An Approach for Load Balancing Among Multi-Agents to Protect Cloud Against DDos Attack

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ABSTRACT: Cloud Computing is widely used technology in present era. Cloud Computing is mainly used for on demand services over the distributed servers. So it is necessary to manage the working load of participating servers for uninterrupted services. DDOS attack is one of the most important issue in cloud environment which basically focuses on prevention in service providence to the authorize users. A Multi agent based framework cam be used to protect the cloud environment from DDOS attack, but there is a major issue of load distribution among agents participating in Intrusion detection. Here in this paper, another agent is used for load distribution among the agents (Intrusion detection agents) in cloud computing. Using this approach our system may be much stronger and then agent may work in a communicating and co-coordinating manner. For this, we will use a load balancing algorithm and by using this algorithm, an efficient approach to manage load among IDAs in cloud computing can be done. In Order to accomplish it the author is using the approach of centralize load distribution.

Keywords –Cloud Computing, Centralize Load Distribution, DDoS attack, IDA, Load Distribution Agent

I. INTRODUCTION

Cloud Computing [1] is the result of evolution and adoption of existing technologies and paradigms. The goal of cloud computing is to allow users to take advantage from all of these technologies, without the need for deep knowledge about or expertise with each one of them. The cloud aims to reduce costs, and help the users focus on their core business instead of being impeded by IT issues,

A multi-agent system (M.A.S.) [4] is a computerized system composed of multiple interacting intelligent agents within an environment. Multi-agent systems can be used to solve problems that are difficult or impossible for an individual agent or a monolithic system to solve. Intelligence may include some methodic, functional, procedural or algorithmic search, find and processing approach.. The terminology of MAS is used in engineering and technology. Topics where multi-agent systems research may deliver an appropriate approach include online trading, disaster response, and modeling social structures. Multi-agent systems consist of agents and their environment. Typically multi-agent systems research refers to software agents. However, the agents in a multi-agent system could equally well be robots, humans or human teams. A multi-agent system may contain combined human-agent teams.

Load Balancing Technique [2] is a frequently arrived technique that has been formulated to facilitate networks and resources by providing maximum throughput with minimum response time is Load Balancing. Data can be transmitted and received without major delay by dividing the traffic between servers. There are many algorithms that are present to help traffic loaded between servers available. Websites can be thought of as a basic example of load balancing.

Users could experience timeouts, delays and possible long system responses without load balancing. A better distribution of the communication traffic can be obtained which conclusively settles website availability by load balancing solutions [3]. As by the clarification, DDoS (Distributed Denial of Service) attacks are sent by two or more persons, or bots. DoS (Denial of Service) attacks are sent by one person or system. A denial-of-service attack is characterized by an explicit attempt by attackers to prevent legitimate users of a service from using that service.

II.   LITERATURE REVIEW

(i)   Rohit Srivastava, Dr. Rohit Sharma and Mr. Avinash Verma has previously given an approach for protecting cloud computing against DDoS attack with the help of Multi-Agent Systen . There the author have considered a private cloud with three nodes and each node is associated with an individual IDA (Intrusion Detection Agent). Here, the authors have assumed that three nodes are sufficient to handle the network traffic receiving in form of requests because it will be divided among three IDAs. But here each IDA is only responsible for handling the requests generated by its individual node, at any instant of time it may arise a problem that a there are so many unauthorized requests are generated by the attacker on any of the three nodes. At that time one IDA(Intrusion Detection Agent) will busy enough to handle those unauthorized requests that it cannot provide services to an authorize users while other IDAs are free of load at that time. This may cause due to load misbalancing and the performance of the system may decrease.

(II)   Doddini Probhuling L. has discussed about various load balancing algorithms useful in cloud. In this paper the author has also discussed a brief comparison between static load balancing and dynamic load balancing and also illustrated the way of implementation.

(III)   Randles, M. ; Sch. of Comput. & Math. Sci., Liverpool, UK ; Lamb, D. ; Taleb-Bendiab, A. has given a comparative study of load balancing algorithms where it has been discussed that a global distribution of load is much effective than any other approach of load distribution. This paper basically checks out three adaptable distributed way outs proposed for load balancing; approaches inspired by Honeybee Foraging Behavior, Biased Random Sampling and Active Clustering.

III.   PROPOSED SOLUTION

In this paper the author is going to implement a load balancing algorithm among agents, where various Intrusion Detection Agents [1],are working individually for their assigned nodes. Here, we are using a private cloud for three nodes where each node is associated with an Intrusion Detection Agent. In order to implement the task of load balancing we are using a Load Distribution Agent which will act as a Master of all

the IDAs by providing equal load among all the IDAs. In order to accomplish this task we are using the concept of Round Robin Algorithm and Centralized Load Balancing Approach.

Here the author has proposed a solution for using centralized load balancing approach as it is assumed that Intrusion Detection Agent(IDA) may exhaust when there is a huge amount of requests are generated by the attacker on a single node. It is a very useful approach where a Load Distribution Agent has been introduced with IDAs in order to distribute load equally among IDAs . In this approach the author has considered a private cloud with three nodes but each node is not associated with a individual IDA.

In this Algorithm (Fig. 1)each IDA sends request for work to Load Distribution Agent (LDA) since it maintains a work pool by arranging all the requests in queue or heap. If any IDA is in ideal state it will automatically generate a request message for work to the LDA, then LDA checks the task queue and if there is task in the queue it assigns it to the respective IDA and if the task queue is empty then it sends a termination message to all the IDAs.

The process of termination depends on basically two things: First the task queue must be empty and second each processor must wait for the new task, then if there is a request for work by any of the IDA then it checks the value of WAIT_COUNT for each IDA, if it is equal to the No. of IDAs used in the environment then LDA sends a termination message to each of the Intrusion Detection Agent (IDA) and this way the similar amount of work has been distributed among all the agents.

Using this approach (Fig. 2) we get that at any instant of time any IDA will not be overloaded so much that it cannot respond any authentic requests while handling unauthorized requests. Here the Load Distribution Agent (LDA) acts as the Master and other Intrusion Detection Agents will act as Slave agents requesting for task.

Algorithm for Load Distribution among IDAs using centralized Distribution Approach

Master Processor: Maintains the work pool (queue, heap, etc.)

While (task =Remove()) != null)

Receive (IDAᵢ, request_ msg)

Send (IDAᵢ, task)

LDA

While (more IDAs)

Receive (IDAᵢ, request_msg)

Send (IDAᵢ, termination_msg)

Slave Processor: *Perform task and then ask for another*

task = Receive(LDA, message)

Figure 2 : centralize load distribution approach

 Process task

Send(LDA, request_msg)

task = Receive(LDA, message)

Algorithm for Centralized Termination

Master Processor

WHILE (*true*)

Receive (IDAᵢ, msg)

 IF *msg* contains a new task

 Add the new task to the task queue

 ELSE Add *IDAᵢ* to wait queue and *wait Count++*

IF (*wait Count>0)* and task queue not empty

 Remove IDAᵢ &*task* respectively from wait &*task* queue

Send (task, IDAᵢ) and *wait Count--*

IF (*wait Count==P)* THEN send termination
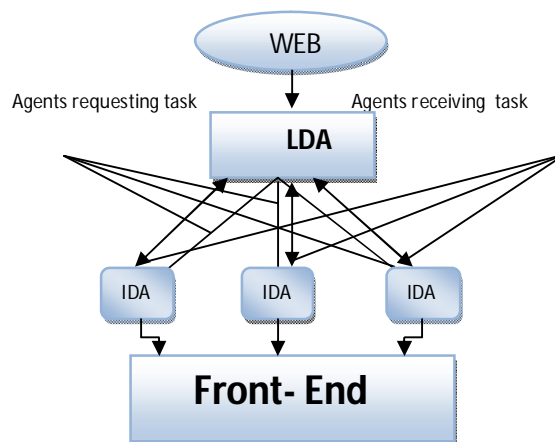 messages & exit

IV. FIGURES

Figure-1: Load Balancing Framework among IDAs Using Centralized Distribution Approach
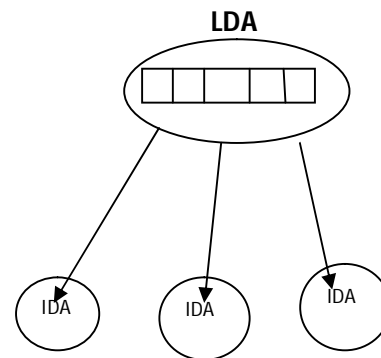

Figure2: LDA performing Centralize Load Distribution.

V. CONCLUSION

 In present paper the author has proposed a framework for implementing a load distribution scheme in order to make the performance of the system stronger. Here, the author has discussed an effective way to implement a Load Distribution agent among various IDAs which were working separately for each node in a private cloud. In this way the author has tried to propose a valuable approach which makes the existing system more powerful to protect the cloud computing against DDoS attack.

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