Multilevel Communication Aware Approach for Load Balancing

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***Abstract* - Cloud computing represents to Application and Services that run on a Distributed network by virtualized resources and accessed by Internet protocols and networking standards. Cloud computing makes dreams of utility computing with a pay-as-you-go, cloud is scalable, universally available system. Issues with latency, transaction control, security, load management and fault tolerance. Load balancing is process of distributed load over the different nodes for better utilization and throughput, lower latency, reduce response time and avoid system overload. Improvement the maximum profits use efficient Load balancing algorithm. However, the network in a data centre is managed according to communication. With an increasing trend towards more communication intensive applications in data centres, the bandwidth usage on virtual machines (VMs) is rapidly growing. Our proposed algorithm for maximum utilization of network resources manage communication intensive task load balance according to communication.**

***Keywords*— Cloud computing, Virtualization, load balancing, Cloudsim**

I.INTRODUCTION

The term cloud" creates from telecommunication world of the 1990s, when providers created by virtual private network (VPN) services for data communication [1]. The internet often denoted as a cloud and the world "cloud computing" arise from that similarity. Cloud computing is the dynamic provisioning of IT capabilities (hardware, software, or services) from third parties over a network. There are three basic types of cloud computing: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) [2].

1. *IaaS*: In which hardware is virtualized in cloud. In IaaS grids or clusters, virtualized servers, memory, networks, storage and systems software are delivered as a service. IaaS provide access to computational resources, i.e. CPUs. And also deliver (managed and scalable) resources as services to the user [2]
   - Amazon's Elastic Compute Cloud (EC2): Lunch and run with amazon Machine Images (AMIs).
   - Amazon Simple Storage Service (S3): Provide big and reliable storage.
2. *Paas:* PaaS offering providing the tool and development environment to organize application. In Paas customer may relate with the software to enter and retrieve data, perform action, get result.
   - Google's App Engine: Permit build and organize application. Provide monitoring, failover, clustering.
   - Force.com: Provides platform to build and run applications and components.
3. *SaaS:* Described as a software that is deployed on a hosted services and can be accessed globally.
   - Google Apps: Offers web based office tools such as e mail, calendar, and document management.
   - Salesforce.com: Provides a full customer relation- ship management (CRM) application.
   - Zoho.com: Provides a large suite of web based applications, mostly for enterprise use.

Type of Cloud Computing

- *Public Cloud:* Available for public use for a large industry group and is owned by an organization selling cloud services. It may be owned, managed, and operated by a business, academic, or government organization.
- *Private Cloud:* Operated for the exclusive use of an organization. By that organization or a third party. May be either on or off premises.
- *Hybrid Cloud:* Combines multiples clouds (Public, community, private)where those clouds retain their unique identities, but are bound together as a unit.
- *Community Cloud:* Cloud has been organized to serve a common function or purpose. Share common concerns such as mission, policies, security, regulatory compliance, etc.

II.VIRTUALIZATION

Virtualization means" Somewhat Which Isn't Real", but it gives all the conveniences of a real. It is the software implementation of a computer which will perform different programs like a real machine. Virtualization is related to cloud, because using virtualization an end user can use dissimilar services of a cloud. The remote datacenter will deliver different services in a fully or partial virtualized manner [3]. Using virtualization, users can access servers or storage without knowing

specific server or storage specifics. The virtualization layer will execute user request for computing resources by accessing suitable resources. Virtualization can be applied to many types of computer resources: Infrastructure such as Storage, Network, Compute (CPU / Memory etc.), Platform (such as Linux/ Windows OS) and Software as Services [10].

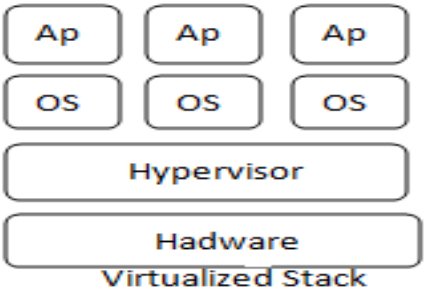

Figure 1 Virtualization

Types of Virtualization

1. Full Virtualization

   Full virtualization is a entire installation of one machine is done on the additional machine. It will result in a virtual machine which will have all the software that are existing in the actual server.

   Purpose [4]

   - Distribution computer system between multiple users.
   - Separating users from each other.
   - Emulating hardware on another machine.

2. Para Virtualization

   In this, the hardware allows multiple operating systems to run on single machine by resourceful use of system resources such as memory. e.g. VMware software. Here all the services are not fully accessible, rather the services are provided partially.

   Advantages [4]

   Disaster recovery: In the system failure, guest instances are moved to another hardware until the machine is repaired or exchange. Migration As the hardware can be replaced without difficulty, hence migrating or moving the different parts is faster and easier [4].

   Capacity management: In a virtualized location, it is easier and faster to add more hard drive capacity and processing power. As the system parts or hardware can be moved or replaced or repaired easily[4].

III.LITERATURE REVIEW

Load balancing is a policy to distribute workload across several computers, or other resources over the network links to reach optimal resource utilization, maximize throughput, least response time, and avoid overburden. It can be used to increase utilization and throughput, lower latency, decrease response time, and avoid system overhead[4]. Short of load balancing, cloud computing would very hard to manage. It also provides fault tolerance when pair with a failover mechanism. A load balancing system can use different mechanisms to allocate service direction. Its main job is to decide how to choose the next server and transfer a new connection request to it.

In order to balance the requests of the resources it is important to know a few major goals of load balancing algorithms:

- Reduce the overall response time and maximize throughput.

Two main kinds of load balancing algorithms

1. *Static Algorithms*

   Static algorithms split the traffic equivalently between available servers. By this approach the traffic on the servers will be disdained easily and consequently it will make the situation more improper. This algorithm included as round robin algorithm. However, there were hug of problems seemed in this algorithm. Therefore, weighted round robin was well-defined to improve the performance of round robin[6].

2. *Dynamic Algorithms*

   Dynamic algorithms design to accurate weights on servers and also search in network a lightest server favored to equilibrium the traffic. However, selecting an suitable server needed real time communication with the networks, which will lead to additional traffic added on system. Dynamic algorithm predicated on query that can be made often on servers, but sometimes overcame traffic will prevent these queries to be answered, and consistently more added overhead can be notable on network[6].

IV.PROPOSED WORK

In some techniques we can see that they can only focus on data intensive task maximum resource utilization but here we more focus on communication. Here, in this paper we divided total load in to the three different parameter and assign finding the

remaining percentage of all three parts. These three parts are network, processor and memory utilization. Here we give the preferences to all this three parts and based on this we created three different queue.

For calculating remaining utilization of VM based on three parameters are considered NW, processor and Memory. As our approach focuses on network parameter, we create three different queue. When we check VM utilization first we can find remaining network utilization. If remaining utilization is > 70% then added in to first queue. Same work with two remains parameter.

1. Algorithm steps for Multilevel Communication

Aware Approach for load balancing

Step 1 : Create VM

Step 2 : Create Cloudlet (Processes)

Step 3 : Calculate remaining utilization of three different load parameter.

- Network (Remaining Network Utilization = 100 - Current Allocated Bandwidth)
- Processor (Remaining Processor Utilization = 100 – Current Processor Utilization)
- Memory (Remaining memory Utilization = 100 – Current Memory Utilization)

Step 4: Put all the remaining utilization in to the different queue. If remaining bandwidth is >70% then this VM added in the first queue. Otherwise check second parameter Processor utilization.

```
If  (Remaining BW > 70% )
    {
     Remaining_bandwidth.Add (vm id);
     }
Else if (Remaining Processor _Utilization > 50%)
    {
     Remaining_cpuutilization.Add(vmid);
    }
Else if (Remaining Memory_Utilization>30%)
    {
      Remaining_MemoryUtilizaton.Add(vmid);
    }
```

Step 5 : Selection of VM. We can select VM randomly from the queue. If first queue are not null then VM selected from the first queue. Otherwise VM selected from second queue.

```
If (remaining_bandwidth.size != 0)
    {
     Randomly select VM from remaining_bandwidth
    }
Elseif (remaining_processorutilization != 0)
    {
      Randomly select VM from remaining
            Cpuutilization
    }
Else(remaining_memoryutilization !=0)
    {
      Randomly select VM from Remaining _Memory
            Utilization
    }
```

Step 5 :

```
Cloudletsubmitted++
go to step 3
```

Step 6 : End.

2. CloudSim

Resources and software are communal on the basis of client's demand in cloud environment. Fundamentally, dynamic utilization of resources is reached under different conditions with numerous previous established policies. Former it is very much tough and time consuming to measure performance of the applications in real cloud environment. In this consequence, simulation is very much helpful to allow users or developers with practical feedback in spite of having real environment. This section portrays the importance of simulation technique and simulation in cloud. In this research work, simulation is carried out with a specific cloud simulator, CloudSim[13].

A brief description of these components

- DataCenter Controller: DataCenter object and reaches the data center management activities such as VM creation and destruction and does the routing of user requests received from User Bases

- Datacenter: Datacenter contains a number of hosts in homogeneous or heterogeneous configurations .It also makes the bandwidth, Ram, and storing devices allocation.
- Virtual Machine (VM): VM characteristics embrace of memory, processor, storage, and VM scheduling policy. Numerous VM can run on single hosts concurrently and maintain processor distribution policies.
- Host: VM need to handle a number of cores to be processed and host should have resource allocation policy to allocate them in these VMs. Host is also responsible for creation and destruction of VMs.
- Cloudlet: Cloudlet is an application component which is responsible to deliver the data in the cloud service model. So the length, and output file sizes parameter of Cloudlet should be greater than or equal to 1.

V. EXPERIMENTAL RESULT

This chart shows the VM1's remaining BW, remaining processor, remaining memory utilization.

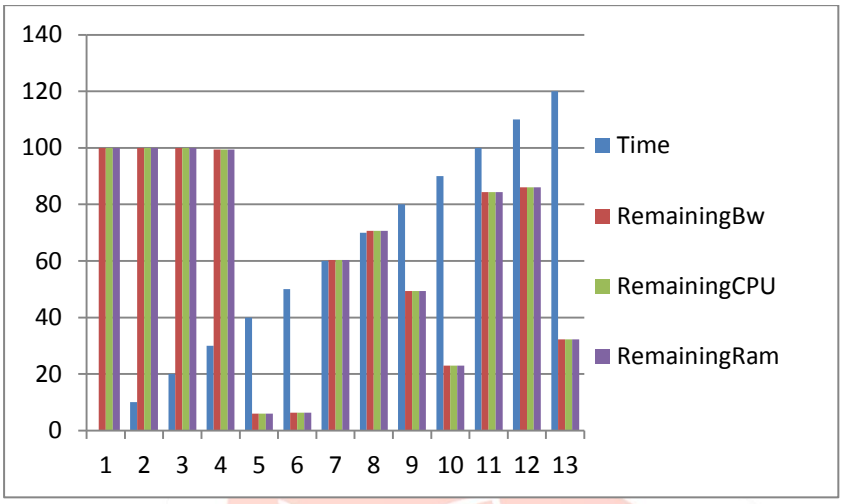

Fig 2 VM1's remaining utilization.

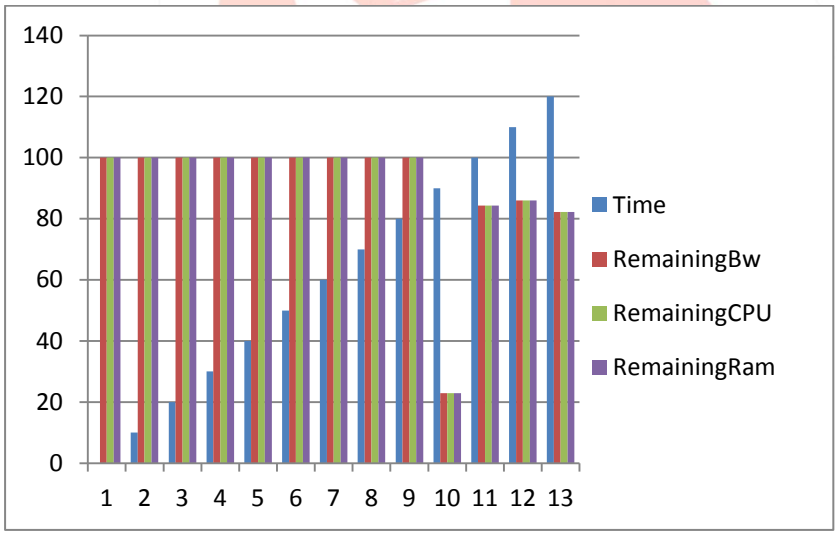

Fig 3 VM2's remaining utilization

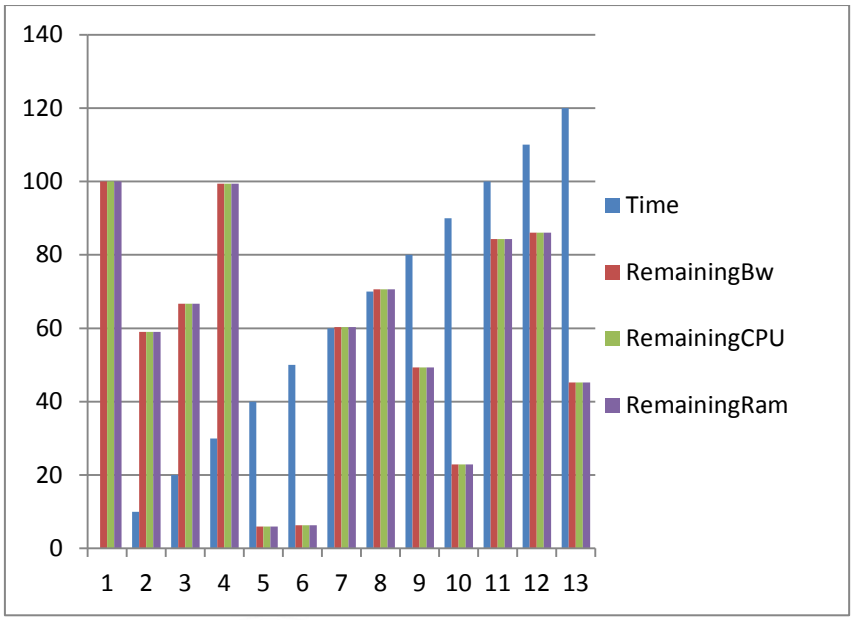

Fig 4VM3's remaining utilization

VI. CONCLUSION

Here we have study on load balancing, some issue are there associated to load balancing. It required distribute load workload crossways multiple computers, or other resources over the network. So balance the load, load balancing is necessary in cloud computing. So in this paper we have discussed existing load balancing algorithm or techniques. Our approach for load balancing techniques provide Maximum utilization of Network and also load distribution on server according to communication request allocated to VM availability of high bandwidth according to remaining bandwidth utilization. Our Approach for load balancing technique we can handle number of request according maximum availability of bandwidth on virtual machine. It will also recover overall Response time, data processing time and also improvement in data transfer rate.

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