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Analysis of Fault Tolerance Approaches in Dynamic Cloud Computing

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Abstract - Cloud computing provide many service to the user. Now a day the user level is highly increased to utilize the services in cloud computing. In cloud computing the major problem area is fault tolerance.. Many clients can request the server at a time make the server overloading cause fault. In our approach the load balancing technique is use to avoid fault. There are various fault tolerance techniques in existing cloud computing. They are self healing, job migration, static load balancing and replication. There are some drawbacks in this technique.. Our proposed method the dynamic load balancing technique is used to avoid this fault tolerance in cloud computing. The Dynamic Load Balancing algorithm checks the utilization of the CPU, if CPU has less utilization given in the algorithm can response the client request otherwise the request is shift to another server with the help of load balancer. This technique gives the better result. This paper deals to analysis the fault tolerance method by using fault tolerance algorithm.

Keywords: Cloud computing, Fault tolerance, Load balancing, Replication, Load balancer.

I. INTRODUCTION

Cloud computing is the fastest technology today. The number of user are highly increase.. Cloud Providers offer services that can be grouped into three categories [1].

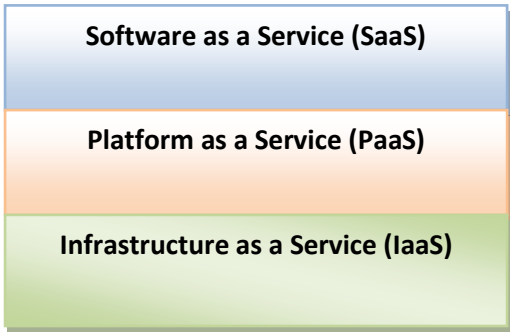

Fig1: Cloud Computing Services

A. ***Software as a Service (SaaS):*** The loud application eliminates the need to install and run the application on the customer's own computer, thus removing the burden of software maintenance ongoing operation to the user[2].
B. ***Platform as a Service (PaaS):*** PaaS providers offer a predefined combination of OS and application servers
C. ***Infrastructure as a Service (IaaS) :*** The Cloud service providers provide computers, as physical or more often as virtual machines. Some common examples are Amazon, GoGrid, etc.

II. REVIEW OF LITERATURE

Load balancing is the important concept in network. The load balancer accepts multiple requests from the client and distributing each of them across multiple computers or network devices based on how busy the computer or network device is. Load balancing helps to prevent a server or network device from getting overwhelmed with requests and helps to distribute the work. For example the client can send application request to the server at that time the server over loaded in another process the current process is wait for some time till the serve is idle. Here the client can wait. To avoid this first we check the utilization of the serve and process the client request. The CPU utilization can properly done by load balancing algorithm. The load balancing algorithm which is dynamic in nature does not consider the previous state or behavior of the system, that is, it depends on the present behavior of the system [3].

III. EXISTING CLOUD COMPUTING

In the existing cloud computing there is no intermediate node like load balancer[5]. The process of the load balancer is to check server utilization if the server has maximum load the request is transfer to another server and identify the reliable server to process the client request. If the load balance is not available the client can wait for long time and process their request in the particular server only where the client give request. The existing the cloud use the following technique instead of load balancer[6][7].

A. ***Self healing***: Maximum human interaction. Use certain rules.
B. ***Job migration***: During the time of failure the job is migrating into another server.
C. ***Replication***: The same data is stored in different place. Replication-Various task replicas are run on different resources, for the execution to succeed till the entire replicated task is not crashed. It can be implemented using tools like HAProxy, Hadoop and AmazonEc2 etc.
D. ***Static load balancing:*** Only fixed capacity of the data is transfer. There are many drawbacks in above four methods. To overcome this drawback the cloud computing use intermediate node in the recent days[8][9]

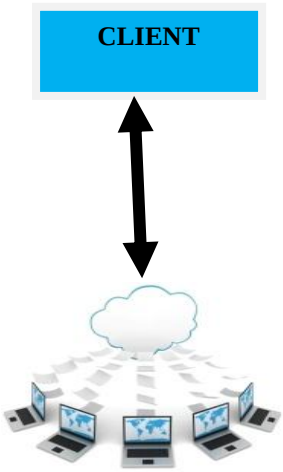

Fig *2: Cloud without intermediate node*

IV. PROPOSED CLOUD COMPUTING

In proposed method the dynamic cloud computing environment is used, The intermediate node is used to monitor the load of each VM in the cloud pool. In this approach the user can send the request to the intermediate node. It is responsible for transfer the client request to the cloud. Here, the load is consider as in terms of CPU load with the amount of memory used, delay or Network load[10]

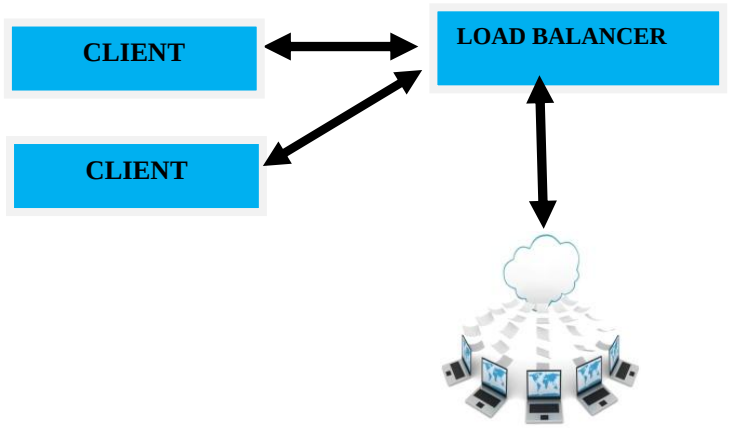

Fig 3*: Cloud with intermediate node*

Load Balancing Algorithm

The VM load balancing algorithm is used to balance the load in the cloud pool. This algorithm check the CPU utilization depends upon the request ***Input:*** Cloud, VM nodes, Task and allocate the server to the client[4].

Output: Solution(s) i.e.Task Completion without Fault

Begin
for each VM: n, n1, n2... ni
Node utilization u(ni) = 0;
Memory m(ni)=0;
do
    for each cloud c1, c2…ci
    do Select VM node (n)
    end
end
do
    Select task Rand(t)
    Allocate to cloud Ci <-- ti
    Calcultate U(ti) && M(ti)
    Calculate U(ni)&& M(ni)
if U(ti) < U(ni) && M(ti) < M(ni) && U(ni) < 75% && M(ni)<75%
    do allocate task to VM
end
if any fault(f) occurs
    do while task completes
     do Switch VM
    go to if U(ti) < U(ni) && M(ti) < M(ni) && U(ni) < 75% && M(ni)<75%
    Allocate task (ti)
end
return solution(s);
end

V. RESULTS AND DISCUSSIONS

In proposed method we take two VM for test. We check the CPU usage and the memory usage of the two VM and we identify the reliable VM which contains less load and high memory can process the client request. The balancing section is responsible for determining where virtual machines will be instantiated. It does this by first gathering the utilization percentage of each active compute node. In this algorithm the load balancer node check the CPU utilization if the CPU is less than 75% utilization the request accepts otherwise VM load balancing Algorithm instantiates a new virtual machine on the compute node with the lowest utilization number[11] The algorithm is to identify the reliable VM and process the client request. For that the algorithm cerate cloud pool. The cloud pool contain the VM.

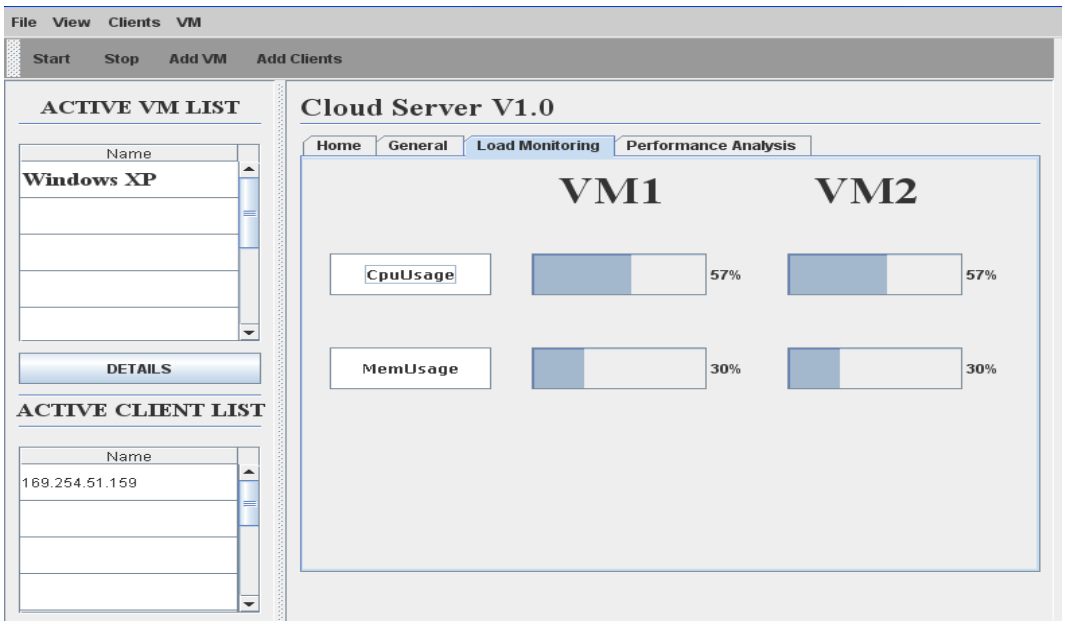

Fig 4: The Comparison of Two VM

The above Fig 4: we find the CPU and the memory usage. If the memory and the CPU has reliable to process the request that VM is selected from the cloud pool. First the client request is sent to load balancer. The load balancer can send that request to cloud pool with the use of client IP address.

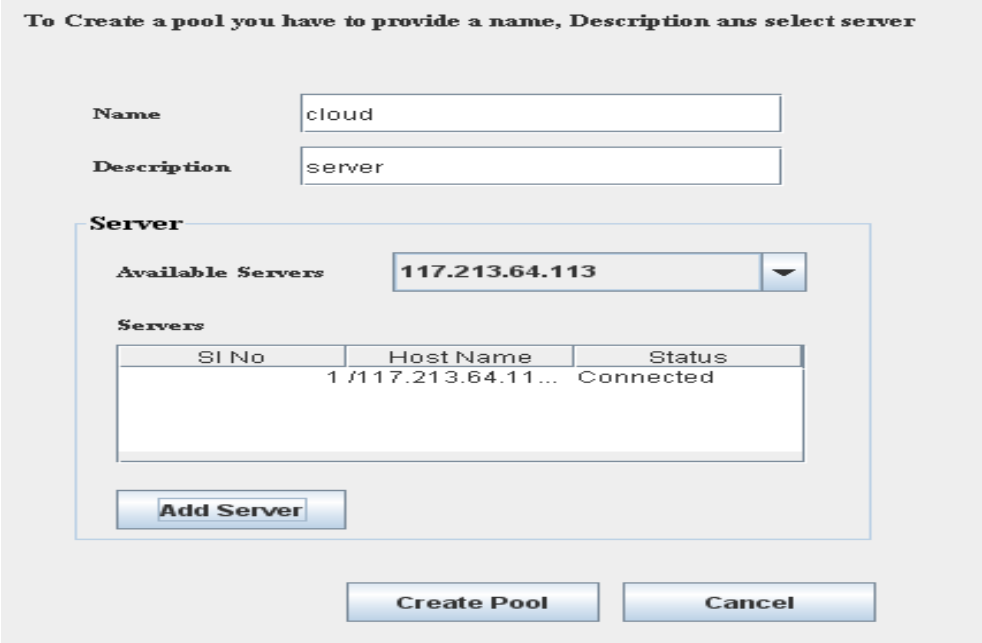

Fig 5: The Creation of cloud VM

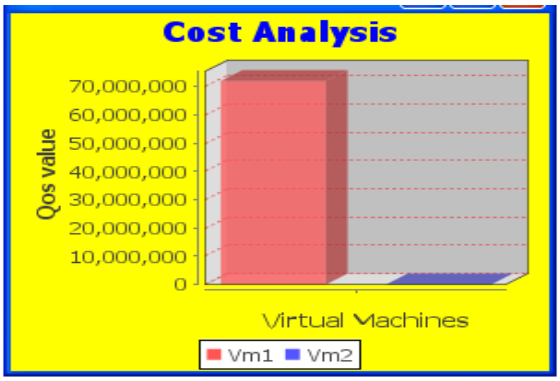

Fig 6: The cost analysis chart

The cost analysis of the load balamcing cloud computing is very efficent and improve the time. The VM payload barrier load balancing algorithm is efficent algorithm in VM cloud.

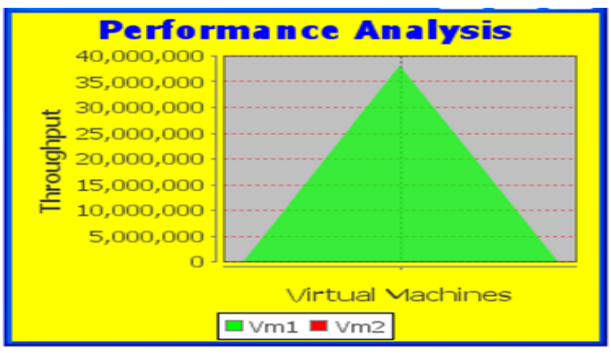

Fig 7: The Performance analysis chart

The performance analysis of the load balancing gives the high throughput and incerase the perofrmance

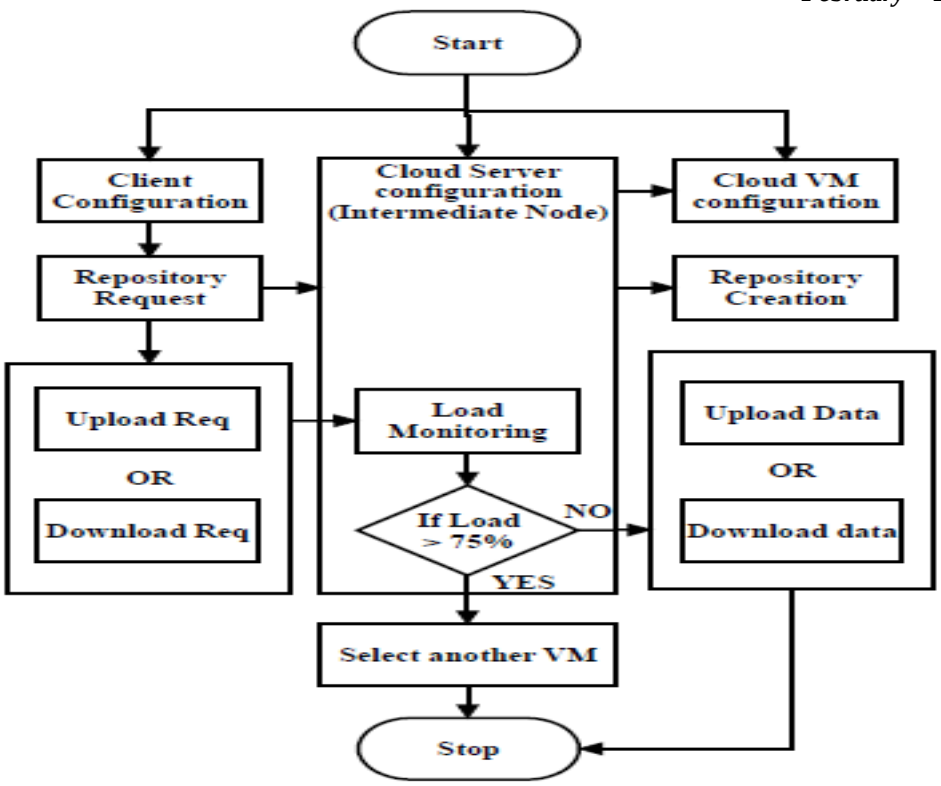

Fig 8: Proposed method flow

In proposed cloud computing the VM monitoring systems can achieve the following

- High scalability
- Dynamic load balancing
- Fault tolerance
- Low overhead

In proposed cloud computing the VM monitoring systems can achieve the following concepts[12]

- ***High scalability:*** The scalability in cloud computing refers to increase the number of clients request with simultaneous request can perform better without fault.

- ***Dynamic load balancing:*** The dynamic load balancing refers to the client can upload or download the document for the cloud server without any specific memory capacity. The intermediate node will check the CPU and the memory usage. If the CPU usage is above 75% the client will process otherwise the client request will go to next available VM.

- ***Fault tolerance:*** The fault in cloud can reduce with the use of dynamic load balancing algorithm. The load balancing algorithm check the CPU utilization and load the request.

- ***Low overhead:*** Setup an alternate computer or network device that can be used as an alternative access point or can share the load through a load balancing.

One of the major drawbacks in cloud computing is finding difficulties over respected software applications. Most of the web applications are configured to use the Apache HTTPd for the interface process at the application level. But the Apache HTTPd does not designed for the dynamic reconfiguration. In our strategy we have made and implementing a generic load balancing approach. Our strategy is based on the Multi-Master-Replication. In our approach Load Balancer acts as an intermediate server which redirects the message to one replica and transmits responds to the client[13].

VI. CONCLUSION

The Dynamic load balancing is a technique to use the cloud computing in efficient manner. The algorithm used in this approach can automatically monitor the load balancing with the use of load balancer The data replication, job migration and the static load balancing is avoid in our method. The CPU and Memory can be utilized properly and identify the reliable VM in the cloud pool.

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