Fault Tolerance Avoidance in Cloud Computing Software Applications

[1]S. Veerapandi, Dr.K. Alagarsamy[2]

[1]*Research Scholar, School of information Technology, Madurai Kamaraj University*
[2]*Associate Professor Rtd, School of information Technology, Madurai Kamaraj University*

Abstract:

Cloud computing is the innovation of service in computing era. In distributed computing which adoptable technology as it provides integration of software and resources. In recent years, cloud computing is highly developed and many company's adopted some type of cloud strategy and apply into their business development. Tremendous growth in cloud computing and its development motivated us to implement the fault tolerance techniques in the cloud environment.

Every system prone to failures but we have to maximize the up time of server. Fault tolerance evaluates the capability of a cloud to respond to an unexpected hardware or software failure. In order to achieve better performance and resource availability in cloud computing, failure should be monitored and handled on time. In this paper we have proposed a novel approach to increase the cloud environment performance and uptime using proxy server tools.

Keywords: *Cloud Environment, Database, Fault tolerance.*

Introduction:

Trust,ability and performance have become important in today's computer dependent world. In many industries where computer & applications are used, old dated, malware, expensive, virus, low configurations, non-maintained hardware's, non-upgraded application.

Just think, how the computer systems in aspace oriented projects are running without modify or non-upgraded. Howtheinstalled computer system in a nuclear plant malfunctioning? These are numerousexamples moreclose to normal day today life, are the telecommunications switching systems and the bank transaction systems.

To reach the needed performance and consistency, we need fault-tolerant computer environment,which has the abilityto tolerate faults by isolate defect modules, detecting failures due to that the rest of the environment can operate correctly.

Reliability is the common requirement in general-purpose computersystem itself.

Four important factors have consider when developing fault tolerance techniques

First thing, once upon a time computer placed in clean and cool environment for operating purpose but modern days computer moved to all the industrial sectors and service sectors, where the temperature will vary and pollution level will be in different condition like dust, pollutant, humidity and unstable power, Which makes the computer get fail.

Second thing user has changed. Olden days well trained people had operated the computers but now due to increasing use of computer, lot of untrained people operating the computer. These kinds of activities makes computer become vulnerable like physical damage, application lose and document missing, etc

Third important thing is service cost. Earlier days purchasing computer is very big financial burden but now a day's system become cheaper and service cost increased high. User becomes an operator which leads to problems and inflation in the service cost.

Final point, earlier days system probably used for individual purpose but the trend has changed and used in the large scale enterprises, distributed environment, cloud computing, space, nuclear, etc.When the complexity level has increased, system has to keep the reliability and fault tolerance.

Related Works:

Prasenjit Kumar Patra,Harshpreet Singh &Gurpreet Singh were proposed "Fault ToleranceTechniques and Comparative Implementation in Cloud Computing". Author discussed various existing models for fault tolerance and compared on the basic metrics for fault tolerance in cloud environment. In modern world, there are numerous of fault tolerance models which provide different fault tolerance approaches to enhance the

system. Still there are number of problems which need address in the every frame work of cloud environment.

Anjali D. Meshram, A.S.Sambare and S. D. Zade , "Fault Tolerance Model for Reliable Cloud Computing "proposed a model with fault tolerance mechanism. Prosed mechanism fault tolerance model for cloud is based upon reliability assessment of virtual machinesin cloud environment and fault tolerance of real time applications running on those VMs. A virtual machine is selected for computation on the basis of its reliability and can be removed, if does not perform well for real time applications.

N. Chandrakala and Dr. P. Sivaprakasam, " Analysis of Fault Tolerance Approaches in Dynamic Cloud Computing ", proposed a load balancing algorithm for virtual machine (VM). The VM load balancing algorithm is used to balance the load in the cloud pool. This method monitor the CPU usage depends upon the request. In thismethod tested in dynamic cloud environment. Middle node frequently checks the load of each VM in the cloud environment. In this method user can able to send their request to the middlenode, this is responsible for transfer the client request to the cloud. Here, the VM load is considered as in terms of CPU utilization of memory.

Ravi Jhawar, Vincenzo Piuri and Marco Santambrogio, "Fault Tolerance Management in Cloud Computing: A System-Level Perspective "proposed a system-level, innovative, modular approach on creating and handling fault tolerance in Cloud environment. Authors proposed a comprehensive high-level approach to hide the implementation details of the fault tolerance techniques to application developers and users by means of a dedicated service layer.

Proposed Method:
There are few fault tolerance techniques available in cloud computing environment. Since cloud computing emerges as one of trendy area, we

are concentrating cloud computing software application fault tolerance mechanism. In our earlier research paper we have discussed check point mechanism for application failures. In this research paper we are extending this work into the cloud environment with the help of some experts tool because cloud environment difficult one. Shelp system can continuously work even when the software application fault occur virtual machine environment. Cloud is in the requirement of automatic fault tolerance and process switching from one server to another server. Due to that requirement we are installing HAproxy in one server to monitor the application process running in the all the servers in cloud environment properly. If any one of the server get fails HAproxy switch theapplication process into another server for uninterrupted service.

There are numerous servers there in cloud environment. For understanding purpose we will take three servers and proxy server. Among that server 1 & 2 are application server and Server 3 is backup server. HAproxy configured on another one server.Fault tolerance and maintenance monitored by proxy server in terms of availability and applications.Server has been installed linux OS and SQL database. HAProxyserver is used to handleserver failures in fault tolerant cloud environment. Configured environment will support java and SQL.
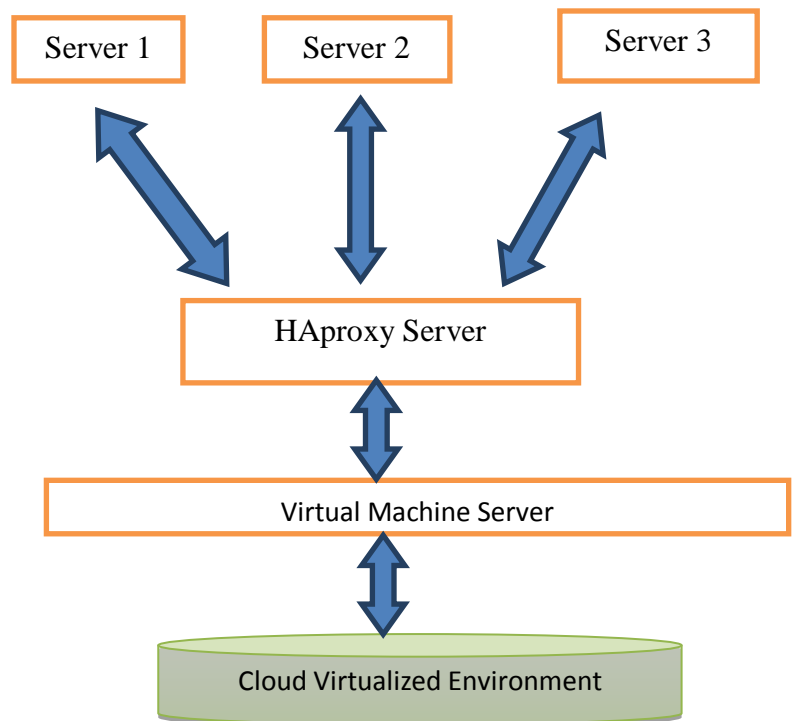

Fig: Proposed cloud Environment

Implementation & performance Results:

This model has been implemented in amazon cloud server facility with linux server.

	Existing System	Proposed System
Throughput	Normal	High
Response Time	10ns	7ns
scalability	Normal	high
Performance	Low	high

Throughput–It describes the number of tasks whose execution has been completed. Throughput of a system should be high.

Response Time- Time taken by the proposed modelto respond and its value should be made minimized.

Scalability– Number of nodes in a cloud system does not affect the fault tolerance capacity of model.

Performance– This parameter checks the performance of the cloud system. Performance of the system has to be enhanced at a sensible cost

Conclusion:

In this paper we have presented a novel approach in cloud environment for sustain in the case of fault tolerance occurrence. We have analyzed various factor and tested with cloud environment. Implementation and result analysis shows that proposed research work will give better result compare with existing models. A result shows that our approach will be useful one for society. It is our belief that this research will helpful to the modern society.

Future Work:

Every research has a loophole up to some limit because of the technology development. The method which seems to be a better solution for certain environment will not be a suitable one in the future endeavors. Growing domain Like cloud computing is the best example one. Young researchers can utilize our research and can make some better solution in this domain.

References:

[1] An Introduction to Fault-Tolerant Systems - Kjetil Nørv°ag, Department of Computer and Information Science Norwegian University of Science and Technology , 7034 Trondheim, Norway

[2] Yilei Zhang, Zibin Zhengand and Michael R. Lyu, "BFTCloud: A Byzantine Fault Tolerance Framework for Voluntary-Resource Cloud Computing", 4th International Conference on Cloud Computing, IEEE, 2011.

[3] Arvind Kumar, Rama Shankar Yadav, Ran vijay and Anjali Jain "Fault Tolerance in Real Time DistributedSystem", International Journal on Computer Science and Engineering (IJCSE),Vol. 3,ISSN: 0975-3397, No. 2 ,Feb 2011. Computer Science, pages 257–270, Springer, 2004.

[4] Felix C. Gärtner, "Fundamentals of Fault-Tolerant Distributed Computing in Asynchronous Environments", ACM Computing Surveys, Vol. 31, No. 1, March 1999.

[5] Lee Pike, Jeffrey Maddalon, Paul Miner, and Alfons Geser, "Abstractions for Fault-Tolerant Distributed System Verification", In Theorem Proving in Higher Order Logics (TPHOLs), volume 3223

[6] Sourabh Dave and AbhishekRaghuvanshi, "Fault Tolerance Techniques in Distributed System", International Journal of Engineering Innovation & Research Vol. 1, Issue 2, ISSN: 2277 – 5668, 2012.

[7] Anjali D. Meshram, A.S.Sambare and S. D. Zade , "Fault Tolerance Model for Reliable Cloud Computing ", International Journal on Recent and Innovation Trends in Computing and Communication, ISSN 2321 – 8169, Vol. 1, Issue: 7, July 2013.

[8] BanM. Khammas, "Design a Fault Tolerance for Real Time Distributed System", Al-Khwarizmi Engineering Journal, Vol. 8, No. 1, PP11 -17, 2012.

[9] Ravi Jhawar, Vincenzo Piuri and Marco Santambrogio, Member of IEEE, "Fault Tolerance Management in Cloud Computing: A System-Level Perspective ", IEEE, 2012 .

[10] Krish Jamsa, "Cloud Computing", First India Edition, Jones and Bartlett India Pvt. Ltd., 978-93-80853-77-2, 2013.

[11] AnjuBala, InderveerChana, "Fault Tolerance- Challenges, Techniques and Implementation in Cloud Computing", International Journal of Computer Science (IJCSI) Issues, Vol. 9, Issue 1, No 1, January 2012.

[12] Prasenjit Kumar Patra ,Harshpreet Singh &Gurpreet Singh, "Fault Tolerance Techniques and Comparative Implementation in Cloud Computing" International Journal of Computer Applications , Vol. 64, No.14, February 2013.

[13] N. Chandrakala and Dr. P. Sivaprakasam, " Analysis of Fault Tolerance Approaches in Dynamic Cloud Computing ", International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277 128X , Vol. 3, Issue 2, February 2013.

[14] OpenNebula, "Opennebula.org: The open source toolkit forcloud computing," http://opennebula.org, [retrieved: january,2012].

[15] Daniel Nurmi, Richard Wolski, Chris Grzegorczyk,Graziano Obertelli, Sunil Soman, Lamia Youseff, andDmitrii Zagorodnov

"The eucalyptus open-source cloudcomputingsystem," in 9th International Symposium onCluster Computing and the Grid (CCGRID), vol. 0, pp.124-131. Washington, DC, USA, 2009.

[16] Vishonika Kaushal and Vishonika Kaushal, "Autonomic faulttolerance using haproxy in cloud environment," InternationalJournal of Advanced Engeneering Sciences and Technologies,vol. 7, 2010.

[17] University. of Chicago, "Nimbus is cloud computing forscience," http://www.nimbusproject.org/, [retrieved: january,2012].

[18] Francesco Tusa, Maurizio Paone, Massimo Villari, and AntonioPuliafito, "Clever: A cloud-enabled virtual environment,"in IEEE Symposium on Computers and Communications(ISCC), pp. 477-482. Riccione, Italy, 2010.

[19] Amazon, Inc, Amazon Elastic Compute Cloud (Amazon EC2).Available: http://aws.amazon.com/ec2/#pricing,

[20] Microsoft, "Windows azure: Microsoft's cloud services platform,"http://www.microsoft.com/windowsazure/.

[21] Y.M. Teo, B.L. Luong, Y. Song, T. Nam,"Cost-Performance of Fault Tolerance in Cloud Computing,International Conference on Advanced Computing andApplications, (Special Issue of Journal of Science andTechnology, Vol. 49(4A), pp. 61-73), Ho Chi Minh, Vietnam, October 19-21, 2011.

[22] L. Arockiam, S. Monikandan& G. Parthasarathy,"Cloud Computing: A Survey, International Journal of InternetComputing (IJIC), and ISSN No: 2231 – 6965, Volume-1, Issue-2, 2011.

[23] Qi Zhang, Lu Cheng,RaoufBoutaba," Cloud computing: state-of-the-art and research challenges, J InternetServAppl (2010) 1: 7–18 DOI 10.1007/s13174-010-0007-6.