ADDIS ABABA UNIVERSITY
AAiT - SITE

Cyber Security Stream

The Mitnick Attack Lab

PROJECT PROGRESS

GROUP MEMBERS

NAOL KECHA ……UGR/6903/12

ZENAMARKOS MOLLA……..UGR/4176/12

DINKA EFA ……..UGR/3476/12

Project progress up to Jan 16, 2023

Submitted to Mr. Daniel

The Mitnick Attack Lab

Introduction

Kevin Mitnick is probably one of the most well-known hackers in USA. He was on FBI's wanted list of criminals.

In 1994, Mitnick successfully launched an attack on Shimomura's computer, by exploiting the vulnerabilities in the TCP protocol and the trusted relationship between two of Shimomura's computers. The attack triggered a dramatic showdown between the two people, and it eventually led to the arrest of Mitnick. The showdown was turned into books and Hollywood movies later. The attack is now known as the Mitnick attack, which is a special type of TCP session hijacking.

In this lab we will cover the following topics:

- TCP session hijacking attack
- TCP three-way handshake protocol
- The Mitnick attack
- Remote shell rsh
- Packet sniffing and spoofing

How Mitnick Attack works

In the actual Mitnick attack, host A was called X-Terminal, which was the target. Mitnick wanted to log into X-Terminal and run his commands on it. Host B was a trusted server, which was allowed to log into X-Terminal without a password. In order to log into X-Terminal, Mitnick had to impersonate the trusted server, so he did not need to provide any password. Figure below depicts the high-level picture of the attack. There are four primary steps in this attack.

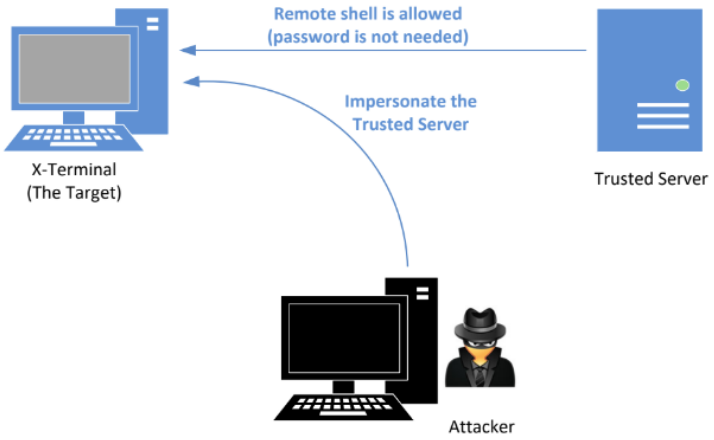


Fig 1: The illustration of the mitnick attack

Step 1: Sequence number prediction.
Step 2: SYN flooding attack on the trusted server.
Step 3: Spoofing a TCP connection.
Step 4: Running a remote shell.

Lab Environment Setup

In this lab, we need three machines, one for X-Terminal, one for Trusted Server, and the other for the attacker. The reason why we choose three virtual machines rather than using a docker container in one machine is that when we use a separate virtual machine it is more convenient to use python script codes. So, We used three virtual machines as shown in figure below.

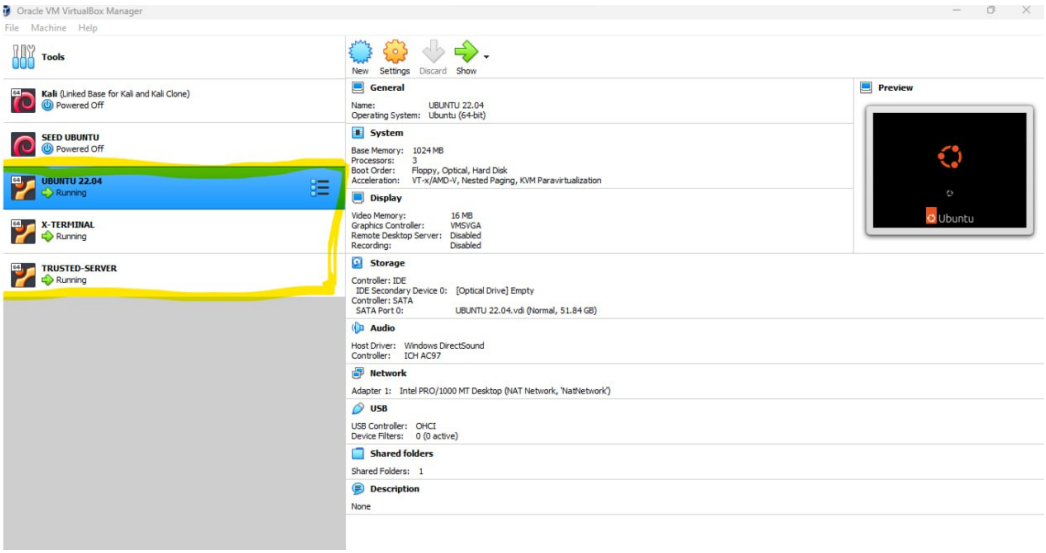


Fig 2: Our virtual machine setup

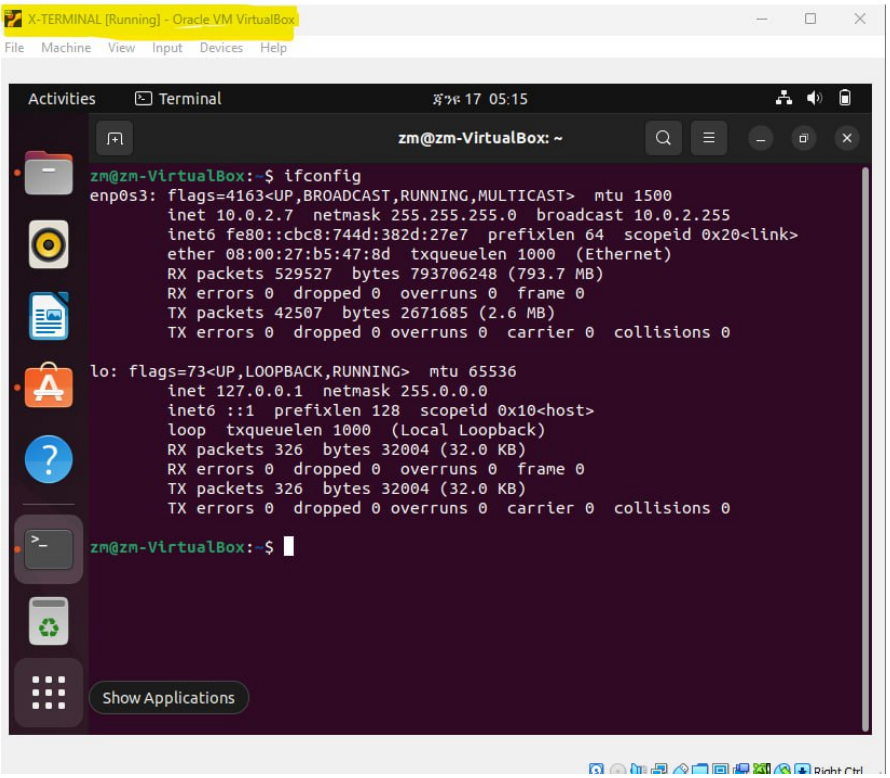


Fig 3: X-terminal Virtual machine

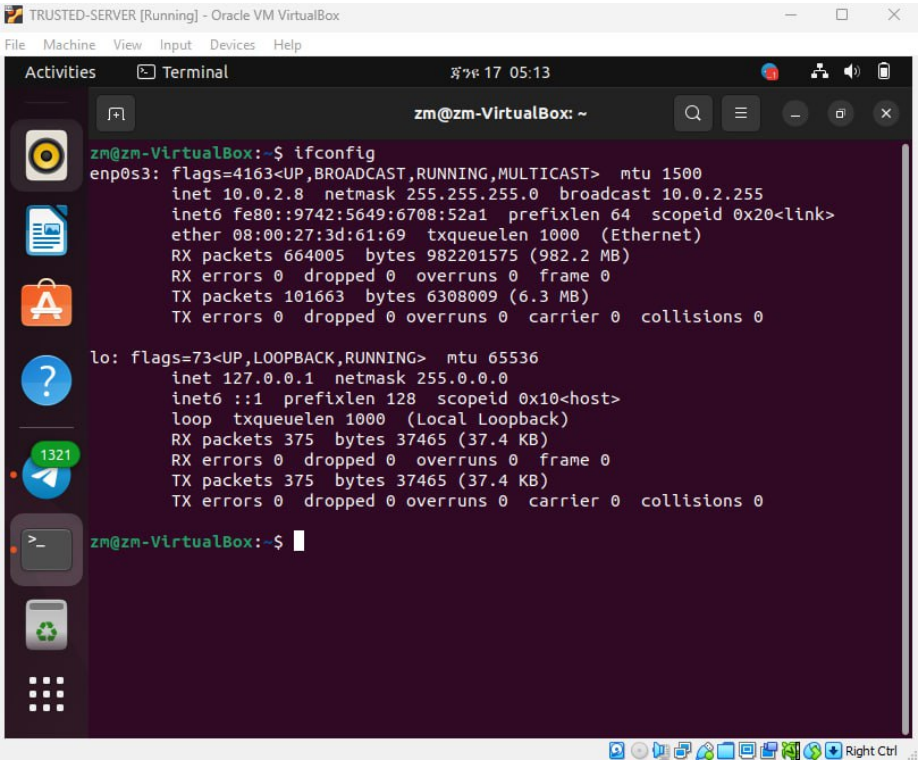


Fig 4: Trusted-server Virtual machine

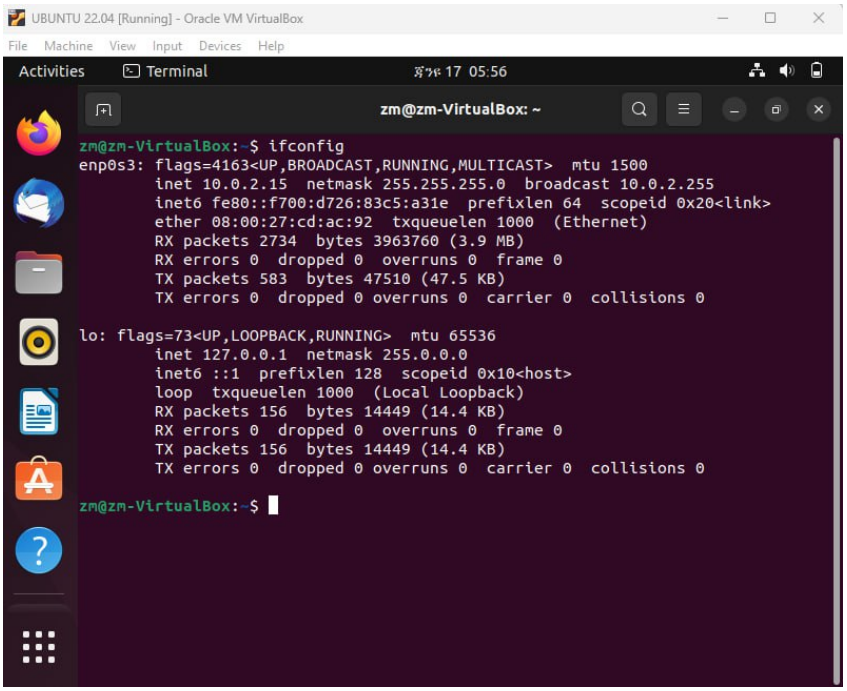


Fig 5: Ubuntu 22.04 VM

Configuration

The rsh server program uses two files for authentication, *.rhosts* and */etc/hosts.equiv*.
We set up the .rhosts file on X-Terminal using commands shown in the *screenshot* below.

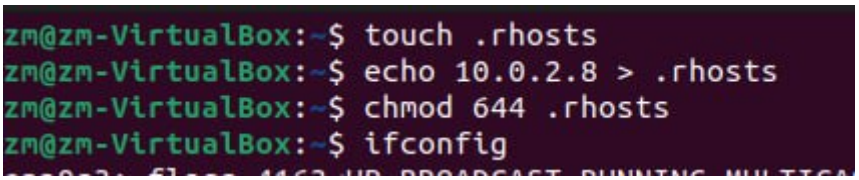


Fig 5: Configuration in X-teminal

To verify your configuration, *rsh 10.0.2.7 date* command on the trusted server.

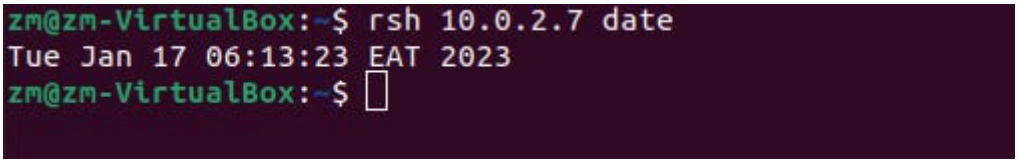


Fig 6: Verifying configuration in trusted server

The command prints the current date and time, so our configuration is working. Now we proceed to do the tsks since we have finished our configuration.

Task 1: Simulated SYN flooding

The operating systems at the time of the Mitnick Attack were vulnerable to SYN flooding attacks, which could mute the target machine or even shut it down. However, SYN flooding can no longer cause such a damage for modern operating systems. We simulate this effect by manually stopping the trusted server VM and then run the following command on X-Terminal to permanently add an entry to the ARP cache:

```
# arp -s [Server's IP] [Server's MAC ]
```

```
zm@zm-VirtualBox:~$ sudo arp -s 10.0.2.8 08:00:27:3d:61:69
[sudo] password for zm:
zm@zm-VirtualBox:~$
```

Now we have "brought down" the trusted server.

Task 2: Spoof TCP Connections and rsh Sessions

2.1. Spoof the first connection

After X-Terminal receives the SYN packet, it will in turn send a SYN+ACK packet to the trusted server. Since the server has been brought down, it will not reset the connection. The attacker, which is on the same network, can sniff the packet and get the sequence number.

Step 1: Spoof a SYN packet

To spoof a syn packet between x-terminal and the trusted server , we use a python code(mitnick_spoof.py) and after running it in the attacker machine, we observe a SYN + ACK response from the x-terminal. We have used wireshark to capture this packet.

```
TCP    54 1023 → 514 [SYN] Seq=778933536 Win=8192 Len=0
TCP    60 514 → 1023 [SYN, ACK] Seq=2241571420 Ack=778933537 Win=29200 …
```

Step 2: Respond to the SYN+ACK packet.

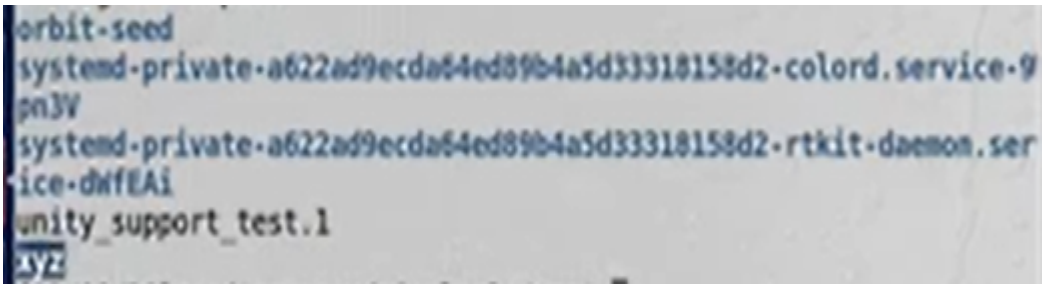
After X-Terminal sends out a SYN+ACK, the trusted server
needs to send out an ACK packet to complete the three-way handshake protocol.
To accomplish this we have written a python code, we named it as mitnick_attack

Step 3: Spoof the rsh data packet.

Once the connection is established, the attacker needs to send rsh data to X-Terminal.
Here also we have used a python script, we have modified a mitnick_spoof.py file that we used in the previous step. Then when we observe it in the wireshark the rsh session is established.

Task 2.2: Spoof the Second TCP Connection

This connection is used by rshd to send out error messages. The connections have been successfully established, and rshd executes the command contained in the rsh data packet.
/tmp/xyz is created in /tmp folder.



Task 3: Set Up a Backdoor

Instead of launching the attack again and again, we created a backdoor in X-Terminal after the initial attack. This backdoor allowed us to log into X-Terminal normally anytime we wanted, without typing any password.

First we have modified the data in the python code from /xyz to “echo ++ > .rhosts”, then we are able to login to the x-terminal from the attacker machine.