Chapter VII

Review of Literature on Adaptive (Dynamic, Run Time) Automated Software Applications with Cloud and Networked Storage.

# **Keywords**

Cloud Computing, Cloud Services, Cloud Network, Cloud Database, Cloud Management, Storage Devices, Data Storage, Adaptive Automation, Adaptive Automation, Real Time Systems, Run Time, Dynamic,

# **Introduction**

Before Cloud, There was a boom on Database applications. But Cloud not only grows rapidly but also developed with variety of applications and services like Platform, Services and Products.

In this chapter, a review of literature is discussed in order to provide a theoretical background and to develop an understanding of the significance and role of Adaptive Automation of Software Applications in cloud,

The focus should be confidentiality integrity and availability of data in cloud. This study aims at presenting a broad introduction to cloud computing, Applications Development and Automated Testing challenges and opportunities in cloud.

It also tracks the background of cloud computing by surveying the main technological spreads that significantly contributed to the advent of this evolving technology, with the objective of clarifying the misperception over the “innovative or evolutionary” cloud computing technology. In addition, this chapter presents review of the research work.

Cloud services deployment models and related topics are dominating the IT landscape.

Many organizations actively addressing these deployment models and has developed an approach to enable to leverage them in a consistent manner to meet business needs.

Before delving into the cloud services deployment models and their security considerations a

Distinction must be made between cloud services offered by Cloud service providers and those offered by third parties.

Web-based network management revolving about database puts forward a feasible mode for network information processing and has the characteristics of wide distribution, full interactivity, real-time dynamic and so on in the application; and is beneficial to timely adjustment for network performance and rapid recovery for fault.

For this purpose cloud management system plays important role. Cloud Computing is a general term used to describe a network based computing over the Internet. Cloud Computing is basically a step up from Utility Computing and much more includes collection/group of integrated and networked hardware, software and Internet infrastructure (called a platform), Using the Internet for communication and transport provides hardware, software and networking services to clients. These platforms hide the complexity and details of the underlying infrastructure from users and applications by providing very simple graphical interface or API (Applications Programming Interface). The cloud is used as a storage location can be accessed and computed from anywhere. The large number of web application makes the use of distributed storage solution in order to scale up.

There are some important literature and views on Cloud computing from different authors and researchers:

National Institute of Standards and Technology (NIST) defines the Cloud as follows:

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

Most of the organization uses the definition provided by NIST (National Institute of Standards and Technology) which can be found here: <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>

Elbaum et.al reported that in regression testing feedback may play positive or negative role in test case prioritization. Do et.al presented an empirical study on assessing the ability of prioritization techniques to improve the rate of fault detection of test case prioritization techniques, measured relative to mutation faults in. The major difference between this work and other test case prioritization techniques is the prioritization is carried out on-the-fly as testing proceeds, which means testing history information is collected and used for future decision making. Other related studies include defect removal and its impact on software testing. Okamura proposed a new reliability estimation method that considers defect removal. This study presents a rigorous model for the defect removal process and its impact to the software under test, and developed the according methodology for testing and parameter estimation.

# **Importance of proposed Investigation**

The problems in building systems that must exhibit robustness to a changing environment; embedding significant COTS/Community Sourced independently evolving components; problems building systems that involve user scripting and ‘plug-ability’.

In proposed design the researcher will study to evaluate and estimation of the run time dynamic network characteristics and behavioural changes occurred due to applications fine tuning its network resources on server platform due to various reasons.

Here the importance is make and work the system using one interface application adaptive to environment so that the estimation matrix database from testing environment can be exported to the automated testing tool work on adaptive methodology and adaptive approach and same can be applied to change test strategies to finalize inputs of the network component under test (network node, NIC, HBA, etc..) With respect to the run time characteristics obtained thorough feedback mechanism.

There are various plugs and play hardware devices i.e. USB devices. Same way there should be plug and play software systems and it is possible only if software is designed on adaptive patterns. The current proposed investigation will try to find out how the adaptive patterns be implemented in automated software systems. In short, problems building the sort of systems we are called on to construct all the time.

We need to develop engineering models and methods for assembling software systems that can dynamically adapt to context and can ‘account for themselves’. Here the Software development is no longer garage ‘design and make’. Most software products and services are embedded in a network of complex inter-product and inter-supplier dependencies. Software is the result of the operation of a 'supply chain' that must be designed and forms part of an 'ecosystem' that must be accommodated. Rethinking software production requires a new discipline of business model and software system co-design.

Therefore Importance of adaptive system varies on the basis of application and environment and it will come with design algorithm and methodologies and code base libraries of adaptive nature intelligent enough to understand their execution environment and input from the user so that program simulate itself as per the nature of (storage networking) protocol, High Performance Networking Systems and can give adequate result/throughput for high performance storage and control systems.

## Following problem sources put force on importance of proposed investigation

* Improper Analysis: happens mostly due to miss-communication between end-users and system analysts.
* Inconsistent System Requirements Specification of automated applications.
* Incomplete or Obsolete or Ambiguous Design of automated Systems.
* Incomplete, Inconsistent Automated Test Plan.
* Improper Feature, Load Tests.
* Continuously changing run time dynamic networking environment.

# **Scope of the proposed study/research**

Due to complexities in modern high performance computing and high performance storage networking systems because of using multi-layered protocol for data transfer on high speed (e.g. Fiber Optics, Ethernet) medium, becoming more complex over the years. As a result there has been as need for automation of functions to cope with this increased complexity. Although several recommendations have been made to develop some sort of automation frameworks and thereby using of various programming techniques for developing automated programs those can be used across platforms.

These techniques has started in use with some new human factors issues and concerns, for example, the ability to intervene effectively when an automated subsystem fails is one of the key issues in automated control systems. Other difficulties that operators of automated systems may face include loss of system awareness and manual skills degradation. These kinds of problems may be characteristic of complex systems in which automation is implemented in a fixed or "static" manner.

In contrast, systems in which automated aids are implemented dynamically, in response to changing task demands on the operator, may be less vulnerable to such problems. It has been proposed that systems with adaptive automation are superior to conventional automation because they provide for regulation of user workload and vigilance, maintenance of skill levels, and task involvement.

Adaptive automation has been proposed as a means for further increasing the number and flexibility of levels of automation in the high performance networked systems. One outcome of this concept is that the adaptive system could select its own level of automation, depending upon the operating environment and system performance. The feasibility of this approach and its impact on operator and system performance is poorly understood. At present, the only consensus in the design of adaptive automation systems seems to be that the philosophy of the user's role in the system will be critical.

Typically, it is argued that the user must interact with the automation as a control system, and as such provides consent to the level of automation assumed by the system. For adaptive automation to work, the system must utilize an accurate operator-state classifier for the real-time assessment. Operator state classifiers, such as discriminate analysis and artificial neural networks.

How an accuracy of 70% to 85% in real-time? An important part to properly implementing adaptive automation is figuring out how big a workload needs to be to require intervention. There has been various effect/essence of Adaptive Automated Testing Tools and Test Strategies in run time dynamic network testing environment. This proposed investigation does critical Study and performance/usability statistics of various Implementations of automated (open source) software testing tool used in high performance different/networking environment/technologies. Further study tries to understand the applications and design of open source automation frameworks and their selection criteria in Technical Organizations to design automated software testing and Adaptive Automated Test Strategies

In proposed design and study, there will be an evaluation and estimation of the network characteristics and behavioural changes occurred due to applications fine tuning its network resources on server platform. To make the system adaptive to environment the estimation matrix database will be exported to the testing tool and adaptive approach will be applied to change test strategies to finalize matrix database of the network component under test (network node, NIC, HBA, etc..) With respect to the run time characteristics obtained thorough feedback mechanism.

The peripheral situations affect the performance of systems; therefore, though one-shot human-cantered automation (HCA) designs might provide better results than the systems designed based on the "automate it as possible" philosophy.

## Following Points are kept in mind while studying

* Scalability: Devise a software and hardware architecture that scales up by some factor. That is, an application's storage and processing capacity can automatically grow by a factor of a million, doing jobs faster just by adding more resources.
* The Turing Test: Build a computer system processing task in less time.
* Trouble-Free Systems: Build system used by people each day and yet administered and managed by a single part-time person.
* Secure System: Assure that adaptive automated algorithm automate the system in a way that only services authorized users, service cannot be denied by unauthorized users, and information cannot be stolen
* Always Up: Assure that the system is always available. Automatic Programmer: Devise a specification language or user interface that
* Makes it easy for people to express designs (1,000x easier),
* Computers can compile/Interpret, and can describe all applications
* The system should reason about application, asking questions about exception cases and incomplete specification. But it should not be onerous to use.
* Formalizing Common Sense for minimum input consideration
* Machine Readable Specification and design
* Automatic Code Verification: i.e. Profiling Tools
* Automatic Feature and Load Testing
* Automatic Action Tracking: i.e. Switching Throughput
* Automatic Problem discovery and Recovery

# **Review of work (Literature) already done on the subject**

In our research work, it is proposed to discuss how an adaptive algorithm can simulate itself according to system environment and its parameters. Now As per review of literature, researcher needs to see how much work already done in this area.

Covering Following areas for Literature review:

* Neuro-ergonomics, computerized adaptive test and Level of Automation
* Dynamic (Run Time) Storage Allocation
* Automated System Testing
* High Performance Cloud and Storage Network

## **Neuro-ergonomics, computerized adaptive test and Level of Automation**

As **Huey-Min Wu, Bor-Chen Kuo and Jinn-Min Yang** submitted research paper on **Evaluating Knowledge Structure-based Adaptive Testing Algorithms**. They developed a theoretical mathematical model called computerized adaptive test (CAT) for the students. Hence adaptive algorithm based on knowledge structure and called it, knowledge-structure-based adaptive testing (KSAT) algorithms. As per their findings the following are several major interfaces of system. The user management interface in is multi-functional. It allows new users to have access to creating new user accounts, creating multiple new user accounts, importing accounts from other sources such as Excel, and giving access to the database. The test administration interface displays the items and allows the examinees to answer the items presented. Since the KSAT system is an adaptive test, only one item per screen is presented.

The group profile interface in displays the group result of the exam. For example, in some concept of the interface, x students passed and y students failed test. Instructors can then take this information and understand the distribution of students’ knowledge states and identify the strengths and weaknesses within a group. This information can be utilized for remedial instruction. Upon completion of the test, the student receives a personalized profile including name, scores, percentile, utilization of test items, date taken, and so forth.

There are several strategies by which adaptive automation can be implemented **(Morrison & Gluckman, 1994; Rouse & Rouse, 1983).**

**One set** of strategies addresses system functionality. For instance, entire tasks can be allocated to either the system or the operator, or a specific task can be partitioned so that the system and operator each share responsibility for unique portions of the task. Alternatively, a task could be transformed to a different format to make it easier (or more challenging) for the operator to perform.

**A second set** of strategies concerns the triggering mechanism for shifting among modes or levels of automation (Parasuraman et al., 1992; Scerbo, Freeman, & Mikulka, 2003).One approach relies on goal-based strategies. Specifically, changes among modes or levels of automation are triggered by a set of criteria or external events. Thus, the system might invoke the automatic mode only during specific tasks or when if it detects an emergency situation. Another approach would be to use real-time measures of operator performance to invoke the changes in automation.

**A third approach** uses models of operator performance or workload to drive the adaptive logic (Hancock & Chignell, 1987; Rouse, Geddes & Curry, 1987, 1988).For example, a system could estimate current and future states of an operator’s activities, intentions, resources, and performance. Information about the operator, the system, and the outside world could then be interpreted with respect to the operator’s goals and current actions to determine the need for adaptive aiding. Finally, psycho-physiological measures that reflect operator workload can also be used to trigger changes among modes.

**Billings (1991)** instead focuses his attention on automation at work: how automation may correctly perform some activities or parts of them, how automation may interact with humans or support them in their tasks.

Billing (ibidem) defines LoA in functional terms: a level of automation corresponds to the set of function that an operator can autonomously control in a standard situation united to system ability at providing answer and solutions, at acting properly according to the proposed solution, and to check the results of its actions. Tightly coupled with Billings’s definition are Rouse’s observations (1988) the adaptive automation provides variable levels of support to human control activities in complex systems, according to the situation. Moreover, the situation is defined by the task features and by the psychophysical status of human operator. As a consequence, the human machine interaction should depend on what has to be automated, and on how and when.

There are several studies reviewing empirical researches about **AA (Parasuraman, 1993), (Hilburn et al., 1993), (Scallen et al., 1995), (Parasuraman et al., 1996), (Kaber, 1997), (Kaber & Riley, 1999)** that focused on the performance effects of Dynamic Function Allocation (DFA) in complex systems, specifically monitoring and psychomotor functions. These studies brought into evidence that AA significantly improves monitoring and tracking task performance in multiple task scenarios, as compared to static automation and strictly manual control conditions.

A further development for AA systems is the Neuroergonomics approach, which uses psychophysiological measures to trigger changes in the state of automation. Studies have shown that this approach can facilitate operator performance **(Scerbo, 1996).**Less work has been conducted to establish the impact of AA on cognitive function performance (e.g. Decision-making) or to make comparisons of human-machine system performance when AA is applied to various information processing functions (Kaber et al., 2002). **Scerbo (1996)**specifies that the AA can start different types of automation, in relation with the context (system and operator).An integration to this conclusion is provided by Kaber and Riley (1999), which defined adaptive automation as a programming or a pre-definition of the control assignment between human and system, in order to improve the human performance.

Human performance is in fact a crucial aspect of the functioning of complex system. As a consequence, the human operator should be involved in the control task, in order to avoid the out-of-the-loop performance.

**As stated by Norman (1989),** without appropriate feedback people are indeed out-of-the-loop; they may not know if their requests have been received, if the actions are being performed properly, or if problems are occurring. Sharing the functions control is not only a matter of quantitative task to accomplish, but it involves the responsibility of the whole operation execution.

The dynamic function allocation (DFA) is a peculiar aspect of AA (Kaber et al, 2001). It basically consists of assigning the authority on specific functions to either the human operator or the automated system, depending on the overall context (i.e. operator’s state and outer conditions) and on a defined set of criteria. DFA should therefore be designed by taking into account both the human and the system status, and considering the means for allowing context recognition.

Focusing on the participation and the autonomy that humans and machines may have in each task to be performed there is some debate. Some researches face the crucial issue of the authority that each part should have in controlling the system. Historically, humans played Human-Computer Interaction, New Developments the role of the supervisory control i.e. the machine decides about the actions and the humans evaluate these decisions; depending on this assessment, control on the actions is either regained by human operators or provided (Sheridan, 1992).In this effort a crucial role is played by the human skills and abilities and by the systems natural limits (Parasuramanet al., 2000).

There is a clear difference between the AA approach and the Level of Automation (Kaber &Endsley, ibidem).

By contrast with the traditional view of automation that is shortly a fixed and highly regulated process designed to eliminate human interaction, AA is designed to expect and anticipate changes under active control of a developer while maintaining precise control of all background variables not currently of interest (Kay, 2006).

AA is based on the dynamic allocation of the control of the whole task or of some parts, crossing along time manual and automated phases. The Levels of automation instead allow only a static function assignment, because the task level of automation is established in the design phase (Kaber & Endsley, ibidem).

AA allows users to experiment with variables seen as key parameters in a system while preventing undesired secondary effects that could unexpectedly arise from variations in parameters not under study, which in manual systems might not be precisely controlled. The Adaptive Automation Design Consideration. From this point of view it is possible to state that Work systems perform functions or units of work. Roles, instead, are more difficult to define. They make sense to consider it as an activity that can be performed either by human or machine (Harrison, Johnson, Wright, 2001).

**The York Method** (developed at the Department of Computer Science, University of York): provides theoretical instruments to define functions, rules and scenarios, and then represents them by some specific grids. The aim is to decide which functions are suitable to which rules, considering different scenarios **(Calefato, Montanari, and Tango 2007)**.

“A function may be separable from all roles, and technically feasible and cost effective to automate, in which case the function may be totally automated.

Alternatively it is possible that the function maps entirely to one of the roles, and is infeasible to automate, in which case the function is totally performed within that role. In most cases however functions fit into neither category.

In this situation the function is to be partially automated” **(Harrison, Johnson, Wright, 2001)**. Functions and roles have to be set into one or more scenarios.

In taking into account the driving scenario, it has to be measured the driver’s competences in tasks critical to performance and safety. These concept can be clarified by an example belonging to the automotive domain. We can hypnotize to have to design a preventive safety system. In order to design the application, the driving scenario and its corresponding manoeuvres have been broken down into functions and sub-functions in order to outline which functions have to be performed manually, automatically or both. Secondly, system and driver’s roles have been combined with functions in order to outline which functions suite best to which roles, considering the given scenarios. The scenarios have been selected in order to measure the driver workload and situation awareness. Consequentially the selected scenario shows the whole behaviour of the system, along the seven LoA implemented **(Calefato, Montanari, and Tango 2007)**.

**Recently, Mozer (2004)** described his experiences living in an adaptive home of his own creation. The home was designed to regulate air and water temperature and lighting. The automation monitors the inhabitant’s activities and makes inferences about the inhabitant’s behaviour, predicts future needs, and adjusts the temperature or lighting accordingly. When the automation fails to meet the user’s expectations, the user can set the controls manually.

The heart of the adaptive home is the adaptive control of home environment (ACHE) and functions to balance two goals:

1) User desires and

2) Energy conservation.

Because these two goals can conflict with one another, the system uses a reinforcement learning algorithm to establish an optimal control policy. With respect to lighting, the ACHE controls multiple, independent light fixtures, each with multiple levels of intensity. The ACHE encompasses a learning controller that selects light settings based on current states. The controller receives information about an event change that is moderated by a cost evaluator. A state estimator generates high-level information about inhabitant patterns and integrates it with output from an occupancy model as well as information regarding levels of natural light available to make decisions about changes in the control settings. The state estimator also receives input from an anticipator module that uses neural nets to predict which zones are likely to be inhabited within the next two seconds. Thus, if the inhabitant is moving within the home, the ACHE can anticipate the route and adjust the lights before he arrives at his destination. Mozer (2004)recorded the energy costs and as well as costs of discomfort (i.e., incorrect predictions and control settings) for a month and found that both decreased and converged within about 24 days.

**Mozer (2004)** had some intriguing observations about his experiences living in the adaptive house. First, he found that he generated a mental model of the ACHE’s model of his activities. Thus, he knew that if he were to work late at the office, the “house” would be expecting him home at the usual time and he often felt compelled to return home! Further, he admitted that he made a conscious effort to be more consistent in his activities. He developed a meta-awareness of his occupancy patterns and recognized that as he made his behaviour more regular, it facilitated the operation of the ACHE, which in turn, helped it to save energy and maximize his comfort. In fact, Mozer claimed, “the ACHE trains the inhabitant, just as the inhabitant trains the ACHE”. Mozer (2004)also discovered the value of communication. At one point, he noticed a bug in the hardware and modified the system to broadcast a warning message throughout the house to reset the system. After the hardware problem had been addressed, however, he retained the warning message because it provided useful information about how his time was being spent. He argued that there were other situations where the user could benefit from being told about consequences of manual overrides.

**The “horse-rider paradigm** “is introduced at first time in 1990 by Connell and Viola, then it was developed by Flemish et al (2003), that named it “H-metaphor” and faced also by Norman (2007).

The “Horse-Rider paradigm” explains the relation between human and automation like the relation that a rider establishes with his/her horse: the human receives information about the actual system status through an osmotic exchange with it. Human intention and actions become the parameters the system uses to offer him the correct solution or answer to the faced context.

In this way it is possible to improve the human performance that represents the crucial hearth of the interaction in complex systems. Besides the operator is maintained in loop during the system control, in order to avoid or reduce the out-of-the-loop performance.

**Lim Tock Keng, Ho Wah Kam Computerized Adaptive Testing in Reading Comprehension**, A Computerized Adaptive Testing (CAT) project in reading comprehension was established to develop multiple choice tests across four grade levels, Primary 3 and 5, and Secondary I and 3. CAT is interactive and allows participants to select their own entry points to the test and gives feedback on their performance. Building a CAT system required the development of an item bank, selection of item and items order to be presented in a test, and evaluating the test for difficulty. The creation of the item bank involved the specifying reading comprehension skills, writing items, field testing, item analysis and calibration. The software, MICROCAT, was used to develop an item bank, to select items and item order to be presented in a test, and to evaluate the test for difficulty. The project is currently at the stage of field testing.

## **Dynamic (Run Time) Storage and Data (Center) Virtualization**

**Siva Rama Krishnan Somayaji, Ch.A.S Murty, published research paper Securing Internet Protocol (IP) Storage: A Case Study,** Storage networking technology has enjoyed strong growth in recent years, but security concerns and threats facing networked data have grown equally fast. Today, there are many potential threats that are targeted at storage networks, including data modification, destruction and theft, DoS attacks, malware, hardware theft and unauthorized access, among others. In order for a Storage Area Network (SAN) to be secure, each of these threats must be individually addressed. In this paper, we present a comparative study by implementing different security methods in IP Storage network. Conclusion is that in this paper we have implemented an IP-Storage network using iSCSI protocol. We have analysed the performance of the IP Storage network without any security implemented and also by implementing SSLv2 and IPsec. We present a comparative analysis IP storage network performance in each case.

**Bindu Trikha (2010) presented a research paper on A Journey from floppy disk to cloud storage,** Data storage and backup needs have evolved over the years necessitating the need for evolution of data storage methods and devices. The needs for a higher storage capacity as well as versatility of storage devices and the need for technologically advanced storage devices became apparent. She talked about all storage devices like punch cards, CD/DVD, Blu-ray Disks, and networked storage. Conclusion is that with the advent of time there is always a need for better options in terms of back up storage and as on date the best option available for internet users is Cloud Storage as backup store

**Insoon Jo, Im Y. Jung, Heon Y. Yeoma (2006) done research on Workload-aware VM Scheduling on Multicore Systems**. He analysed that since in a virtual environment where multiple virtual machines can be run on a single physical host and found that performance interference between virtual machines is a big challenge in the field of virtualization. Hence I learned from this research work there were a workload aware virtual machine scheduler were introduced on multi core systems which finds the mapping of virtual machines related with the physical host and how VM can be scheduled to share the load with Dynamic Storage Allocation and Management .

**Ramona A, Razvan R. (2006) done research on a Perspective on the Benefits of Data Virtualization Technology**. This research work was based on the integration of virtualization technology with the data integration technology. He found that Data integration and maintenance is a big and costive way which includes the feeds in the applications, reporting, analysis etc. which required time and consume more resources. I been have some advantage got information from this research work were done to provide the benefits of combining the virtualization with data integration and how resources can be managed with run time dynamic storage allocation.

**Udeze Chidiebele. C, Okafor Kennedy .C (2008) done research on Effective Security Architecture for Virtualized Data Center Networks**. As Virtualization is the new and key concept in the field of information technology but since it’s a new technology so there are lots of assumptions are exist with the security of the virtualized data center networks. He found from study that there were lots of architecture presented like integration of Open Flow Software Defined Networking (OFSDN) with VLAN Virtual Server Security (VVSS) were addressed to address the security issues in the virtualized data center. Hence I been benefitted from this research work about the security issues on the virtualized networks.

**Soran; Philip E. (Eden Prairie, MN), Guider; John P. (North Oaks, MN) ( 2009 ) done research on Virtual disk drive system and method** .Here A disk drive is the main subsystem of a computer system and it may include RAIS subsystem which included the pool of storages like the Metrix of storage blocks or a page pool of storage. He concluded that Storage has a great importance in the field of virtualization and this research work was based on the concept of the virtualization of the storage drives. I got information about the Dynamic management of Storage Allocation with virtualization.

**Patil S.V and Honwadkar K.N (2009) done research on Unified Virtual Storage**. They Studies Virtualization of Distributed Storage in a Network. This research work based on the techniques to efficiently utilize the free disk space on the connected networked machines. Their founding is that since in the usual way we do reserved some amount of space to a machine and the unused space sits ideal there, in same way lots of storage space reserved and sits ideal on the several machines, Hence I was able to know about a new way were proposed to utilize such ideal space by using on shared basis on networked machines.

**Hiteshi Atif (2010) done research to found Virtualization as the new and key concept in the field of information technology** but since it’s a new technology so there are lots of assumptions are exist with the security of the virtualized data center networks. He found that that there were lots of architecture presented like integration of Open Flow Software Defined Networking (OFSDN) with VLAN Virtual Server Security (VVSS) were addressed to address the security issues in the virtualized data center. Hence this research work was based on the security issues on the virtualized networks. Hence learned about the security implementation in Virtualized Dynamic Storage.

**Sung-Do Chi, Jong Sou Park (2006) done research on Availability Modelling and Analysis on Virtualized Clustering with Rejuvenation**. Since recovery and downtime is the major concern specially in the field of information technology and lots of systems and terms are already defined to get the high availability and to get the error free and fast failover either in term of application or in term of machines or severs. It’s found in this study that Clustering is provides the way to provide the high availability by running same redundant services in parallel so conclusion is that in case of failure of one on the service other will take over.

**K.GEETHA, DR. ANANTHI SHESHASAYEE published a research paper DATA DYNAMICS USED FOR STORAGE SPACE IN CLOUD COMPUTING**, They mentioned that Cloud Computing has been envisioned as the next-generation architecture of IT Enterprise. This work studies the problem of ensuring the reliability of data storage in Cloud Computing. In particular, we consider the task of allowing a Third party assessor, on behalf of the cloud client, to verify the reliability of the dynamic data stored in the cloud. The introduction of Third party assessor eliminates the involvement of the client through the assessing of whether his data stored in the cloud is indeed together, which can be important in achieving economies of scale for Cloud Computing. Further the support for data dynamics via the most general forms of data operation, such as block modification, insertion and deletion, is also a significant step toward practicality, since services in Cloud Computing are not limited to archive or backup data only. While prior works on ensure isolated data reliability often lacks the support of either public review capability or dynamic data operations, this work achieves both. Conclusion is to identify the difficulties and possible protection problems of through extensions with fully dynamic data updates from prior works and then show how to construct the seamless combination of these two most important features in our procedure design.

**P. Dhanalakshmi, V. Ramesh published paper on Dynamic Storage Assurance on Cloud Computing,** Cloud computing investigate the problem of data security in cloud data storage, which is essentially a distributed storage system. Distributed storage integrity auditing mechanism, utilizes the homomorphic token and distributed erasure-coded data. The proposed design allows users to audit the cloud storage with very lightweight communication and computation cost. The auditing result not only ensures strong cloud storage correctness guarantee, but also simultaneously achieves fast data error localization, i.e., the identification of misbehaving server and recover the corrupted data. Considering the cloud data are dynamic in nature, the proposed design further supports secure and efficient dynamic operations on outsourced data, including block modification, deletion, and append. Analysis shows the pro-posed scheme is highly efficient and resilient against Byzan-tine failure, malicious data modification attack, and even server colluding attacks. With the advent of data storage and new technology trends that result in new failure modes for storage, interesting challenges arise in ensuring data integrity and security. In this paper, we discuss the cause of integrity violations and implementation issues to perform efficient integrity assurance. The main aim of this paper is to prevent the file from integrity violations and recovering the corrupted file with low cost overhead.

**Logica BANICA, Mariana JURIAN, Cristian STEFAN done research on Data center virtualization and its economic implications for the companies**, They studied In the current situation of the economic crisis, when companies target budget cuttings in a context of an explosive data growth, the IT community must evaluate potential technology developments not only on their technical advantages, but on their economic effects as well. More than ever, the old cliché “doing more things with fewer resources” is true today. They analysed Many IT companies started building very large facilities, called data centres (DCs) or Internet DC (IDCs), which provide businesses a wide range of solutions for systems deployment and operation. In recent years, the IT departments around the world have moved from data center and infrastructure consolidation to virtualization. Data center virtualization is the process of aligning available resources with the actual needs of the offered services, moving from physical servers to virtual servers, sharing and provisioning servers, networks, storage, and applications. Further By taking advantage of three basic innovations virtualization, tiered storage architectures and dynamic provisioning software, an organization can achieve greater efficiencies in their current computing environment. Such a unified computing architecture offers end-to-end virtualization; all structures are optimized for virtualized environments, from the CPU to the aggregation layer. They found in conclusion that in combination with embedded management, this approach increases responsiveness and reduces the opportunities for human error, improving consistency and reducing server and network deployment times.

**Federico Calzolari (2009) presented a research paper on High availability using virtualization, this research was with regards to Data Center** where High availability has always been one of the main problems. Till now high availability was achieved by host per host redundancy, a highly expensive method in terms of hardware and human costs. He further found that a new approach to the problem can be offered by virtualization. Using virtualization, it is possible to achieve a redundancy system for all the services running on a data center. This new approach to high availability allows to share the running virtual machines over the servers up and running, by exploiting the features of the virtualization layer: start, stop and move virtual machines between physical hosts. The system (3RC) is based on a finite state machine with hysteresis, providing the possibility to restart each virtual machine over any physical host, or reinstall it from scratch. A complete infrastructure has been developed to install operating system and middleware in a few minutes. To virtualize the main servers of a data center, a new procedure has been developed to migrate physical to virtual hosts. The whole Grid data center SNS-PISA is running at the moment in virtual environment under the high availability system. As extension of the 3RC architecture, several storage solutions have been tested to store and centralize all the virtual disks, from NAS to SAN, to grant data safety and access from everywhere. Conclusion was that exploiting virtualization and ability to automatically reinstall a host, we provide a sort of host on-demand, where the action on a virtual machine is performed only when a disaster occurs

**Ardalan Amiri Sani, Sreekumar Nair, Lin Zhong, Quinn Jacobson (2013) presented a research paper on Making I/O Virtualization Easy with Device Files**, As Personal computers have diverse and fast-evolving I/O devices, making their I/O virtualization different from that of servers and data centres. In this paper, they present recent endeavours in simplifying I/O virtualization for personal computers. Their key insight is that many operating systems, including Unix-like ones, abstract I/O devices as device files. There is a small and stable set of operations on device files, therefore, I/O virtualization at the device file boundary requires a one-time effort to support various I/O devices. They further present devirtualization, their design of I/O virtualization at the device file boundary and its implementation for Linux/x86 systems. Finally they were are able to virtualize various GPUs, input devices, cameras, and audio devices with fewer than 4900 LoC, of which only about 300 are specific to I/O device classes. Conclusion was that measurements show that devirtualized devices achieve interactive performance indistinguishable from native ones by human users, even when running 3D HD games.

**Maurice Askinazi, David Free, Bruce Gibbard, Thomas Throwe (2003) presented a research paper on Large Scale Online Storage Management**, The HENP computing facility at Brookhaven National Laboratory supports both the Relativistic Heavy Ion Collider (RHIC) and US involvement in the ATLAS LHC experiment. The facility includes 150 Tera Bytes of centralized online (disk) storage, which is served to a processor farm of 2000 CPU's. Multiple levels of virtualization are used in the deployment of this storage. They found that this allows for a great deal of flexibility in the maintenance, performance tuning, and expansion of the resource in a manner which is transparent to its users. The tools and strategies employed and the additional functionality achieved, they studied about consolidation, documentation and High Availability. Discussed about HBA, Switches and Cabling with Veritas Software for Storage Management. Showed the connectivity between these

**Thandar THEIN, Sung-Do CHI, Jong Sou PARK presented paper on Availability Analysis and Improvement of Software Rejuvenation Using Virtualization**, This paper presents teaching and curriculum design for Information Technology classes. Today, students demand hands-on activities for the newest technologies. It is feasible to satisfy this appetite for exciting education by employing server virtualization technologies to teach advanced concepts with extensive hands-on assignments. Through utilization of virtualized servers, students are able to deploy, secure and manage virtual machines and networks in a contained environment. Various techniques, assessment tools and experiences will be analysed and presented by this manuscript. Previous teaching cases for Information Systems or Information Technology classes are done using non-commercial products, such as free VMware Server or VMware Player. Such products have very limited functionality in terms of networking, storage and resource management. Several advanced data center functions, such as Distributed Power Management (DPM), vMotion and others, are not available in desktop versions of that type of virtualization software. This manuscript concludes the utilization of commercial software, such as vSphere 4.1, with full data center functionality and operations for teaching Information Technology classes of various levels.

**Dhanamma Jagli, Ramesh Solanki, Rohini Temkar, Laxmi Veshapogu presented a paper on Semi Symmetric Method Of SAN Storage Virtualization**, As Virtualization is one of the biggest buzzwords of the technology industry right at this moment. The fast growth in storage capacity and processing power in enterprise installations coupled with the need for high availability, requires Storage Area Network (SAN) architecture to provide seamless addition of storage and performance elements without downtime. This paper describing about Storage Virtualization, and Data Virtualization and also Symmetric and Asymmetric Virtualization at subsystem level. The usual goal of virtualization is to centralize administrative tasks while improving scalability and workloads. This paper, concludes about new proposed method for virtualization, which would be overcome limitations of existed methods for storage virtualization and Data virtualization solves the most intractable troubles facing in IT organizations. Data virtualization places an agile and configurable layer between back-end physical databases and the way these databases are represented using data services. This proposed method would be providing all the feature of existed storage virtualization methods.

**Hai Xin LU presented a research paper on A Study of Key Management for Encrypted Storage in Storage Area Network**, as secure storage becomes more pervasive throughout the enterprise, the focus quickly moves from implementing encrypting storage devices to establishing effective and secure key management policies. Without the proper key generation, distribution, storage, and recovery, valuable data will be eventually compromised [9]. Although a considerable amount of research has been dedicated to encryption algorithms in the past decades, key management becomes an issue due to the quantity of data. For example, with millions of data you will need million set of keys. To manage and keep track of these keys, complexity and operational inefficiency becomes an issue. How to manage keys becomes a challenging task. Adequate understanding of these new challenges is essential to effectively devise new key management policies and mechanisms to guard against them. We discuss many of these methods in this new context to fill this gap

**Traeger et al. 2008** Reported HPC in petascale computing is rapidly increasing I/O demands of both scientific and industrial applications. petascale computing must have the ability to process terabytes if not, petabytes of data which are generated in bursts and also should handle very high I/O concurrency from parallel processes running on millions of cores. Different layers of I/O stack, such as runtime library and OS kernel in order to explore higher parallelism and better locality of data access for I/O performance improvement. I/O stack are often unable to achieve the full potential, since aggregated impact is on the whole layers in turn that determines the I/O performance of the systems. Comprehensive re-examination of the design and implementation of existing software stack, especially for parallel I/O, is necessary for solving performance bottleneck in HPC system

The enterprise storage arrays architecture like Storage area Network (SAN), Direct attached storage (DAS), Network area storage (NAS) do even perform poorly when it comes to large scale distributed data intensive computing claimed by Philip Chen and Zhang 2014; Hennessy and Patterson 2011; Min et al. 2005. Authors also studied, in today’s’ storage system it has been noted that it significantly lacks in sustaining the strong growing concurrency and per compute throughput which is essential requirements of the I/O intensive applications executed in distributed environment.

## **Automated (Adaptive Control) System Testing**

**Lazic Ljubomir** has examined that Organizations are constantly working to leverage today’s best practices for testing within the context of their existing IT environments. As IT works to balance the business needs for a certain application and the testing limitations with regards to resources and schedules, making the best use of the testing environment becomes critical. Optimized testing is a way for organizations to move their testing efforts forward to reflect changing business environments and resource constraints.

**Palanisamy V** has analysed that select test cases to maximize the proportion of program elements of a given type (e.g. statements, branches, conditions, and loop) that are covered (executed). The coverage based technique makes use of greedy algorithm in order to prioritization out the repeatedly executing test cases. So, by prioritization with the number of executing test cases the overall quality of the testing process can be improved.

**Alqrainy Shihadeh** has analysed that our utmost effort should be in identifying a comprehensive list of software risk factors that covers wider range of threats through the SDLC. This list can serve as a checklist that can guide project team in identifying probable risk factors and help them in designing strategies to (mitigate/avoid) them

[**Sachin Sharma**](http://www.oalib.com/search?kw=Sachin%20Sharma&searchField=authors)**,** [**Mrs. VISHAWJYOTI**](http://www.oalib.com/search?kw=Mrs.%20VISHAWJYOTI&searchField=authors) **done research on STUDY AND ANALYSIS OF AUTOMATION TESTING TECHNIQUES.** They argued that Testing is a very important activity in Software Development Process. Hence to examine & modify source code. Effective Testing produces high quality software. This research Paper deals with a significant and vital issue of Software Testing. Testing can be conducted manually as well as Automated. These Techniques have their own advantages & disadvantages. The Objective of this paper is to perform Automation Testing using Software Testing Tool “Selenium”. With this web testing tool, test cases are automatically recorded in background while tester is entering the data in a web application screen. Hence I learned about the automation testing techniques and their advantage and disadvantage.

[**SUNIL L. BANGARE**](http://www.oalib.com/search?kw=SUNIL%20L.%20BANGARE&searchField=authors)**, SACHIN M. KAMBLE,** [**PALLAVI S. BANGARE**](http://www.oalib.com/search?kw=PALLAVI%20S.%20BANGARE&searchField=authors)**,** [**ABHIJIT V. NAIK**](http://www.oalib.com/search?kw=ABHIJIT%20V.%20NAIK&searchField=authors) **published paper on AUTOMATED TESTING IN DEVELOPMENT** PHASE, here they done study In software development the applications are tested in testing phase of software development process. They found that testing of application is not possible without complete development of module/application. It takes additional time in completion of software development. Hence as proposed in this paper the model for tool which provides the way to developer to test his code/application in development phase itself. They also mentioned about the tool and the model helps in java API (application programmable interface) testing. With this tool, developer can able to test his code/module automatically considering all the aspect of testing. Here they have given an approach predefined test cases are loaded for testing, and thousands of test cases are run at same time and application is tested by developer. So it helps in regression testing. Hence I found the hints of in reducing software development period. Ultimately it saves the people resources, hardware and software resources.

[**Arvinder Kaur**](http://www.oalib.com/search?kw=Arvinder%20Kaur&searchField=authors)**, Shubhra Goyal done study and research on A GENETIC ALGORITHM FOR REGRESSION TEST CASE PRIORITIZATION USING CODE COVERAGE**, They Studies about the Regression testing which is a testing technique used to validate the modified software. The regression test suite is typically large and needs an intelligent method to choose those test cases which will detect maximum or all faults at the earliest. Many existing prioritization techniques arrange the test cases on the basis of code coverage with respect to older version of the modified software. In this approach, a new Genetic Algorithm to prioritize the regression test suite is introduced that will prioritize test cases on the basis of complete code coverage. They concluded that genetic algorithm would also automate the process of test case prioritization. The results representing the effectiveness of algorithms are presented with the help of an Average Percentage of Code Covered (APCC) metric. It helped to understand the genetic algorithms approach in adaptive automation.

**Birgit Vogel-Heuser, Christian Diedrich, Alexander Fay, Sabine Jeschke, Stefan Kowalewski, Martin Wollschlaeger, Peter G done study on Challenges for Software Engineering** in Automation which gives an introduction to the essential challenges of software engineering and requirements that software has to fulfil in the domain of automation. They concluded that besides, the functional characteristics, specific constraints and circumstances are considered for deriving requirements concerning usability, the technical process, the automation functions, used platform and the well-established models, which are described in detail. On the other hand, challenges result from the circumstances at different points in the single phases of the life cycle of the automated system. The requirements for life-cycle-management, tools and the changeability during runtime are described in detail in this research.

[**Tariq M. King**](http://www.oalib.com/search?kw=Tariq%20M.%20King&searchField=authors)**,** [**Alain E. Ramirez**](http://www.oalib.com/search?kw=Alain%20E.%20Ramirez&searchField=authors)**, Rodolfo Cruz, Peter done study An Integrated Self-Testing Framework for Autonomic Computing Systems**

As the technologies of autonomic computing become more prevalent, it is essential to develop methodologies for testing their dynamic self-management operations. Self-management features in autonomic systems induce structural and behavioural changes to the system during its execution, which need to be validated to avoid costly system failures. The high level of automation in autonomic systems also means that human errors such as incorrect goal specification could yield potentially disastrous effects on the components being managed; further emphasizing the need for runtime testing. In this paper we propose a self-testing framework for autonomic computing systems to dynamically validate change requests. Our framework extends the current architecture of autonomic systems to include self-testing as an implicit characteristic, regardless of the self-management features being implemented. They concluded and validate a framework by creating a prototype of an autonomic system that incorporates the ability to self-test.

I learned about adaptive management of Testing System.

**Rajesh Mathur, Scott Miles, Miao Du done research on Adaptive Automation: Leveraging Machine Learning to Support Uninterrupted Automated Testing of Software Applications**, They started Checking software application suitability using automated software tools has become a vital element for most organisations irrespective of whether they produce in-house software or simply customise off-the-shelf software applications for internal use. They found that software solutions become ever more complex, the industry becomes increasingly dependent on software automation tools, yet the brittle nature of the available software automation tools limits their effectiveness. It’s been discovered that Companies invest significantly in obtaining and implementing automation software but most of the tools fail to deliver when the cost of maintaining an effective automation test suite exceeds the cost and time that would have otherwise been spent on manual testing. Therefore A failing in the current generation of software automation tools is they do not adapt to unexpected modifications and obstructions without frequent (and time expensive) manual interference. Such issues are commonly acknowledged amongst industry practitioners, yet none of the current generation of tools have leveraged the advances in machine learning and artificial intelligence to address these problems. Thereby pre4ent paper proposes a framework solution that utilises machine learning concepts, namely fuzzy matching and error recovery. The suggested solution applies adaptive techniques to recover from unexpected obstructions that would otherwise have prevented the script from proceeding. Recovery details are presented to the user in a report which can be analysed to determine if the recovery procedure was acceptable and the framework will adapt future runs based on the decisions of the user. Using this framework, a practitioner can run the automated suits without human intervention while minimising the risk of schedule delays. Learning of adaptive methodology by fuzzy logic is been demonstrated in Software Automation Testing by tools.

[**Er. RAJENDER KUMAR**](http://www.oalib.com/search?kw=Er.%20RAJENDER%20KUMAR&searchField=authors)**,**[**Dr. M.K.GUPTA**](http://www.oalib.com/search?kw=Dr.%20M.K.GUPTA&searchField=authors) **done study of Dynamic Test Case Design Scenario and analysis of Module Testing Using Manual vs. Automated Technique**, They started Software can be tested either manually or automatically. The two approaches are complementary, automated testing can perform a huge number of tests in short time or period, whereas manual testing uses the knowledge of the testing engineer to target testing to the parts of the system that are assumed to be more error-prone. Despite this contemporary, tools for manual and automatic testing are usually different, leading to decreased productivity and reliability of the testing process. Auto Test is a testing tool that provides a “best of both worlds” strategy: it integrates developers’ test cases into an automated process of systematic contract driven testing. This allows it to combine the benefits of both approaches while keeping a simple interface, and to treat the two types of tests in a unified fashion: evaluation of results is the same, coverage measures are added up, and both types of tests can be saved in the same format. The objective of this paper is to discuss the Importance of Automation tool with associate to software testing techniques in software engineering. In this paper we provide introduction of software testing and describe the CASE tools. The solution of this problem leads to the new approach of software development known as software testing in the IT world. Software Test Automation is the process of automating the steps of manual test cases using an automation tool or utility to shorten the testing life cycle with respect to time.

**Anna Derezinska, Tomasz Malek presented an article on Experiences in Testing Automation of a Family of Functional- and GUI-similar Programs**, They presented experiences in the automation of a testing process. The main goal is the unified testing of not only one program, but a whole family of programs. The family is characterized by a common functionality and therefore similar GUI interfaces. The testing process integrates extraction of the application specific data from its executable and the usage of the capture and replay testing technique. The testing of various members of application family is driven by a unified, common script. As a family of applications under test a set of RSS aggregators was used. They concluded that a unified test RSSscript was developed and verified in test experiments. The results of functional, performance and regression testing are presented. The benefits and limitations of the solution are discussed.

**Appasami Govindasamy, Suresh Joseph.K, Annadurai P. presented an idea on topic Online Test Automation for new Generation of Silverlight Web Applications**, In this paper New Interactive, attractive and device independent web application’s Graphical User Interfaces (GUI) are developed by new technologies like Silverlight and Moonlight. Silverlight is Microsoft's cross platform runtime and development technology for running Web based multimedia applications in windows platform. Moonlight is an open-source implementation of the Silverlight development platform for Linux and other operating systems. Manufacturing Execution systems (MES) is a framework which tries to address the problems in integration, deployment, Consistent GUI, etc. that exists in present manufacturing applications. Next generation Visualization technologies for the Manufacturing Execution systems will improve consistency, productivity and usability of the systems. Silverlight is one of the main UI technologies that are used in MES Framework. Testing of UI is always challenging and has been mostly manual till now. In the next generation of MES applications the testing of GUI needs to be automated as it will save lot of man-hours that is lost in manual testing also it will catch the defects early on in the cycle. GUI testing is a commonly known form of Usability Testing of software or website. It is also known as User Interface Testing. GUI testing is a performance related assessment of a software or website in terms of ease of use, versatility, friendliness with focus on the target audience, visual impact and the approach and time taken to progress into the specific purpose. Improving the quality of software is the main goal of UI Test Automation. Hence conclusion is that Reducing testing time and cost are the goals of UI Test Automation. Reducing manual power is also one of the major objectives of UI Test Automation

[**John Barnett**](http://www.oalib.com/search?kw=John%20Barnett&searchField=authors) **presented a paper on Training People to Use Automation: Strategies and Methods**, as automation is being introduced into the workplace more and more frequently, and more and more people are learning to use automated systems. However, many people tend to exhibit patterns of behaviour towards automation which influences how they use it, or if they use it at all. Often, these behaviour patterns can either negate the advantages of automation, or allow automation to lead people into precarious situations. This paper concluded some of these common behaviour patterns and how training may help people avoid their negative consequences. Learning comes out as a suggested automation training strategy to help training developers design training programs for automated systems that takes user attitudes towards automation into account.

**Karol Rastocny, Juraj Zdansky presented a paper on Using of Finite Automation at Programming PLC**, This Paper is concerning with systematic advances at programming programmable logic controllers (PLC), which comes out from algebraic description of behaviour of sequential circuit, in the way of finite automaton. This kind of access is streamlining the work of a programmer and enabling to use formalisms in the of whole process of system development, that is from process of analysing demands to process of verification and validation created program.

**Rohan R. Kachewar presented on a paper K model for designing Data Driven Test Automation Frameworks and its Design Architecture Snow Leopard**, here an automated testing improves the efficiency of testing practice at various levels of projects in the organization. Unfortunately, Its comes out that we do not have a common architecture or common standards for designing frameworks across different test levels, projects and test tools which can assist developers, testers and business analysts. To address the above problem, in this paper, He has first proposed a unique reference model and then a design architecture using the proposed model for designing any Data Driven Automation Frameworks. The conclusion is that the reference model is K model which can be used for modelling any data-driven automation framework. The unique Design architecture, based on above model is Snow Leopard.

**Tanya Jha, Rashmi Shetty presented a paper on Automation of Smartphone Traffic Generation in a Virtualized Environment**, They presented a paper on Scalable and comprehensive analysis of rapidly evolving mobile device application traffic is extremely important but a challenging problem for the Deep Packet Inspection (DPI) engines to perform effective policy management. We present a test framework in which a test driver can automate/orchestrate traffic generation by invoking appropriate method (intent) of real mobile applications (as opposed to traffic replay) in regression or functional testing of mobile application traffic analysis engines in a virtualized environment, without real hardware. They concluded the concept by automating a real-time Skype call through a DPI engine in a virtual test setup using Android VMs. Understanding is made how automation can be made in network traffic with virtualized storage environment.

**M. Thillaikarasi, K. Seetharaman, presented a paper on Regression Testing in Developer Environment for Absence of Code Coverage**

Here the techniques of test case prioritization schedule the execution order of test cases to attain respective target, such as enhanced level of forecasting the fault. The requirement of the prioritization can be viewed as the en-route for deriving an order of relation on a given set of test cases which results from regression testing. Alteration of programs between the versions can cause more test cases which may respond differently to following versions of software. In this, a fixed approach to prioritizing test cases avoids the preceding drawbacks. The JUnit test case prioritization techniques operating in the absence of coverage information, differs from existing dynamic coverage-based test case prioritization techniques. They concluded that, the prioritization test cases relying on coverage information were projected from fixed structures relatively other than gathered instrumentation and execution.

**Jussi Kasurinen, Ossi Taipale, Kari Smolander presented a paper on Software Test Automation in Practice: Empirical Observations**, The objective of this industry study is to shed light on the current situation and improvement needs in software test automation. To this end, 55 industry specialists from 31 organizational units were interviewed. In parallel with the survey, a qualitative study was conducted in 12 selected software development organizations. The results indicated that the software testing processes usually follow systematic methods to a large degree, and have only little immediate or critical requirements for resources. Based on the results, the testing processes have approximately three fourths of the resources they need, and have access to a limited, but usually sufficient, group of testing tools. As for the test automation, the situation is not as straightforward: based on our study, the applicability of test automation is still limited and its adaptation to testing contains practical difficulties in usability. In this study, we analyse and discuss these limitations and difficulties.

**SUNIL L. BANGARE, SACHIN M. KAMBLE, PALLAVI S. BANGARE, ABHIJIT V. NAIK presented paper on AUTOMATED TESTING IN DEVELOPMENT PHASE,** In software development the applications are tested in testing phase of software development process. So testing of application is not possible without complete development of module/application. It takes additional time in completion of software development. So this paper proposed the model for tool which provides the way to developer to test his code/application in development phase itself. The model also helps in java API (application programmable interface) testing. They come up with an approach of tool and with this tool, developer can able to test his code/module automatically considering all the aspect of testing. Hence conclusion is in this approach predefined test cases are loaded for testing, and thousands of test cases are run at same time and application is tested by developer. So it helps in regression testing. Hence it helps in reducing software development period. Ultimately it saves the people resources, hardware and software resources.

**T.Murali Krishna, Devara Vasumathi presented a research paper on A Study of Mining Software Engineering Data and Software Testing**, Here they started with the primary goal of software development is to deliver Optimal Software, i.e., software produced at low cost, high quality & productivity and scheduled with in time. In order to achieve this optimal software, programmers generally reuse the existing libraries, rather than developing similar code products right from the scratch. While reusing the libraries, programmers are facing several changes such as many existing libraries are not properly documented and many libraries contain large number of program interfaces (PIs) through which libraries expose their functionality. These challenges lead to certain problems that affect in producing optimal software. The problems such as reuse of existing libraries consumes more time, lack of knowledge on reusing of program interfaces and we can’t generate effective test inputs during white box testing. The first two problems reduce the software productivity whereas last one effect on software testing. To resolve these problems, we propose a general framework called Netminer. Netminer contains a code search engine. With the help of code search engine, we can search the available open source code over the internet. In the analysis phase, Netminer automatically compares the specifications of program interfaces with relevant code examples that are available in the internet. In the next phase, Netminer applies data mining techniques on code examples that are collected and identify common patterns. The common patterns represent exact usage of program interfaces. We propose some more approaches based on Netminer. Some approaches help programmers in effectively reusing program interfaces provided by existing libraries. Some approaches identify defects under analysis from the mined specifications and some approaches help in generating test inputs by the use of static and dynamic test generation. Their research study concludes that Netminer framework can be effectively used in software engineering for achieving optimal software.

**Juan A. Godoy presented a paper** **Have the Software Testing a Future?** Software testing is directed to a dark future, with greater political isolation management, less funding and poorer overall quality. The hopes of the theory of software quality and test new technologies of the 1990s have been usurped by "tastes" in the development focused on ideas such as "Agile", "Object Oriented", "Cloud” and applications “Mobile” of $ 0.99. The new languages and development methods are designed to allow developers to "throw" code faster and not to improve versions, maintenance, testing and traceability or auditing. The costs of maintenance and development will increase, the budgets for the test will fall and more projects fail. The future of the tests is shade. In this article is analysed this situation.

**E. E. Khatko, V. A. Filippov presented paper on An Analytical Model of Tests Generation Process for Mobile Applications**, Because of rapid mobile technologies expansion, there is a gap between the complexity of mobile applications and the complexity of employed testing techniques. This paper is aimed at reducing the gap from the practical point of view. Tests generation techniques are widely spread, but none of them are optimized for mobile applications. This paper proposes an analytical model of tests generation process, which is based on prototypes and takes mobile specificity into consideration. Along with this an analysis of existing tests generation approaches has been made. The flowchart of the proposed model has been submitted with the model. In conclusion an analytical model of tests generation process which is based on prototypes and takes mobile specificity into consideration is proposed. The scheme of the proposed model is submitted. The efficiency of the model is described in the numerical results section.

**Latika Kharb, Dr. Vijay Singh Rathore researched about Reliable Software Development with Proposed Quality Oriented Software Testing Metrics**, For an effective test measurement, a software tester requires a testing metrics that could measure the quality and productivity of software development process along with increasing its reusability, correctness and maintainability. Until now, the understanding of measuring software quality is not yet sophisticated enough and is still far away from being standardized and in order to assess the software quality, an appropriate set of software metrics needs to be identified that could express these quality attributes. Our research objective in this paper is to construct and define a set of easy-to measure software metrics for testing to be used as early indicators of external measures of quality. So, we’ve emphasized on the fact that reliable software development with respect to quality could be well achieved by using our set of testing metrics, and for that we’ve given the practical results of evaluation

**Richard Lai,Mohit Garg, Parmod Kumar Kapur, Shaoying liu A Study of When to Release a Software Product from the Perspective of Software Reliability Models**, If a software product with a significant number of defects is released too early to users, the software manufacturer will incur post-release costs of fixing the faults. If a product is released too late, the additional development cost and the risk of missing a market window could be substantial. Software Reliability Growth Models (SRGMs) can capture the quantitative aspects of testing and are used to estimate software release time. From a cost-benefit viewpoint, SRGMs aid developers to decide the optimal release time of the software product by providing effective approaches to minimising the expected total software system cost. This paper helps answer the question of when to stop testing a software product by presenting the perspectives from a study of cost models. The study focuses on aspects of the relationship between development cost and schedule delivery of the software product and the total software cost including the risk costs, such as the penalty cost incurred due to late delivery of software product and the cost of fixing a fault during the warranty period. We also investigate various software release policies, for example, policies based on the dual constraints of cost and reliability.

**Chayanika Sharma, Professor. Sangeeta Sabharwal, Asst. Professor Ritu Sibal, A Survey on Software Testing Techniques using Genetic Algorithm**, The overall aim of the software industry is to ensure delivery of high quality software to the end user. To ensure high quality software, it is required to test software. Testing ensures that software meets user specifications and requirements. However, the field of software testing has a number of underlying issues like effective generation of test cases, prioritisation of test cases etc... which need to be tackled. These issues demand on effort, time and cost of the testing. Different techniques and methodologies have been proposed for taking care of these issues. Use of evolutionary algorithms for automatic test generation has been an area of interest for many researchers. Genetic Algorithm (GA) is one such form of evolutionary algorithms. In this research paper, we present a survey of GA approach for addressing the various issues encountered during software testing.

**SUNIL L. BANGARE, SEEMA BORSE, PALLAVI S. BANGARE, SHITAL NANDEDKAR, AUTOMATED API TESTING APPROACH**, Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. With the help of software testing we can verify or validate the software product. Normally testing will be done after development of software but we can perform the software testing at the time of development process also. This paper will give you a brief introduction about Automated API Testing Tool. This tool of testing will reduce lots of headache after the whole development of software. It saves time as well as money. Such type of testing is helpful in the Industries & Colleges also.

**Wilson Solís, Enrique Buenaponte, Marina Aguilar, Tools and Behaviour Abstraction: A Future for Software Engineering**, Software engineers rely on and use tools to analyse automatically and detailed the code and design specifications. Although many are still used to find new defects in old code, is expected in the future have more application in software engineering and are available to developers at the time of editing their products. If were possible build them fast enough and easy to use, software engineers would apply it to improve design and product development. To solve any problem, traditional engineering use programming languages, however, the level of abstraction of the most popular is not much larger than C programs several decades ago. Moreover, this level is the same in all the code and do not leaves room for abstraction of behaviour, in which the design is divided into phases and which gradually introduces more details. This article presents a study of the need for a larger set of analysis tools to create languages and development environments, which provide good support to archive this abstraction.

**Maneela Tuteja,Gaurav Dubey, A Research Study on importance of Testing and Quality Assurance in Software Development Life Cycle (SDLC) Models**, In recent years, software testing is becoming more popular and important in the software development industry. Indeed, software testing is a broad term encircling a variety of activities along the development cycle and beyond, aimed at different goals. Hence, software testing research faces a collection of challenges. A consistent roadmap of most relevant challenges is proposed here. In it, the starting point is constituted by some important past achievements, while the destination consists of two major identified goals to which research ultimately leads, but which remains as reachable as goals. The routes from the achievements to the goals are paved by outstanding research challenges, which are discussed in the paper along with the ongoing work. Software testing is as old as the hills in the history of digital computers. The testing of software is an important means of assessing the software to determine its quality. Since testing typically consumes 40~50% of development efforts, and consumes more effort for systems that require higher levels of reliability, it is a significant part of the software engineering Software testing is a very broad area, which involves many other technical and non-technical areas, such as specification, design and implementation, maintenance, process and management issues in software engineering. Our study focuses on the state of the art in testing techniques, as well as the latest techniques which representing the future direction of this area. Today, testing is the most challenging and dominating activity used by industry, therefore, improvement in its effectiveness, both with respect to the time and resources, is taken as a major factor by many researchers The purpose of testing can be quality assurance, verification, and validation or reliability estimation. It is a trade-off between budget, time and quality. Software Quality is the central concern of software engineering. Testing is the single most widely used approach to ensuring software quality.

**FREITAS, F. G.,MAIA, C. L. B.,CAMPOS, G. A. L.,SOUZA, J. T.(2010), Optimization in Software Testing Using Metaheuristics**, There are Software Test problems that may not be solved with traditional software engineering techniques. Nevertheless, such problems may be modelled mathematically in order to be solved with mathematical optimization, especially with the use of metaheuristics. In this context, a new research field called Search based Software Engineering (SBSE), which deals with solving software engineering problems by means of optimization techniques, has emerged. Given the significance of the Software Testing phase, a specific subarea called Search Based Software Testing (SBST) has become increasingly important. This paper presents the current state of the area and summarizes its future potential. Initially, we describe the main metaheuristics techniques used in the area. We follow with the presentation of the state of the art of SBST through the description of the main problems that have already been modelled and the results achieved. From the results, we can realize the promise of this field.

**Prakash. V,Ravikumar Ramadoss, S.Gopalakrishnan (IJCS,2012),** Software as a Service (SaaS) Testing Challenges- An In-depth Analysis, Organizations in this modern era are interested in deploying and making use of readymade business applications. The reasons are in a plenty - short time to market, lack of capital budget which is required to develop new software and for on-premise deployment and of course the rapid emergence of the Cloud. In fact cloud has attractive Software as a Service jargon which drives the idea of making use of ready-made and on-demand business solutions. Since there is an increasing demand in SaaS usage there is more in for SaaS Testing. This paper focuses on the challenges for testers in Saas and also analyses the ways in which SaaS testing differs from testing conventional applications

**Prakash.V, Ravi Kumar Ramadoss, S.Gopalakrishnan, Software as a Service (SaaS) Testing Challenges- an In-depth Analysis**, Organizations in this modern era are interested in deploying and making use of readymade business applications. The reasons are in a plenty - short time to market, lack of capital budget which is required to develop new software and for on-premise deployment and of course the rapid emergence of the Cloud. In fact cloud has attractive Software as a Service jargon which drives the idea of making use of ready-made and on-demand business solutions. Since there is an increasing demand in SaaS usage there is more in for SaaS Testing. This paper focuses on the challenges for testers in Saas and also analyses the ways in which SaaS testing differs from testing conventional applications. Conclusion was SaaS applications definitely help non-software organizations to concentrate their core business areas. It eliminates the effort required to develop, maintain and support software which is not their cup of tea. SaaS makes them to use their resources in a much productive form in their core business areas. On the other hand the expectations SaaS are so high and it has been projected as software which is readily used. This gives clients who are subscribing to SaaS, a complete product which is ready for consumption. It is the job of testers to make it true in majority of cases so this definitely throws upon some new challenges among testers. A comprehensive testing is necessary so that subscribers can make use of all the benefits offered by SaaS. Organizations must also need to realize the demand for End-to-End testing on these types of applications. And most importantly organizations who opt for SaaS must realize that they need a testing team which contains not only testers a team of but domain and business experts for carrying out tests with the right strategy.

[**Xihui Zhang**](http://www.oalib.com/search?kw=Xihui%20Zhang&searchField=authors)**,** [**Tao Hu**](http://www.oalib.com/search?kw=Tao%20Hu&searchField=authors)**,** [**Hua Dai**](http://www.oalib.com/search?kw=Hua%20Dai&searchField=authors)**,** [**Xiang Li**](http://www.oalib.com/search?kw=Xiang%20Li&searchField=authors) **(ITJ, 2012), Software Development Methodologies, Trends and Implications**: A Testing Centric View,The practice of software development has evolved steadily over the decades. Numerous methods and models (e.g., life cycle models and agile methods) have been proposed to enhance its efficiency and effectiveness. This study provides a testing centric view of software development practices. Specifically, it reviews software development methodologies (i.e., methods and models), identifies the latest trends in the industry and discusses their implications. The review of methodologies, the identification of these trends and the discussion of their implications will be useful to software development educators, students, practitioners and researchers.

R. Jeevarathinam, Dr. Antony Selvadoss Thanamani, (IJEST, 2010) TOWARDS TEST CASES GENERATION FROM SOFTWARE SPECIFICATIONS, Verification and Validation of software systems often consumes up to 70% of the development resources. Testing is one of the most frequently used Verification and Validation techniques for verifying systems. Many agencies that certify software systems for use require that the software be tested to certain specified levels of coverage. Currently, developing test cases to meet these requirements takes a major portion of the resources. Automating this task would result in significant time and cost savings. This testing research is aimed at the generation of such test cases. In the proposed approach a formal model of the required software behaviour (a formal specification) is used for test-case generation and as an oracle to determine if the implementation produced the correct output during testing. This is referred to as Specification Based Testing. Specification based testing offers several advantages to traditional code based testing. The formal specification can be used as the source artifact to generate functional tests for the final product and since the test cases are produced at an earlier stage in the software development, they are available before the implementation is completed. Central to this approach is the use of model checkers as test case generation engines. Model checking is a technique for exploring the reachable state-space of a system model to verify properties of interest. There are several research challenges that must be addressed to realize this test generation approach. Conclusion is that This work is continuing instrumentation of Java byte code and will extend this work to C and C++. Some other research group has done fundamental research in other areas, such as software model checking (model checking the application itself and not just the input domain) and static analysis. In general, the ultimate goal is to combine the different technologies into a single coherent framework

Marcin Kawalerowicz (Computer Science, 2013), Classification of automatic software build methods, The process of creating working software from source code and other components (like libraries, database files, etc.) is called "software build". Apart from linking and compiling, it can include other steps like automated testing, static code analysis, documentation generation, deployment and other. All that steps can be automated using a build description of some sort (e.g. script). This article classifies the automatic software build processes beginning at build script and reaching the various types of continuous integration. This paper described the build automation classification dividing the automated build on the levered and continual builds. It introduces continuous integration division to transitional (where build is not executed after every change; e.g. scheduled) and strict (where build is triggered after every change in the central repository). This paper described also methods of triggering the builds using polling and hooking.

Ralph LaBarge, Thomas McGuire (Computer Science, 2013), Cloud Penetration Testing, This paper presents the results of a series of penetration tests performed on the OpenStack Essex Cloud Management Software. Several different types of penetration tests were performed including network protocol and command line fuzzing, session hijacking and credential theft. Using these techniques exploitable vulnerabilities were discovered that could enable an attacker to gain access to restricted information contained on the OpenStack server, or to gain full administrative privileges on the server. Key recommendations to address these vulnerabilities are to use a secure protocol, such as HTTPS, for communications between a cloud user and the OpenStack Horizon Dashboard, to encrypt all files that store user or administrative login credentials, and to correct a software bug found in the OpenStack Cinder type delete command. Conclusion is that It is important to continue to perform penetration tests on the OpenStack Cloud Management Software. OpenStack is being used by many large companies for their private, as well as public clouds. Improving the overall security posture of OpenStack through penetration testing is a worthy effort since many OpenStack users are moving more of their applications and data into the cloud.

Alexey Markov, Software Testing Models against Information Security Requirements, This is an overview and classification of software testing models are done. Recommendations on the choice of models are proposed, this research has revealed a great number of mathematical models that can be used to assess the technical software security at different stages of its lifecycle, which is very important for information security cost budgeting. The suggested classification of models will be practical when making the right choice or complexing models on the basis of available statistics. One should bear in mind that because of rapid development, complexity, and diversity of modern software kits, the above models must not be expected ever to provide high accuracy, and very often they only provide intuitive data for taking a decision in preparation of software testing on the entire array of input data. Notwithstanding this, the results of these models applications are very convenient for use in both the justification of testing labour costs and reporting records, which may be helpful for the customer to view the obtained results as reliable.

N. Srinivasan, P. Thambidurai, (AJIT, 2012) On the Problems and Solutions of Static Analysis for Software Testing, Software testing is any activity aimed at evaluating an attribute or capability of a program or system and determining that it meets its required results. Although crucial to software quality and widely deployed by programmers and testers, software testing still remains an art, due to limited understanding of the principles of software. The difficulty in software testing stems from the complexity of software: we cannot completely test a program with moderate complexity. Testing is more than just debugging. The purpose of testing can be quality assurance, verification and validation, or reliability estimation. Testing can be used as a generic metric as well. Correctness testing and reliability testing are two major areas of testing. Software testing is a trade-off between budget, time and quality. In our approach, we focus the problems and solutions and the static analysis of those problems and solutions for software testing.

Sunil Kumar Scholar, Dr. P.K Yadav,(IJTA, 2011) Formal Methods of Software Testing and Terminology, Software provides a complete set of application development tools for building stand-alone, client-server, and Internet-enabled applications. But making it easy to build applications can be a two-edged sword. Not only can developers build powerful, sophisticated applications, but they can also build applications that frustrate users, waste computer resources, and damage the credibility of both the developer. Formal testing will help prevent bad applications from being released. For those unfamiliar with the topic, this paper can serve as a primer or first step in learning about a more formal, rigorous approach to software testing, conclusion is that Software testing is a cr itical element in the software development life cycle and has the potential to save time and money by identifying problems early and to improve customer satisfaction by delivering a m ore defect-free product. Unfortunately, it is often less formal and rigorous than it should, and a primary reason for that is because the project staff is unfamiliar with software testing methodologies, approaches, and tools. To partially remedy this situation very software testing and terminology. Without adequate testing, however, there is a greater risk that an application will inadequately deliver what was expected by the business users or that the final product will have problems such that users will eventually abandon it out of frustration. In either case, time and money are lost and the credibility and reputation of both the developers.

Deepti Gaur, Dr. Rajender Singh Chhillar (IJCSMS, 2012), HOW AUTOMATED TESTING TOOLS ARE SHOWING ITS IMPACT IN THE FIELD OF SOFTWARE TESTING, as, we know that Software testing is a very vast field in Software development life cycle. In this paper, we describe that how automated testing tools are very much convenient and easy to use which also makes testing faster and more effective in less time. Actually the world of technology revolves at fast pace today and among all Testing tools only automated testing tools makes Software testing more significant and effective.

Priyadharshini. V, Malathi.(Computer Science, 2014) A, Survey on software testing techniques in cloud computing, Cloud computing is the next stage of the internet evolution. It relies on sharing of resources to achieve coherence on a network. It is emerged as new computing standard that impacts several different research fields, including software testing. There are various software techniques used for testing application. It not only changes the way of obtaining computing resources but also changes the way of managing and delivering computing services, technologies and solutions, meanwhile it causes new issues, challenges and needs in software testing. Software testing in cloud can reduce the need for hardware and software resources and offer a flexible and efficient alternative to the traditional software testing process. This paper provides an overview regarding trends, opportunities, challenges, issues, and needs in cloud testing and cloud based application. Conclusion is that Functional testing acquires high usage of hardware and software to simulate user activity. While non-functional testing enables the measurement and association of the testing of non-functional attributes of software systems. Only a few advantages and few testing challenges of cloud computing have been identified. Testing is a periodic activity and new requirements need to be set up for each project.

Premal B. Nirpal, Dr. K. V. Kale (IJCSE, 2011), **A Brief Overview Of Software Testing Metrics,** Metrics are gaining importance and acceptance in corporate sectors as organizations grow, mature and strive to improve enterprise qualities. Measurement of a test process is a required competence for an effective software test manager for designing and evaluating a cost effective test strategy. Effective management of any process requires quantification, measurement and modelling. Software Metrics provide quantitative approach to the development and validation of the software process models. Metrics help organization to obtain the information it needs to continue to improve its productivity, reduce errors and improve acceptance of processes, products and services and achieve the desired Goal. This paper, focusing on metrics lifecycle, various software testing metrics, need for having metrics, evaluation process and arriving at ideal conclusion have also been discussed in the present paper. Conclusion is that Metric is the cornerstone in assessment and foundation for any business improvement. It is a Measurement Based Technique which is applied to processes, products and services to supply engineering and management information and working on the information supplied to improve processes, products and services, if required. It indicates level of Customer satisfaction, easy for management to digest number and drill down, whenever required and act as monitor when the process is going out-of-control.

Chitra Wasnik (IJCDS, 2013), SOFTWARE TESTING AND SOFTWARE DEVELOPMENT LIFECYCLES, Software Testing is the process used to help identify the correctness, completeness, security, and quality of developed computer software. What is Software Testing? Process of validating and verifying that a program does what it is expected to do. Software Testing is an empirical investigation conducted to provide stakeholders with information about the quality of the product or service under test, with respect to the context in which it is intended to operate. Software Testing also provides an objective, independent view of the software to allow the business to appreciate and understand the risks at implementation of the software. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs. It can also be stated as the process of validating and verifying that a software program/application/product meets the business and technical requirements that guided its design and development, so that it works as expected and can be implemented with the same characteristics. Software Development Life Cycle (SDLC) is a methodology that is typically used to develop, maintain and replace information systems for improving the quality of the software design and development process.

## **Cloud (Dynamic) and Storage Network (Networked Storage)**

un Yao,Ji-Wu Shu,and Wei-Min Zheng, Distributed Storage Cluster Design for Remote Mirroring Based on Storage Area Network, With the explosion of information nowadays, applying data storage safety requirements has become a new challenge, especially in high data available cluster environments. With the emergence of Storage Area Networks (SANs), storage can be network-based and consolidated, and mass data movements via Fiber Channels (FCs) can be of very high speed. Based on these features, this paper introduces a dual-node storage cluster designed for remote mirroring as a concurrent data replication method to protect data during system failures. This design takes full advantage of a SAN system's benefits, and it adopts a synchronous protocol to guarantee a fully up-to-date data copy on the remote site. By developing a Linux kernel module to control the I/O flow and by using the technologies of software Logic Unit Number (LUN) masking, background online resynchronization and a self-management daemon, we have achieved a reliable mirroring system with the characteristics of server-free data replication, fault tolerance, online disaster recovery and high performance. In this study, we implemented the design in a remote mirror subsystem built on a software Fiber Channel Storage Area Network (FC-SAN) system.

**Bhardwaj Sushil, Jain Leena, Jain Sandeep (2009) done research on An Approach for Investigating Perspective of Cloud Software-as-a-Service (SaaS).** As Cloud computing further extending the area of virtualization, SOA, Web center, Information technology management etc. and bringing new paths to extend dimension on utility computing. They found in their research that Cloud computing provide an web interface for your application so you don’t have to worried about the Hardwar’s and software’s and you have to only use services as a service. With virtualization it combines lots of facilities and enhancements and could computing can be categories further as SaaS, IaaS, Paas and SaaS.

**Shamsolmoali Pourya, Alam M.Afshar (2010)** done research work to introduced the concept of cloud service model overview and discussed on the way to design a platform for a virtual group of scientist to explain and display their achievements on the internet. They Found that Cloud computing has been defined and designed by the independent third party body and now after the development of cloud computing and internet become a new network manufacturing mode.

**Inyiama H.C, Okezie C.C (2010) this research work based on the techniques to efficiently utilize the free disk space on the connected networked machines**. Since in the usual way we do reserved some amount of space to a machine and the unused space sits ideal there, in same way lots of storage space reserved and sits ideal on the several machines, so here a new way were proposed to utilize such ideal space by using on shared basis on networked machines. It helped to understand the using networked storage in sufficient manner.

[**Hai Xin LU**](http://www.oalib.com/search?kw=Hai%20Xin%20LU&searchField=authors) **done A Study of Key Management for Encrypted Storage in Storage Area Network**. He checked that secure storage becomes more pervasive throughout the enterprise, the focus quickly moves from implementing encrypting storage devices to establishing effective and secure key management policies. He found that although a considerable amount of research has been dedicated to encryption algorithms in the past decades, key management becomes an issue due to the quantity of data. For example, with millions of data you will need million set of keys. To manage and keep track of these keys, complexity and operational inefficiency becomes an issue. Hence from this research paper I understand about the new challenges essential to effectively devise new key management policies and mechanisms for secure storage

**Hardeep Singh presented a paper on Cloud Computing: An Internet Based Computing**, here He done study on the overview of Cloud Computing. Further he analysed that Cloud Computing is an Internet-based computing; where resources, software and information are provided to computers on-demand, like a public utility; is emerging as a platform for sharing resources like infrastructure, software and various applications. And concluded on some of the prominent applications of Cloud Computing, and how they meet the requirements of reliability, availability of data, scalability of software and hardware systems and overall customer satisfaction.

**Gurudatt Kulkarni presented a research paper on Cloud Computing-Software as Service**, he does research on SaaS service model, He further stated that Cloud Computing, means “Internet Computing.” The Internet is commonly visualized as clouds; hence the term “cloud computing” for computation done through the Internet. With Cloud Computing users can access database resources via the Internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable. The paper concluded that Cloud computing is unlike grid computing, utility computing, or autonomic computing. In fact, it is a very independent platform in terms of computing. The best Example of cloud computing is Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.

**Mr. Ajey Singh, Dr. Maneesh Shrivastava presented a paper on Overview of Security issues in Cloud Computing**

They started with definition of cloud computing as management and provision of resources, software, applications and information as services over the cloud (internet) on demand. They further studied that Cloud computing comes into focus only when you think about what IT always needs a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. "Cloud computing continues to gain acceptance as a critical way to deliver on-demand information and resources to customers,” The cloud architecture is implemented in such a way that it provides you the flexibility to share application as well as other network resources(hardware etc.). This will lead to a need based flexible architecture where the resources will expand or contract with a little configuration changes. Cloud computing is often provided "as a service" over the Internet, typically in the form of infrastructure as a service (IaaS), platform as a service (PaaS), or software as a service (SaaS).From an end-users perspective, you don’t need to care for the OS, the plug-ins, web security or the software platform. Everything should be in place without any worry. This paper concluded on technical security issues in cloud computing, cloud computing has various benefits in an enterprise but major concern is how security is implemented in cloud computing

**Qiang Xu, Zhengquan Xu,**[**Tao Wang**](http://www.oalib.com/search?kw=%20Tao%20Wang&searchField=authors) **presented a research paper on Data-Placement Strategy Based on Genetic Algorithm in Cloud Computing**, They started With the development of Computerized Business Application, the amount of data is increasing exponentially. Cloud computing provides high performance computing resources and mass storage resources for massive data processing. In distributed cloud computing systems, data intensive computing can lead to data scheduling between data centres. Reasonable data placement can reduce data scheduling between the data centres effectively, and improve the data acquisition efficiency of users. They proceed in this paper, about the mathematical model of data scheduling between data centres is built. By means of the global optimization ability of the genetic algorithm, generational evolution produces better approximate solution, and gets the best approximation of the data placement at last. The experimental results concluded that genetic algorithm can effectively work out the approximate optimal data placement, and minimize data scheduling between data centres.

[**YOGITA GUNJAL**](http://www.oalib.com/search?kw=YOGITA%20GUNJAL&searchField=authors)**,** [**PROF. J.RETHNA VIRJIL JENY**](http://www.oalib.com/search?kw=PROF.%20J.RETHNA%20VIRJIL%20JENY&searchField=authors) **presented a paper on Data Security and Integrity of Cloud Storage in Cloud Computing**,He researched aboutCloud computing that it is the computing paradigm which enable obtaining resources like software, hardware, services over the internet. Most of user store their data on cloud for data security and integrity are prime related. In this article the problem of ensuring data integrity and security of data storage in cloud computing. For ensuring correctness of data, we assume the task of allowing a Third party auditor (TPA) used for exposing risk of cloud storage services on behalf of the cloud client to verify data integrity stored in the cloud. This paper focus on the data security, we proposed erasure correcting code in the file distribution to provide the redundancies and guarantee data dependability. In the end it is concluded that by using homomorphic token with distributed verification of erasure coded data, our scheme achieve storage correctness as well as error localization. Extensive security analysis show the proposed scheme is highly efficient and resilient against Byzantine failure, malicious data alternation attack and even server colluding attacks.

**B. Shwetha Bindu, B. Yadaiah published research paper on Secure Data Storage in Cloud Computing**, They started researching about Cloud computing which has gained a lot of hype in the current world of I.T. Cloud computing is said to be the next big thing in the computer world after the internet. Cloud computing is the use of the Internet for the tasks performed on the computer and it is visualized as the next- generation architecture of IT Enterprise. The ‘Cloud’ represents the internet. Further they found that Cloud computing is related to several technologies and the convergence of various technologies has emerged to be called cloud computing. In comparison to conventional ways Cloud Computing moves application software and databases to the large data centres, where the data and services will not be fully trustworthy. And they concluded on secure data storage in cloud; it is an important aspect of Quality of Service. To ensure the correctness of users’ data in the cloud, I propose an effectual and adaptable scheme with salient qualities. I learned that this scheme achieves the data storage correctness, allow the authenticated user to access the data and data error localization, i.e., the identification of misbehaving servers.

**MR. A.SRINIVAS, M.KALYAN SRINIVAS, A.V.R.K.HARSHA VARDHAN VARMA done A STUDY ON CLOUD COMPUTING DATA MINING**, They started analysing that Cloud Computing has become a main source for the data processing, storage and distribution. The storage of the data is simple and free to use. In data mining the data which is used as data security in a parallel computing platform. The some of the key features are used for the distribution of the data in certain things for the user understandable language. As we implemented the cloud storage in different servers for the security reasons data mining concept is used for the efficiency of the each part of the data is in a secure state. According to this concept we use data effectiveness from some so the supports of the AnazonEC2 map reduce platform. Conclusion is an approach for the experimental result and documented for the cloud computing data mining.

**Amandeep Kaur Parmar, Navjeet Singh, Dr. Gurdev Singh presented a research paper on AN OVERVIEW OF CLOUD TESTING AS A SERVICE**, Here Cloud storage is used , They started with Testing which is an important process for software quality assurance. Here it’s been noticed that a cloud infrastructure creates significant new opportunities for software quality assurance and testing. Making the test infrastructure that directly represents the production cloud infrastructure is too expensive – in terms of hardware, software licenses and testing professionals. It’s been concluded that to deal with this challenge the paper gives an overview of various cloud testing strategies and also introduces ‘Testing as a Service’, using Cloud computing.

**Cameron Fisher published a research paper on Cloud versus On-Premise Computing,** This study talks about investigating new choices for enterprise solutions, decision-makers need to increasingly weigh the merits of Cloud offerings. Accessibility, performance and security are key requirements along with vendor reputation and user community. The race to acquire customers and expand market share is prompting vendors to offer attractive introductory pricing to capture Cloud tenants. To keep in mind long term TCO and business outcomes, it’s essential to conduct due diligence to minimize risks or surprises. Further knowing the business, technology and contractual drivers will inform the decisions on the future of Cloud at your organization. Decisions to embrace the Cloud will always require complete analysis of the options and business metrics. After performing a full needs analysis and understanding the variables, a reliable and cost-effective result is better selected and managed. The conclusion is to understand the implications for deciding on Cloud versus On-Premise Computing going forward.

**Nithiavathy.R , Suresh J, presented paper on Verification of Data Reliability and Secure Service for Dynamic Data in Cloud Storage**, Cloud computing has been the genuine solution to the rising storage costs of IT Enterprises. The cost of data storage devices is too high rate at which data is being generated, where the enterprises or individual users to frequently update their hardware or software. The data outsourced to the cloud would help in reducing the maintenance. The user’s data are moved from cloud to large data centres, which are located remotely which does not have control over it. Hence there is a security breech which has to be resolved. To address this issue, we propose an effective method to achieve secure and dependable cloud storage by using distributed storage integrity auditing mechanism, which incorporate homomorphic token and distributed erasure-coded data for dynamically storing data. The proposed design allows the user with lightweight communication and computation cost. To maintain reliable cloud storage correctness, and to locate them is behaving server in which the data are frequently changing in cloud. It is an efficient method for dynamic operation which include erase, append, and block modification and it very effective in fighting against server colluding attacks, by zantine failure, malicious data block modifications.

The enterprise storage arrays architecture like Storage area Network (SAN), Direct attached storage (DAS), Network area storage (NAS) do even perform poorly when it comes to large scale distributed data intensive computing claimed by **Philip Chen and Zhang 2014**; Hennessy and Patterson 2011; Min et al. 2005. Authors also studied, in today’s’ storage system it has been noted that it significantly lacks in sustaining the strong growing concurrency and per compute throughput which is essential requirements of the I/O intensive applications executed in distributed environment.

**Priyanka Malviya presented a paper on A Study Paper on Storage Area Network Problem-Solving Issues**, she studied about some issues of SAN Infrastructure, How to access SAN, advantage and disadvantage, connection issues, HBA configuration issues, SAN Boot issues, SAN connectivity issues, and then solving those issue.

However, there are still issues that can occur and take some time to resolve that problem come in the Storage area network applications. The number of Storage Protocols and Storage Interfaces rapidly increased in a Networking technology field, it avoids the Bottleneck of data centres. This paper focuses on few guidelines that may help to understand some of the design issues involved in SAN. Those Problems that are abstract and cannot solve on SAN infrastructure and application run on SAN can solve after understanding all the parameters. Fibre channels also, make some concern that is not solvable and creates issues.

**Jiehui JU, Jiyi WU, Jianqing FU, Zhijie LIN (2011) published a research paper on A Survey on Cloud Storage**, They mentioned that As interest in the cloud increases, there has been a lot of talk about the maturity and trustworthiness of cloud storage technologies. They done a study and survey about, Is it still hype or is it real? Many end-users and IT managers are getting very excited about the potential benefits of cloud storage, such as being able to store and manipulate data in the cloud and capitalizing on the promise of higher-performance, more scalable, and cheaper storage. They concluded research paper with a typical Cloud Storage system architecture, a reference Cloud Storage model and Multi-Tenancy Cloud Storage model, survey the past and the state-of-the-art of Cloud Storage, and discuss the Advantage and challenges that must be addressed to implement Cloud Storage. Use cases in various Cloud Storage offerings were also summarized.

**Tran et al. 2012 proposed Applications are being deployed to read more data thereby increasing the I/O operation**. Clients make simultaneous accesses to trivial portions of gigantic multidimensional storage array. The clients vary its access operations with different patterns of read and write. This diversity limits the scalability of storage and data management, which becomes the critical issue. In order to encounter the needs of applications, the storage stack needs to be enhanced and specialized. In Exascale scenario, the chunking layout management becomes the bottleneck that is not addressed by this proposed model. There is a huge gap being created between the relational tables, file system and application model.

**Chen and Chen 2012 came up with dynamic active storage**. The research work discussed the essential idea of active storage – moving code near data for execution. The proposed model is more suitable for those kinds of applications where the data does not have dependency among various data nodes or the applications should share the successive data dependence. The proposed model gathers the data dependence pattern and file distributing information. Based on the information the active storage client will calculate and predict the bandwidth consumption to execute a task. If the predicted bandwidth cost is less than the file size, the offloading will not happen else the request is accepted. This research has contributed by proposing the DAS system and highlighted the data dependency will degrade the performance of I/O intensive application executed in the distributed and parallel networked environments.

**Authors Fitch et al. 2009 reviewed and researched on active storage fabrics concept.** The concept exhibits the computations being embedded with distributed data facilitating the execution of applications closer to the data in a parallel or serial fashion. The execution takes place by using the common data access methods and to alleviate the interoperations and executions. A slight modification needs to be made to the application-storage interface and the middleware to consider both the execution fashion. The authors have merged the fabric with middleware components using IBM GPFS, IB 2 and created prototypes with Blue Gene/L/P systems. The literature review reveals that the proposed framework is hugely dependent on the Memory (DRAM) of the parallel machine. Putting together the parallel in database memory components will form the active storage fabrics. It uses the Key/Value pair and is distributed along with partitioned data sets on different servers or parallel servers. The overhead here is maintaining the balance of the datasets, which are distributed. The Authors research has revealed directions to develop and modify utilities for data management with POSIX as well as RDBMS and how the active storage utilities and legacy components can inter work with each other.

**Sivathanu and Bairavasundaram n.d. Proposed performance and availability of the storage system can be improved by expending the semantically smart disks**. These disks are well aware of the file system structures and execute the file system operations. Explicitly, the research work enhanced the probability of using such disks for deploying database systems. In order to achieve the goal, authors have informed the required changes for configuration of database and the changes to be made in file system. This is vital to tap the potential of disks and explore its competencies to make database work on it. The limitations that are observed from this proposed model are lack of communication pattern. There is not enough intellectual regarding the pattern in which the applications communicate with the disks or vice-versa. Even though is some interfaces like SCI or IDE is used for communication purpose, in order to understand the semantics at both the ends there would be need of a third interface which is also not mentioned in the research study.

**Jun Yao, Ji-Wu Shu, and Wei-Min Zheng presented a research paper on Distributed Storage Cluster Design for Remote Mirroring Based on Storage Area Network**, They proceed with the explosion of information nowadays, and applying data storage safety requirements has become a new challenge, especially in high data available cluster environments. With the emergence of Storage Area Networks (SANs), storage can be network-based and consolidated, and mass data movements via Fiber Channels (FCs) can be of very high speed. Based on these features, this paper introduces a dual-node storage cluster designed for remote mirroring as a concurrent data replication method to protect data during system failures. This design takes full advantage of a SAN system's benefits, and it adopts a synchronous protocol to guarantee a fully up-to-date data copy on the remote site. By developing a Linux kernel module to control the I/O flow and by using the technologies of software Logic Unit Number (LUN) masking, background online resynchronization and a self-management daemon, we have achieved a reliable mirroring system with the characteristics of server-free data replication, fault tolerance, online disaster recovery and high performance. In this study, we implemented the design in a remote mirror subsystem built on a software Fiber Channel Storage Area Network (FC-SAN) system.

# **Research gaps identified in the proposed field of investigation**

Researcher has seen that As Huey-Min Wu, Bor-Chen Kuo and Jinn-Min Yang submitted research paper on “Evaluating Knowledge Structure-based Adaptive Testing Algorithms”. In this automated adaptive tool have interface and as per the login to user that tool was easily distribute questionnaires to take the exams and even was able to display results, but the scope was limited to evaluation and it was not to adapt the nature of run time environment.

**Morrison & Gluckman, 1994; Rouse & Rouse, 1983 discussed about different strategies, mainly interaction between operator and machine**, where machine could estimate different states of an operator’s activities, intentions, resources, and performance. Therefore same Information about the operator, the system, and the outside world could then be interpreted with respect to the goals and actions to determine the need for adaptive aiding, hence machine learning is proposed with regard to operator activities not as per dynamic environment. Kaber et al, 2001, told that the dynamic function allocation (DFA) is a peculiar aspect of AA. It basically consists of assigning the authority on specific functions to either the human operator or the automated system.

The York Method (developed at the Department of Computer Science, University of York) tell about the design consideration and desire of control to automate.

**The “Horse-Rider paradigm” explains the relation between human and automation** like the relation that a rider establishes with his/her horse.

As per all above findings , they were able to success in their design criteria but no algorithmic solution was provided to select criteria for automated tools as per the adaptive nature of environment and no study was done to design algorithm adaptive as environment changes and their implementation criteria in run time dynamic environment.

The researcher observed that there in all previous studies, no implementations and design done towards applications verifying networking cloud/environment and component under test (network node, NIC, HBA, etc...) With respect to the run time characteristics obtained thorough feedback mechanism.

It is clear there are different approaches to develop adaptive algorithms, especially in the area of avionics, Neuro-ergonomics, Educations, robotics and missile/space and communications technology but nobody have considered enough to implementation in testing of high performance storage networking and control systems and even no appropriate automated tool being developed on the basis of adaptive philosophical theory to work and test the technological and networking systems and high performance control systems.