**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**

**Submitted for the Award of the Ph. D. degree of**

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**Acknowledgement**

**Abstract**

Adaptive automation refers to process in which both the user and the system can initiate changes in the level of automation. The first adaptive automation systems were implemented in associate systems based on models of user’s behaviour and workload. Recently, however, systems have been developed that follow the neural networks approach and use Artificial Intelligence measures to trigger changes in the state of automation. Studies suggested that this approach can facilitate user performance. Further, evidence is beginning to show that people not only think of adaptive systems as co-workers, they may even *expect* them to behave like humans.

Adaptive automation creates new challenges for both users and designers that go beyond traditional ideas of human-computer interaction and system design in run time dynamic network storage cloud.

In this research work implementation of adaptive automation, I will be discussed first with Adaptive Strategies with example of adaptive automation systems having different workload.

There is a discussion about Human computer Etiquette, where human and computer have different behaviour strategies, hence human should be careful while dealing with computers while doing automation.

Adaptive automation may be of different types in different kind of environments. This paper will discuss about managing adaptive automation in dynamic storage cloud. If there are multiple device involved then Emulated Software can be used for Cross Device Testing Automation.

To work adaptive automation in storage network, need to know about Fundamental Adaptive Storage Networks, about Adaptive network vision which includes Programmable Infrastructure, Analytics and Intelligence and third, Software control and automation.

Then discussion about data storage networks solves present challenges, uses of adaptive storage networks, solutions, open networking and strategic partnership.

Next will see adaptive interface to scalable cloud storage

To know and proceed further with adaptive automation, need to know about adaptive life cycle management, which have mainly six phases comprises of first, Decision of Automation involves expectation, QA, CI/CD and management support, then second decision to acquire automation tools, thereafter automation tools acquisition. Then, third automation introduction process about process analysis for fitting tools at right place. Fourth phase talks about Automation Planning, Automation Design, and Automation Development in Technical Environment, Phase five details about execution and management of automation and last phase talks about Review and Assessment of automation implementation.

Then will describing about automation artifacts includes code base, dependencies, configuration, Backup, Software Build, Run and Release, different processes, handling concurrency and administration and Log monitoring.

As the environment for considering adaptive automation is Storage Cloud Networks so need to understand about cloud computing and Storage fundamentals, Will see types and definition of storage devices (magnetic, flash, optical, online cloud and paper) their need, storage location, capacity and common problems encountered with storage devices.

Further storage networks are of two types, Direct Attached Storage and Network Attached Storage, will highlight about their uses cases, categories, security issues, future outlook and trends and their convergence.

To understand the storage network, distinction between storage protocols and storage network protocol need to be understood. Storage Protocols includes SCSI, FC, CIFS, NFS and HTTP. These protocols defines formation and storing data. Storage Networking Protocols includes iSCSI and FCoE, defines the way of transferring data over the IP or Ethernet based networks.

Storage virtualization plays an important role to achieve dynamic storage and further adaptive automation, there are two basic methods of Storage Virtualization, file based and Block Based. Virtualization methods are of three types, Host Based, Array Based and Network Based.

Now will check implementation of Storage Protocols, Storage Networks Protocols and Storage Virtualization with respect to Cloud Storage. With respecting to cloud computing will check definition of Software as a Service, Platform as a Service, Infrastructure as a Service and Database as a Service. Thereafter access methods (data transfer) of cloud storage are discussed using Web Service API, File Based Protocols (NFS, CIFS, FTP). Cloud storage will have some advantage over conventional storage systems.

There are some misconceptions about development cloud (Private Cloud) within organizations about its usages and relations of other environments and promotion to higher environments as per the internal policies of organization, concerns regarding to security and access and support and role of administrative group.

There are different ways of hosting shared services in Development cloud. Cloud services are delivered on-premise and off-premise.

Cloud service models and cloud deployment models (public, private, community and hybrid) have some security risks with respect to data, regulatory compliance, and Law, Vulnerability, Access, Identity and Infrastructure management. Also other expect of cloud computing, benefits of cloud computing in organization.

Cloud computing evaluation whether it can be dedicated, virtualized Internal, External and Hybrid Cloud. Implementation strategy and Initiatives also mentioned.

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.

This research continue demonstrating some 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 have 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.

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.

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

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