**Introduction**

Distributed Web applications are being used in all areas such as Banking, E-learning, e-commerce, Public services etc. Increase of attacks that forces us to build new web application security solutions with high performance.

Mobile agent is a paradigm which is widely used in distributed environments and getting more priority for researchers. Using the Mobile Agent technology efficiency for centralized management of Web application firewall is a novel way in web application security.

A Web application security solution by using Mobile Agent paradigm as a methodology for centralized management for firewall deployed in the network infrastructure is proposed and implemented. It motivates further research in using mobile agents for web application security. Proposing Priority level communication to the administrator about attacks will give practical experience of mobile agent usage which can be future work extension of this research.

**Objectives**

- To give sophisticated security by new methodology
- To enable less expensive to the commercial environment
- Robust, performance, asynchronous communication takes matter
- Centralized management of Distributed web application firewall
- Monitoring and gathering threat information.
- Priority level warning
- Can be extended further use in Artificial immunity
- Best idea to design security by taking model of Artificial immunity.
- Possible to extend by creation of Mobile Agent layers as biological T-Cells and White Cells etc.

The main focus of this project is to provide a security solution by using Mobile Agent paradigm. There is Mobile Agent Manager functioning on the load balancer and Mobile Members at local web servers. The crucial benefit of mobile agent is managing update of firewalls in a centralized management approach.

1. First function is Mobile Agent Manager communicating with local Mobile Agent Members on the web servers.
2. Second function is to update firewall rules on the local web server and if any attacks found, sending that attack information to the Mobile Agent Manager at LoadBalancer.
3. Third function is sending warning to the administrator; this can be in any form such as email or mobile text message (SMS) or both. This can be based on priority level.

**Materials and Methods**

**Development tools**

- Mobile Agent Paradigm,
- Java Agents and JADE platforms
- Java Language
- Linux environment
- Distributed web server environment

The following pseudo code represents the functions of the Mobile Agent.

```
Function1: while (true)
    Check /tmp/Rules on LoadBalancer;
    If rule.txt exists
        Then Copy rule.txt to Webserver1 & webserver2;
        Delete 
```

**Results**

1. Established the communication between Mobile agent members to the Mobile agent Master in Main Server
2. Established asynchronous communication with administrator
4. Scalability by enabling sending firewall rules to multiple servers at a time
5. Monitor the Attacks or attack attempts as displayed in the below graph.
6. Successfully implemented and executed.

**Why Mobile Agents**

- Mobile agents reduce network load:
  Firewalls are facing many problems with the increase of attacks. Maintaining centralized management of Firewall rule updating is a complex issue due to large amount of data. By using Mobile Agent paradigm this problem can be overcome. Mobile Agent can do data transmission with a small code. So the Mobile Agent migration can overcome this problem. Mobile Agent can do data transmission with a small code. So the Mobile Agent migration paradigm this problem can be overcome.
  - Asynchronous nature:
    Mobile agent can do data transmission with a small code. So the Mobile Agent migration can overcome this problem. Mobile Agent can do data transmission with a small code. So the Mobile Agent migration paradigm this problem can be overcome.
  - Dynamic adaption:
    Mobile agent can react to multiple situations although the functions of firewall increase in number. It has been developed so that agents can go to the multiple destinations with a single click in this project. They are able to adapt the behavior dynamically according to the situations.
  - Efficiency saving:
    There is less need of CPU consumption and CPU usage for processing mobile agents. Mobile agent needs only one node and remaining nodes will work when needed. 13
  - Supportability for Large Data Applications:
    Mobile Agents can highly support in transferring large amount of data. The processing of remote data with large amount is a typical function of Mobile agent which is the key element in this project for updating firewall rules to the web servers.

**References**


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