated testing. The ALM approach mirrors the benefits of modern rapid application development efforts, where such efforts engage the user early in the development cycle. The user of the software product is actively involved throughout analysis, design, development, and test of each software build, which is delivered in an incremental fashion may be called as beta versions.

Many organizations have adopted the ALM. Many companies have adopted the ALM as their company standard for automated software testing. Others believe that industry automated tool vendors will soon be incorporating the ALM’s structured methodology within their tools. Instead of performing the entire test lifecycle haphazardly, software managers will use an ALM-compliant test tool that automatically supports (and possibly enforces) the ALM's sound building-block approach to the test effort. In ALM, we need to finalize the decision to automation and expectations from the automated testing. But before that a significant automated plan should be generated and test tool should be selected in such a way that one tool should fit for most of the requirements. These should be concrete benefit of selecting and working with automated tools.

There should be proper use of adaptive test automation design patterns while doing automated testing. It includes Adaptive Life Cyclewhich is made of following steps (*speculate*, *collaborate*, and *learn*). As An adaptive software test and development approach is based on observation, so it is best-suited for projects with uncertainty and focuses should be on the rapid creation and evolution of software systems. Complex Adaptive System Theory which talks about differences of behavior, style, and culture with Management Techniques, Strategies and Understanding of adaptive software.There are two perspective of Adaptive Software Development (ASD): Conceptual perspective and Practical Perspective. CAS concept also talks about emergence, complexity and quality. RAD practices includes characteristics, those are mission-focused, feature-based, iterative, time boxed, risk driven and change tolerant. Adaptive management policies also works as passive and active adaptive management mode.

Almost all of the modern cloud or API applications are developed in the new micro-services architecture, there are certain factors or requirements the application should closely adhere to make sure it is cloud ready or can be used to easily expand and change services/behaviours as per market demand. These standards help us achieve applications to be in sync with the cloud computing definition from NISTas closely as possible to be used and deployed on a cloud infrastructure.

There been study of cloud storage networks, which is of mainly of software as a service and platform as a service, and infrastructure as a service. Storage devices are categorized as Primary and Secondary storage device, which is further divided in Magnetic, Optical and Flash storage devices. As there are different types of storage hence it is necessary to have particular usages. So in data centres, storage devices with larger capacity should be used. Those may be direct attached, networked attached or storage area network, based on storage and networking protocols. But now a days most importantly cloud based file storage is used frequently.

In dynamic storage we need to first know about storage protocols for high speed data transfer, includes SCSI,FC, CIFS, NFS and HTTP/S. Storage networking protocols includes iSCSI, FCoE, and TCP/IP stack. Now a days Storage Virtualization technologies are being used mainly in cloud computing.

There are some tools and technologies available to achieve results on Run Time Dynamic Adaptive Automation Testing (RTDDA). These tools are mainly divided in two categories Free/Open Source Tools and Commercial Tools. There are some tools used for cross platform testing, Hence in the list of many tools there should be strategy to choose right tools on the basis of Market research, Experts View and Personal Experience. Sometime if required tools may be developed in-house.

After doing thorough study of tools which are used to automate the process and Test the application in run time dynamic adaptive environment. The most important is Selenium, which supports doing Web Automation by using Java, Python, C# and Other Scripting Languages.

JMeter is most commonly used Tool to Bench Mark Web Performance Testing. Junit and TestNG are Unit Test Automation Frameworks. Hence it completes the ecosystem from Unit Test Automation to functional test automation and then Performance Testing Automation.

A Practical implementation of Adaptive automation system by setting up Automated Build System with Continuous Integration and Continuous delivery is demonstrated using setting up (deploying) Free/Open source Software (Jenkins) over cloud for accomplishing multiple tasks such as triggering software build as soon as check-ins made in repo, or then running unit tests, Code Coverage and Static Code Analysis and parsing code for bugs, running integration tests etc. As there are many plugins freely available, if configured properly it encompasses (approaches to) adaptive learning as per environment and schedule.

As Jenkins takes care of automating task from Code Check-ins into repository to Unit Test, Code Coverage, Code Analysis, Build, Generates Reports, and does Code Integration with Delivery. Hence it’s an end to end solution and by using intelligent Plugins and using scripts process can be made continuously better and better. And here everything happens over cloud server irrespective of geographical location. This whole system can be configured in one Master and multiple Slave Nodes to get better performance in forms of distributed computing.

This research continue demonstrating patterns used in adaptive automation testing. It includes continuously Learning, Speculate and Collaborate, Spiral model have Plan, Build and Revise continuously. It can be understood with Complex Adaptive Systems Theory. It includes Adaptive Software Development with conceptual perspective and particle perspective. CAS has concepts of Emergence, Complexity and Quality.

Rapid Application Development can be used for adaptive development because it’s iterative, time boxed and change tolerant.

Adaptive S/W development management has polices namely Passive and Active Management and Leadership-Collaboration Management. Adaptive Automation Testing have some patterns named as Data Patterns, Technical Patterns, Proxy Patterns, Business Patterns, Page Object Patterns, Façade Patterns, Factory Patterns, and Singleton Patterns.

A study of Adaptive Algorithm is done used to develop adaptive software algorithms and tools mainly categorized in Heuristic Strategy and Fuzzy Logic and concluded.

This research worked on broad area of automation but focus is adaptive automation for High Speed Storage and that itself should be in dynamic, run time environment. This is possible with the algorithms able to work in environment in High Performance and High Speed but sufficient transportation of data storage should be there.

Present era is an era of information and vast information is lying over servers worldwide. This information is accessed using various Internetworking technologies, protocols and search engines.

Here the nature is always dynamic and processing of information is done on need basis. This all information is managed with various data centres. Hence every Big organization manages and runs Data Centres where high speed storage networking protocols are used. Then this information is travels over Internet using TCP/IP stack and application Layer protocols mainly in a secure manners. This research opens the scope of study of secure data storage, access and transfer in cloud network, i.e. the uses of https (Transport Level Security), and various cryptography and security algorithms.

Hence this research can be taken further with other areas of Information Security, Cyber Intelligence and Solutions and Neural networks and Artificial Intelligence Solutions. Where data is processed dynamically to conclude decision at run time. Hence this research plays a significant role in added technologies.

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