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An Efficient Dynamic Load Balancing Algorithm Using Machine Learning Technique in Cloud Environment

Smaranika Parida[1], Bakul Panchal[2]
[1]M.E(I.T) Student, I.T Department,L.D College of Engineering, Ahmedabad, Gujarat, India
[2]Assistant Prof., I.T Department,L.D College of Engineering, Ahmedabad, Gujarat, India

ABSTRACT

Cloud Computing is delivery of computing services- storage, databases, networking, and software over internet.Cloud service provider provides the service in pay as per usage basis. Load balancing process of making effective resource utilization by reassigning the total load to the individual nodes. LB is basically divided into two types such as static LB, Suitable for homogenous environment where load variations are low and dynamic LB which is more flexible and suitable for heterogeneous environment. Proposed algorithm based on dynamic load balancing using machine learning technique.

Keywords: Cloud Computing, Load Balancing, Machine Learning

I. INTRODUCTION

Cloud computing is an emerging technique; it provides services to its clients in on demand basis. It provides different services to its clients like Infrastructure-as-Service (Iaas), Platform-as-Service (Paas), Software-as-Service (Saas) in a virtualized environment. Iaas provides different services including data storage space, access to network features and also computers (both virtual or on dedicated hardware), Paas provides platform which allow the client to focus on the deployment and management of the applications. Saas is also referred as end-user applications, it provides a completed product that is run and managed by the CSP (cloud service provider).

Figure 1. View of the Cloud Computing Environment

Cloud computing have been facing numerous challenges, like providing security, an efficient load balancing technique, scaling, proper resource scheduling, energy consumption of Data Centers, performance monitoring, Quality of Service management, and service availability. Load balancing process of distributing the entirety load of a system among individual nodes to guarantee that neither any node is overloaded and nor any under loaded, idle or doing little work. It is the process of assigning and reassigning the total load among all available resources, with the aim to maximize throughput, while minimizing the response time and costing, also improves resource utilization and performance as well as energy saving. Hence key to the success of cloud computing environments is providing an efficient load-balancing algorithms for distributing the total load evenly.

Load Balancing is one of the major challenges and concerns in cloud environments. The Proposed algorithm based on dynamic load balancing using

machine learning technique which will be useful in distributing the load more efficiently.

II. FLOW OF PROPOSED METHOD

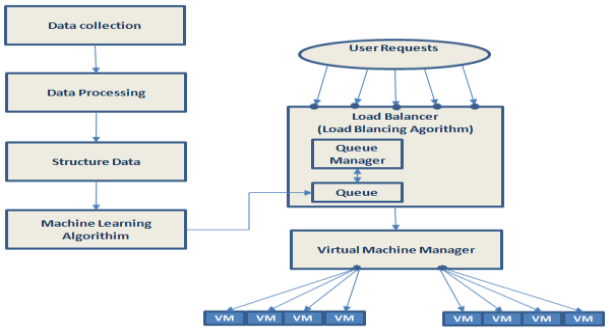


Figure 2. proposed system overview

When a new request will come, the load balancer will allocate the job to the appropriate VM by consulting with the queue manager in order to maintain balance. In the proposed method machine learning technique is used for efficient load balancing. In this ,first step different data about the VM will collected such as VM id, capacity, current load, cpu utilization,I/O, NetworkIn , NetworkOut, memory utilize etc. Then in the next step data are structured as per our requirement, using machine learning technique we have to find out the information about the VM and store that information in a queue. Next step is the former queue is replaced by this queue.

Algorithm for ML based Load Balancing :-

INPUT:

Upper_threshold = X%,

Lower_threshold = Y%

Virtual machine data.

Procedure Supervised ML based Load Balancing regression

For all the N Servers

For all VM ∈ N

CPU_UTIL[ ] ←Fetch the cpu utilization

End for

Apply regression analysis

Calculate Average cpu_util of that slot

If Average current cpu_util[] > upper_threshold of predicted data

Queue1< > id(VM)

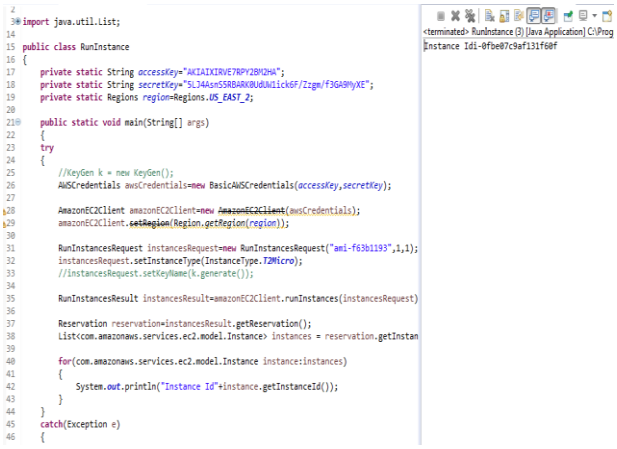
else

Queue2< > id(VM)

EndIf

if cpu_util = = 0% || cpu_util < lower_threshold of predicted data store the id of that VM in sleepQueue[ ]

End For



```
import java.util.List;

public class RunInstance
{
    private static String accessKey="AKIAIXIRVE7RPY2BH2HA";
    private static String secretKey="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";
    private static Regions region=Regions.US_EAST_2;

    public static void main(String[] args)
    {
    try
    {
        //KeyGen k = new KeyGen();
        AWSCredentials awsCredentials=new BasicAWSCredentials(accessKey,secretKey);

        AmazonEC2Client amazonEC2Client=new AmazonEC2Client(awsCredentials);
        amazonEC2Client.setRegion(Region.getRegion(region));

        RunInstancesRequest instancesRequest=new RunInstancesRequest("ami-f63b1193",1,1);
        instancesRequest.setInstanceType(InstanceType.T2Micro);
        //instancesRequest.setKeyName(k.generate());

        RunInstancesResult instancesResult=amazonEC2Client.runInstances(instancesRequest)

        Reservation reservation=instancesResult.getReservation();
        List<com.amazonaws.services.ec2.model.Instance> instances = reservation.getInstan

        for(com.amazonaws.services.ec2.model.Instance instance:instances)
        {
            System.out.println("Instance Id"+instance.getInstanceId());
        }
    }
    catch(Exception e)
    {
```

<terminated> RunInstance (3) [Java Application] C:\Prog
Instance Id1-0fbe07c9af131f60f

Figure 3. VM creation

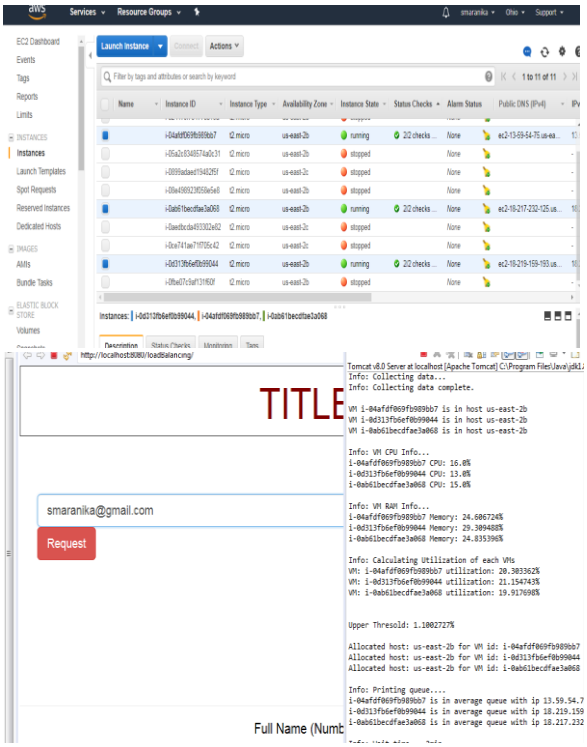


Figure 4. Fetching initial parameters of different virtual machines

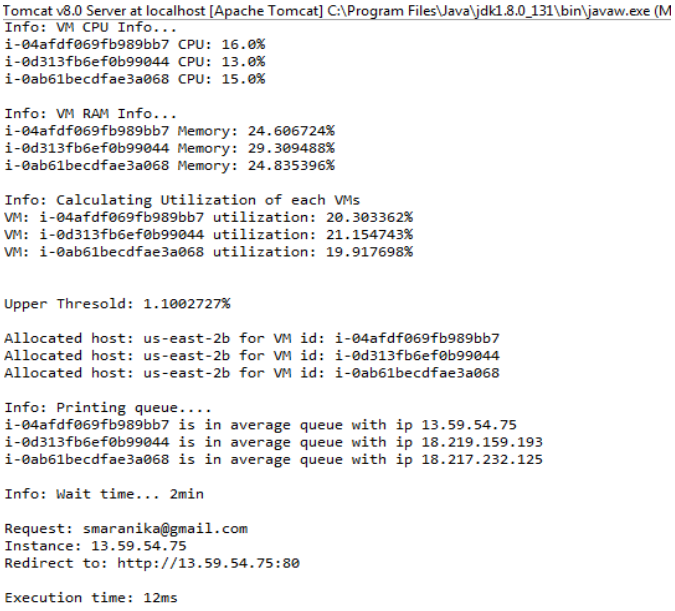


Figure 5. Generating queue and allocating request to it

III. RESULT ANALYSIS

For implementation AWS EC2 has been used.EC2 has its own load balancer which allocates the resource to the request in round robin fashion. When first request comes it allocates that request to the lightly loaded VM, without analysing the efficiency of the node. But using proposed method the load balancing becoming more efficient.

III. CONCLUSION

Cloud computing is an emerging technique; users of cloud environment are increasing day by day. So load balancing is becoming biggest challenge where load should be transfer from overloaded machine to under loaded machine in order to maintain balance. So using machine learning technique in load balancing results in efficient load balancing in cloud infrastructure. The proposed algorithm will give more fine-tuned analytical data on which we can make current load scheduling mechanism.

V.REFERENCES

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