Building a Honeypot Server
And Analyzing the Data it Collects

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ABSTRACT

This project aims to build a honeypot server and analyze the data it collects. The goal of the honeypot server is to create vulnerable server on the open internet which we expect will be attacked by malicious actors. These attacks will be logged by the server, then we will analyze the data collected to find common trends in the attacks.

1. INTRODUCTION

A honeypot is a server that is made intentionally vulnerable in order to attract the attention of malicious actors. The server then logs any attempts by attackers to exploit and gain access to it. The goal is for researchers to be able to analyze common trends in the kinds of attack used by attackers and even possibly discover new kinds of attacks that have never been seen before. Another use case for honeypots in an enterprise environment is to slow down attackers by allowing them to attack the non-critical honeypot instead critical infrastructure.

There are many different tools that can be used to create a honeypot. For example, the honeypot could emulate a vulnerable web app or a vulnerable end-user machine. The configuration of the honeypot depends on the goals of its creators whether that be research or protection as described above. Our goal is to research these various tools and gather enough data to be able provide an analysis of current trends in attacks.

For our approach, we will configure a honeypot as a vulnerable server using various tools which we have found to emulate common vulnerabilities and log attack data. The key insight of our project is dependent on the data which collect as there a numerous outcomes depending on the types of attacks we receive.

2. MOTIVATION

Mairh, et al. discuss a variety of use-cases for honeypots, among them is the use of a honeypot in conjunction with an Intruder Detection System (IDS). The authors note that an IDS typically uses misuse and anomaly detection [1]. We hope to both implement a system similar to the one described by Mairh, et al. and perform an analysis of the data we collect from the system in accordance with the type of anomaly detection described.

Additionally, Chuvakin was able to classify individual types of attacks on his system [2]. Such a level of analysis is impressive, and we hope to achieve similar data collection, albeit in a lesser volume due to the significantly shorter time frame. Also, our analysis may be more focused on traffic metrics rather than the sort of in depth log analysis done by Chuvakin. We are more inclined towards determining if and when an attack has occurred rather than what specific attacks occurred.

3. OUR ARCHITECTURE

We have set up a basic Amazon Web Services server. The server is an EC2 t2.micro instance. We are using an Ubuntu Server 18 image as our operating system.

To create the functionality of the honeypot, we have found several tools which we will configure and test. Dionaea captures malware and can simulate certain individual vulnerabilities. SNARE is a web application based honeypot which we plan on using for the face of our honeypot.

For data analysis we will mainly use Python to graph trends. Tanner is another tool we can test which analyzes data specifically from SNARE, mentioned above.

4. SETUP AND CONFIGURATION

We have set up Dionaea on our AWS server and it is successfully collecting logs. Some further configuration may be required in order to ensure that we are logging at an appropriate level. We are still attempting to configure Snare to meet our needs.

5. CONSIDERATIONS

Since we are using AWS to host our honeypot, we must consider the configuration of the AWS instance itself. In particular, we will consider AWS firewall rules and security groups to allow all incoming connections and deny all outgoing connections. We must also consider that AWS might shutdown our server if they detect it is under attack. In that case, we will have a backup of the server prepared and it will be migrated to a private server which we control. Finally, if our honeypot does not collect enough attack data in the time period during which it is active, we will attack the server ourselves to demonstrate its capabilities.

If time permits, we have further plans to add more AWS honeypot servers and network them together with our original instance to hopefully see how an attack might traverse the network. We can also implement an intrusion detection system such as Snortif we have enough time.

6. RELATED WORK

Steve Gathof wrote an excellent article on the setup of a honeypot on an AWS EC2 instance [3]. While his work will likely be a useful reference for our architecture, it is not explicitly related to the analysis that we will be performing.

Additionally, Polyakov et al. explored both the architecture and several specific functions that a honeypot should fulfill [4]. We will try to implement the functions mentioned in the Polyakov's article, in particular, creating variable conditions for accessing the system in order to possibly filter out low level intruders.

7. CONCLUSIONS

We hope to construct and analyze a honeypot server. We intend to perform an analysis of our findings in order to determine trends regarding the traffic our server receives. In particular, we hope to detect and examine anomalies on our system. We do expect to receive a some amount of traffic from automated sweepers and hope to attract more interesting attackers as well.

8. REFERENCES

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