International Journal of Advanced Scientific Technologies ,Engineering and Management Sciences (IJASTEMS-ISSN: 2454-356X) Volume.3,Special Issue.1,March.2017

# A New Framework for Trustworthy Cloud Computing Environment

***R. Yamuna[1], M. Usha Rani[2]***
***[1]Research Scholar, [2]Professor, Dept. of Computer Science, SPMVV, Tirupati.***
***ryamunaspmvv@gmail.com, rambabu.en@gmail.com, musha_rohan@yahoo.co.in.***

***Abstract:***

***Cloud computing technology has become an integral trend in the market of Information Technology. Cloud computing, virtualization are Internet-based lead to various types of failures to occur and thus the need for reliability and availability has become a crucial issue. To ensure cloud reliability and availability, a Strong fault tolerance strategy should be developed and implemented. Most of the early fault tolerant strategies focused on using only one method to tolerate faults. This paper presents a New Trustworthily framework to cope with the problem of fault tolerance in cloud computing Environments. The new Adaptive framework works both duplication and checkpointing methods in order to obtain a reliable platform for bring out multi tenants requests. And also, the new algorithm determines the most suitable fault tolerance method for each selected VM. To evaluate framework's performance simulation experiments are carried out. Finally the experiments show that the proposed new framework improves the performance of the cloud in terms of availability, overheads, throughput, and monetary cost.***

***Keywords:: Cloud Computing, reliability and availability , crucial issue , fault tolerant strategies, adaptive framework, replications, check pointing methods.***

## I.INTRODUCTION

Today, most of the companies, from single to giant enterprises, migrated to cloud computing so as to get a high level of productivity by entrusting their IT problems to associate knowledgeable one. Cloud computing provides comprehensive IT services and solutions for each firms and individual users [2], [3]. they'll lease elements of the cloud while not spending time and cash in constructing or shopping for these elements [4]. In cloud systems, computing is introduced as associate abstract service over the net with concealment the small print of implementation [3]. The readying models of cloud computing systems area unit public, personal or hybrid. In public, services area unit provided through the net in sorts of cloud utilization. the most classes of those applications embrace Infrastructure-as-a-Service (IaaS), Software-as-a-Service (SaaS) and Platform-as-a-Service (PaaS). Most of IT businesses cannot invest in sure services like supercomputer-class services. In IaaS, the cloud provides computing, storage and networking resources with any needed configuration and capability as paid services to the purchasers. samples of sensible applications of IaaS will embrace Amazon EC2 and Google cipher Engine. In most IT organizations, there are not any enough consultants to develop and run the desired code applications. In SaaS, the cloud provides customers with access to professionally enforced code applications and therefore they save the customers' cash. Salesforce.com and Google Apps area unit samples of sensible applications of SaaS. In PaaS, customers will run their custom applications on the final purpose code and hardware with the foremost recent configurations. sensible applications of PaaS embrace Google App Engine and Microsoft Azure [4], [5]. personal clouds area unit enforced and maintained by enterprises to supply internal services and that they have additional flexibility than public clouds however they're dearer. In hybrid clouds, some parts of computing will be tired a public cloud whereas different parts will be done internally through the personal one [6]. In spite of cloud computing systems wont to offer services of computing, they're not utterly reliable and that they may suffer from outages of services owing to failures [7]. associate outage is outlined because the case within which a client request isn't completed in its desired point. With the rise of the cloud users, the amount of needed services will increase then the likelihood of outages will increase. the most causes of those outages embrace code failures like incorrect upgrade, excessive work load, hacking, etc. and hardware failures like unobtainable resource, network failure, power down, etc. Outages area unit fashionable publically clouds within which a colossal range of services is provided to customers with needed levels of service quality. within the last decade, several outages have occurred in most known public cloud environments. In 2013, the house page of Amazon went down for pretty much associate hour, that prices Amazon near 5 million North American country greenbacks [8]. In 2014, many Google services like Gmail, Calendar, Google Docs were stumbled for concerning associate hour. Some servers of Google receive incorrect configurations that cause in depth errors [9]. In 2015, some services of Azure cloud like virtual machines and websites had over 2 and 0.5 hours of interruptions across multiple regions [10]. Cloud outages or failures have an excellent impact on each the cloud vendors and therefore the customers. For vendors, a profit are going to be lost owing to the cloud resources that may be employed in order to alleviate the consequences of outages occurred. K. Bilal et al [11] have expressed that every period hour in an exceedingly knowledge center prices

## III.PROBLEM DESCRIPTION:

Cloud resources one collected into various virtual machines to perform customer requests. So there may be

some failures will occur that will extend the time expected to carryout the customer requests and this will clean/wash up the cloud resources. So for customers, they will not get their services in the time expected.

For cloud, failures will lead to loss of cloud resources and then money.

So this will lead to a considerable impact on the reliability, credibility and reputation of cloud. Applying fault tolerance methods to face following challenges:

The cloud can have only sing,e-copy of VM that can carry out the request of customer. Also, the cloud may have multiple VM's to carry requests, but only one is available , if others are busy then replication method can't be applied.

Solution is: Checkpoint method is involved in our framework beside replication. Our framework allows the cloud to choose either checkpoint or replication to achieve fault tolerance.

The no.of replicas(copies) not be fixed because that will lead to poor influence on cloud. This happens because all other virtual machines will be used to carry out the same service. So cloud will loose profit.

Solution is: Replication algorithm is applied when there are multiple and available virtual machines in cloud that can carry out the

Customer's request replication method not applied on all VM's, only replicated on most valuable VM's that will have a great impact in cloud.

Determining the most valuable VM is a great challenge solutions is, the percentage of profit gained by the cloud when using the VM is involved in deciding no.of replicas required for each VM's.

In the checkpointing, determined the length of checkpointing interval is a major challenge.

Solution is: main advantages of checkpointing over replication is to reverse the computing resources of cloud to other customer request and reduce the profit loss because of using replication .

Algorithms for this frame work :

SFT Algorithm : (selecting fault tolerance ):

This algorithm objective is to select the appropriate method for tolerating fault in cloud Computing system.

The algorithm depends on using customer's requirement and the available information About virtual machines.

Process:

Step 1:The algorithm prepares a list vm's that can carry about the customers request and satisfies the customer's requirement.

Step 2: customer requirements considers as cost and monitory costs then compares both customers requirements with estimated vm's both costs and monitory costs.

Then compare both customer's requirements with estimated VM's both costs and monitory costs.

Step 3: Therefore after, the algorithm selects check pointing methods if there is only a single vm in the list. Otherwise, the algorithm selects replication method.

Replication algorithm :

Replication is applied when there are multiple and available vm in cloud that can carry out the customers request.

However it is the central challenge to define the optimal no of replies.so, we only need to replicate requests executed on most valuable vm that will have a great impact on cloud if they fail.

In order to determine most valuable vm's in cloud, vm's should be ranked according to their value and influence on cloud.

The ranking is based on failure probability of vm and profit gained through using it. If the value of failure probability becomes high, the need for applying fault tolerance methods rises.

Algorithm for replication:

This algorithm for determine no of replicas of a request.

If failure probability or profit percentage of vm increases the need for more replicas increases.

Consequently, vm with higher value of profit or failure probability have higher fault tolerance needs and then higher priority of replication than other vm's .

$F_i(X)$ : failure probability of vm i

$P_i$ : percentage of cloud profit gained through usage of vm i

Rep : the no of replicas

```
 for (a=0; a<n;a++)
  {
   for(b=0;b<m;b++)
{
 If(Fi(X)(a)<=Fi(X)<Fi(X)(a+1)and pi(b)<=pi<pi<(b+1))
          Rep = Rep(a)(b);

}
}
```

3.Checkpoint algorithm :

This algorithm reduces failures when occured. Moreover , most cloud computing systems implements by replication techniques.

From the view of cloud service provider, replication results in profit loss due to allocating extra components to execute the replicas of a request, particularly these components may be use full for other request.

From the view of customers, replication is time loss due to waiting for components that execute replicas to be free from executing other requests.

So main advantage of using checkpointing over replication is to reverse the computing resources of the cloud to other customer's requests and to reduce the profit loss because of using replication.

This algorithm mainly influenced by checkpointing interval and latency.

Checkpoint interval represents the time b/w a check point to next check point.

Checkpoint latency is time consumed in saving a checkpoint.

If checkpoint interval is small, there will be a large no of check points. So cloud resources are consumed highly.

If the check point interval is large, there will be a small no of checkpoints so cloud resource are consumed slightly.

Process :

Determining the length of checkpointing interval is the major challenge for challenging technique.

Fixed interval leads to required checkpoints that consume cloud resources and increase checkpoint latency.

First,algorithm assumes that the length of the checkpointing interval must not be fixed during the execution of the customers task.

Then, algorithm calculates the next checkpointing interval at the time of current checkpoint.it is calculated based on failure history of vm on which task is executed.

In the case of a poor failure history, the algorithm will shorten the checkpoint interval. Moreover, the algorithm will prolong the check point interval in case of good failure history.

## IV. CLOUD ARCHITECTURE

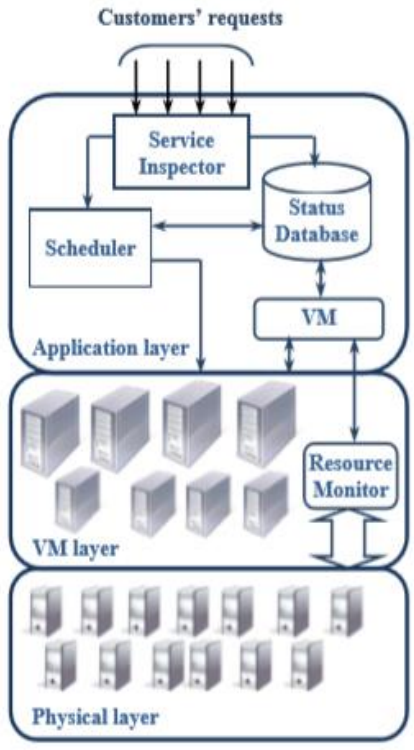


Figure 1. The level architecture of a cloud computing system.

Cloud computing environments should have the ability to receive, perform, monitor and control customers' requests. The cloud should be reliable in order to provide its services within the limits of customer requirements. This section describes the proposed framework which enables the cloud to be reliable. As shown in Figure 1, the architecture of the framework assumes the cloud consists of three main layers: application, virtual and physical layers. One function of the application layer is to allow customers to interact with the cloud. Also, it performs the scheduling of customers' requests to the virtual machines in the cloud. In addition, tolerating faults is the responsibility of the application layer. In order to perform these functions, the structure of the application layer comprises four modules:

1. Service Inspector:

This module is chargeable for guaranteeing the accomplishment of customer's QoS necessities. during this paper, the thought-about QoS necessities embrace time and financial prices. A client will submit his request to the cloud through this module at the side of the QoS necessities. The module asks the standing info module for the supply of acceptable VMs which will perform the client request and gets a reply. If the reply indicates the presence of acceptable VMs which will perform the request at intervals customer's necessities, the Service Inspector can settle for the request and it'll deliver it to the computer hardware module. Otherwise, the request are going to be discarded.

2. Scheduler:

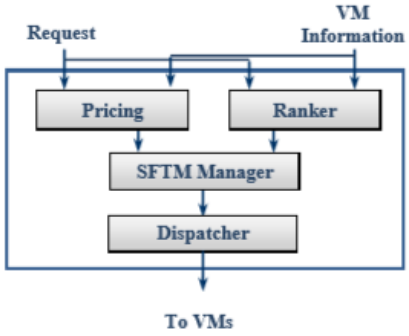


Figure 2. Scheduler components and their interactions.

The main perform of the hardware is to assign every request to the appropriate virtual machine that may perform it inside the boundaries of client needs. Also, hardware has the responsibility of decisive the charge of serving the request. additionally, hardware has the responsibility of fault tolerance. so as to try to to its responsibilities, the hardware module ought to contain the subsequent components: Ranker, Pricing, programing and Fault Tolerance Manager (SFTM) and Dispatcher. Figure two illustrates the interactions between the most elements of the hardware. the most role of the Ranker is to work out the foremost valuable VMs within the cloud (see subdivision four.2). It receives customer's request with QoS needs from the Service Inspector and contacts the standing information module so as to induce data concerning the virtual machines that may accomplish

the request. supported this data, it prepares an inventory of VMs that may fulfill the time and financial needs of the customer's request. evaluation part determines the charge the client ought to get hold of the service. SFTM implements algorithmic program one so as to pick out the acceptable fault tolerance technique for the virtual machine appointed to every request. The algorithmic program selects either checkpointing or replication supported data concerning virtual machines. Dispatcher delivers the requests of consumers to the chosen VMs.

3. Status Database:

It represents the central repository of data concerning all virtual machines within the cloud like computing capability, storage capability, price, usage history and failure history.

4. VM Monitor:

The most operate of this module is to watch the performance of the virtual machines within the cloud. It notifies the standing info to update the record of a VM in an exceedingly case of the failure or the recovery of that VM. additionally, this module has the responsibility for forming or reforming virtual machines of the cloud. it's virtualization software package accustomed type distinctive and isolated virtual machines exploitation the cloud physical resources.

## VI. CONCLUSION

Failures area unit inevitable in cloud computing environments. To treat this issue, associate adaptational framework for tolerating faults in cloud computing environments has been planned during this paper. The framework has one algorithmic program for choosing virtual machines to hold out customers' requests and another algorithmic program for choosing the acceptable fault tolerance technique. each replication and checkpointing ways area unit enclosed within the framework. The performance of the framework is evaluated with a replication-based algorithmic program and additionally with a checkpointing-based algorithmic program in terms of outturn, cloud overheads, financial price and accessibility. Experimental results indicate that the planned framework improves the cloud's performance.

In the future work, we'll embrace investigations concerning applying our framework and therefore the well-established fault detection and reliable management ways for advanced industrial processes. Also, we'll give a lot of thought to the migration of information centers and tasks between them.

## REFERENCES

[1] R. Buyya, C. Yeo, S. Venugopal, J. Broberg and I. Brandic, "Cloud computing and emerging it platforms: vision, hype, and reality for delivering computing as the 5th utility," Future Generation Computer Systems, vol. 25, pp. 599–616, 2009.

[2] M. Chen, Y. Ma, J. Song, C. Lai and B. Hu, "Smart Clothing: Connecting Human with Clouds and Big Data for Sustainable Health Monitoring," ACM/Springer Mobile Networks and Applications, vol. 21, issue 5, pp. 825-845, 2016.

[3] A. Alhosban et al, "Self-healing Framework for Cloud-based Services," in Proc. of 2013 Int'l Conf. on Computer Systems and Applications, May 2013.

[4] E. Deelman, G. Singh, M. Livny, B. Berriman and J. Good, "The cost of doing science on the cloud: the montage example," in Proc. of ACM/IEEE Conference on Supercomputing, SC'08, Austin, Texas, pp. 1– 12, 2008.

[5] M. Armbrust, A. Fox, R. Griffith, A.D. Joseph, R.H. Katz, A. Konwinski, G. Lee, D.A. Patterson, A. Rabkin, I. Stoica, M. Zaharia, Above the clouds: a Berkeley view of cloud computing, Technical Report No. UCB/EECS-2009-28, The University of California at Berkeley. Available: http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS2009-28.pdf.

[6] L. Wang, M. Kunze, J. Tao and G. Laszewski, "Towards building a cloud for scientific applications", Advances in Engineering Software, Vol. 42,pp. 714–722, 2011.

[7] A. Gómeza, L. Carril, R. Valin, J. Mouriñoa and C. Cotelo," Fault-tolerant virtual cluster experiments on federated sites using BonFIRE," Future Generation Computer Systems, vol. 34, pp. 17–25, 2014.

[8] The worst cloud outages of 2013, Online, cited 01.04.2016. Available: http://www.infoworld.com/slideshow/107783/the-worst-cloud-outagesof-2013-so-far-221831.

[9] The worst cloud outages of 2014, Online, cited 01.04.2016. Available: http://www.infoworld.com/article/2606209/cloud-computing/162288The-worst-cloud-outages-of-2014-so-far.html.

[10] Assessing cloud infrastructure provider performance in 2015, Online, cited 01.04.2016. Available: http://searchcloudcomputing.techtarget.com/feature/Assessing-cloudinfrastructure-provider-performance-in-2015. [11] K. Bilal et al, "Trends and Challenges in Cloud Data Centers," IEEE Cloud Computing Magazine, vol. 1, no. 1, pp. 10-20, 2014.

[12] K. Ganga and S. Karthik, "A Fault Tolerant Approach in Scientific Workflow Systems based on Cloud Computing," in Proc. of the 2013 International Conference on Pattern Recognition, Informatics and Mobile Engineering (PRIME), pp 378-390, Feb.2013.