Activity Network Security

Q1

Nmap found 2 open ports on my notebook which are 6463 and 49510

```
Nmap scan report for localhost (127.0.0.1)
Host is up (0.00077s latency).
Other addresses for localhost (not scanned): ::1
Not shown: 65533 closed ports
PORT STATE SERVICE VERSION
6463/tcp open unknown
| fingerprint—strings:
| DNSStatusRequestTCP, DNSVersionBindReqTCP, Help, Kerberos, LDAPBindReq, LDAPSearchReq, LPDString, RPCCheck, RTSPRequest, SIPOptions, SMBProgNeg, SSLSessionReq, TLSSessionReq, TerminalServerCookie, X11Probe:
| HTTP/1.1 400 Bad Request
| Connection: close
| FourOhFourRequest, GetRequest, HTTPOptions:
| HTTP/1.1 404 Not Found
| Content—Length: 32
| Content—Type: application/json
| Date: Tue, 22 Sep 2020 04:58:04 GMT
| Connection: close
| {"rode":0,"message":"Not Found"}
| 49510/tcp open bandwidth—test MikroTik bandwidth—test server
```

Nmap scan on the notebook

6463 is opened with unknown reason, but with some research I found that it's being used by Discord

RPC Server Ports

The port range for Discord's local RPC server is [6463, 6472]. Since the RPC server runs locally, there's a chance it might not be able to obtain its preferred port when it tries to bind to one. For this reason, the local RPC server will pick one port out of a range of these 10 ports, trying sequentially until it can bind to one. When implementing your client, you should perform the same sequential checking to find the correct port to connect to.

Source: https://discord.com/developers/docs/topics/rpc

While 49510 said to be used by Bandwidth test

In the meantime there is no suspicious port opened in the VM. Only the intended ssh (22) and http (80) are open

```
Imap scan report for 192,168,56,101
Host is up (0.0027s latency).
Not shown: 65533 filtered ports
PORT STATE SERVICE VERSION
22/tcp open ssh OpenSSH 8.2p1 Ubuntu 4ubuntu0.1 (Ubuntu Linux; protocol 2.0) 80/tcp open http Apache httpd 2.4.41 ((Ubuntu))
| http-methods:
 _ Supported Methods: HEAD GET POST OPTIONS
 _http-server-header: Apache/2.4.41 (Ubuntu)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
NSE: Script Post-scanning.
Initiating NSE at 11:49
Completed NSE at 11:49, 0.00s elapsed
Initiating NSE at 11:49
Completed NSE at 11:49, 0.00s elapsed
Initiating NSE at 11:49
Read data files from: /usr/local/bin/../share/nmap
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 95.40 seconds
```

Nmap scan on the VM

Q2 OS Scanning

With nmap -O -osscan-guess, it cannot detect my notebook's OS.

While it guessed that my VM is running on Linux, which is correct but it did not specified about the Linux distribution of it. It also list a lot of other possible OS that the VM might use judging from the behavior of it.

```
Studo nmap -0 --osscan-guess localhost
Starting Nmap 7.80 ( https://nmap.org ) at 2020-09-22 11:05 +07
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000083s latency).
Other addresses for localhost (not scanned): ::1
All 1000 scanned ports on localhost (127.0.0.1) are closed
Too many fingerprints match this host to give specific OS details
Network Distance: 0 hops

OS detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 9.35 seconds
```

OS check on the notebook

```
<u>sudo</u> nmap -0 --osscan-guess 192.168.56.101
Starting Nmap 7.80 ( https://nmap.org ) at 2020-09-22 11:04 +07
Nmap scan report for 192.168.56.101
Host is up (0.00060s latency).
Not shown: 998 closed ports
PORT STATE SERVICE
22/tcp open ssh
80/tcp open http
MAC Address: 08:00:27:E8:37:D3 (Oracle VirtualBox virtual NIC)
Aggressive OS guesses: Linux 2.6.32 (96%), Linux 3.2 - 4.9 (96%), Linux 2.6.32 - 3.10 (96%), Linux 3.4 - 3.10 (95%), Linux 3.1 (95%
), Linux 3.2 (95%), AXIS 210A or 211 Network Camera (Linux 2.6.17) (94%), Synology DiskStation Manager 5.2–5644 (94%), Netgear RAID
iator 4.2.28 (94%), Linux 2.6.32 - 2.6.35 (94%)
No exact OS matches for host (If you know what OS is running on it, see https://nmap.org/submit/ ).
TCP/IP fingerprint:
OS:SCAN(V=7.80%E=4%D=9/22%OT=22%CT=1%CU=30874%PV=Y%DS=1%DC=D%G=Y%M=080027%T
OS:M=5F6977D2%P=x86_64-apple-darwin19.5.0)SEQ(SP=100%GCD=1%ISR=108%TI=Z%CI=
OS:Z%II=I%TS=A)OPS(01=M5B4ST11NW7%02=M5B4ST11NW7%03=M5B4NNT11NW7%04=M5B4ST1
OS:1NW7%05=M5B4ST11NW7%06=M5B4ST11)WIN(W1=FE88%W2=FE88%W3=FE88%W4=FE88%W5=F
OS:E88%W6=FE88)ECN(R=Y%DF=Y%T=40%W=FAF0%0=M5B4NNSNW7%CC=Y%Q=)T1(R=Y%DF=Y%T=
OS:40%S=0%A=S+%F=AS%RD=0%Q=)T2(R=N)T3(R=N)T4(R=Y%DF=Y%T=40%W=0%S=A%A=Z%F=R%
OS: 0=%RD=0%Q=)T5(R=Y%DF=Y%T=40%W=0%S=Z%A=S+%F=AR%0=%RD=0%Q=)T6(R=Y%DF=Y%T=4
OS:0%W=0%S=A%A=Z%F=R%0=%RD=0%Q=)T7(R=Y%DF=Y%T=40%W=0%S=Z%A=S+%F=AR%0=%RD=0%
OS:Q=)U1(R=Y%DF=N%T=40%IPL=164%UN=0%RIPL=G%RID=G%RIPCK=G%RUCK=G%RUD=G)IE(R=
OS:Y%DFI=N%T=40%CD=S)
Network Distance: 1 hop
OS detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 12.28 seconds
```

OS check on the VM

Q3

Port scanning from nmap can reveals open ports and its service, it could lead to malicious attack if the attacker tries to get in a sensitive service like ssh login. Even when the ssh isn't set on port 22 nmap can still find the ssh service on other ports.

Source: https://www.howtogeek.com/369506/htg-explains-what-is-port-scanning/

IP Address	Description
127.0.0.1	Localhost
10.0.2.15	IP address when network was set to NAT
192.168.56.101	IP address when network is set to host-only adapter
192.168.56.1	My notebook's IP address

```
27.0.0.1 - - [22/Sep/2020:10:30:04 +0700] "GET / HTTP/1.1" 200 3477 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0  
127.0.0.1 - - [22/Sep/2020:10:30:05 +0700] "GET /icons/ubuntu-logo.png HTTP/1.1" 200 3623 "http://localhost/" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
127.0.0.1 - - [22/Sep/2020:10:30:05 +0700] "GET /favicon.ico HTTP/1.1" 404 487 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
10.0.2.15 - - [22/Sep/2020:10:32:12 +0700] "GET / HTTP/1.1" 200 3477 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
10.0.2.15 - [22/Sep/2020:10:32:13 +0700] "GET /icons/ubuntu-logo.png HTTP/1.1" 200 3623 "http://10.0.2.15/" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
10.0.2.15 - [22/Sep/2020:10:32:13 +0700] "GET /favicon.ico HTTP/1.1" 404 487 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
192.168.56.101 - [22/Sep/2020:10:39:33 +0700] "GET / HTTP/1.1" 200 3477 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
192.168.56.101 - [22/Sep/2020:10:39:33 +0700] "GET /icons/ubuntu-logo.png HTTP/1.1" 200 3623 "http://192.168.56.101/" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
192.168.56.101 - [22/Sep/2020:10:39:35 +0700] "GET /favicon.ico HTTP/1.1" 404 492 "-" "Mozilla/S.0 (X11; Ubuntu; Linux x86_64; rv:80.0) Gecko/20100101 Firefox/80.0"  
192.168.56.101 - [22/Sep/2020:10:39:55 +0700] "GET / HTTP/1.1" 200 3477 "-" "Mozilla/S.0 (Macintosh; Intel Mac OS X 10_15_6) AppleWebKit/605.1.15 (KHT ML, like Gecko) Version/14.0 Safari/605.1.15"  
192.168.56.1 - [22/Sep/2020:10:39:55 +0700] "GET /icons/ubuntu-logo.png HTTP/1.1" 200 3623 "http://192.168.56.101/" "Mozilla/S.0 (Macintosh; Intel Mac OS X 10_15_6) AppleWebKit/605.1.15 (KHT ML, like Gecko) Version/14.0 Safari/605.1.15"  
192.168.56.1 - [22/Sep/2020:10:39:55 +0700] "GET / HTTP/1.1" 200 3477 "-"
```

Access.log file for apache server

```
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET /nmaplowercheck1600755978 HTTP/1.1" 404 456 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; ht tps://nmap.org/book/nse.html)"
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
nse.html)'
192.168.56
          ,
56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "POST / HTTP/1.1" 200 11192 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/n
se.html)"
192.168.56.1 -
se.inm()
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET /.git/HEAD HTTP/1.1" 404 456 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/
book/nse.html)"
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "POST /sdk HTTP/1.1" 404 456 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET / HTTP/1.0" 200 11192 "-" "-"
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET / HTTP/1.1" 405 524 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)"
/nse.ncmc/
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
nse.html)"
nse.numl)
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET /evox/about HTTP/1.1" 404 456 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org
/book/nse.html)"
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "VKUU / HTTP/1.1" 501 500 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse
 192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "PROPFIND / HTTP/1.1" 405 524 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book
192.168.56.1 -
 nse.html)
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "GET / HTTP/1.1" 200 11192 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/ns
 192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
nse.numt)
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)"
192.168.56.1 - - [22/5ep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
          ,
56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
 se.html)
192.168.36.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
192.168.56.1 - - [22/Sep/2020:13:26:18 +0700] "OPTIONS / HTTP/1.1" 200 181 "-" "Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/
```

Access.log file showing logs with nmap scanning attempts

Port scanning does not yield any different result, but OS scan does yield a minor different result. Mainly is that the TCP/IP fingerprint is hidden after iptables have been configured.

```
Initiating Connect Scan at 13:29
Seaming 193, 186, 56, 181 (5535 ports)
Discovered open port 20, 166, 56, 181
Comnect Scan Tising; About 27, 598 done; ETC: 13:26 (e19:45 remaining)
Comnect Scan Tising; About 27, 598 done; ETC: 13:26 (e19:44 remaining)
Completed Comnect Scan at 13:26, 98, 28 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:26 (e19:44 remaining)
Completed Scan at 13:26, 98, 28 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:26 (e19:44 remaining)
Completed Scan at 13:28, 98, 118 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:27 (e19:147 remaining)
Completed Scan at 13:28, 98, 118 elapsed (5535 total ports)
Distinction Scan at 13:28, 6.18 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:27 (e19:147 remaining)
Completed Scan at 13:28, 6.18 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:27 (e19:147 remaining)
Completed Scan at 13:28, 6.18 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:27 (e19:147 remaining)
Completed Scan 13:28, 6.18 elapsed (5535 total ports)
Distinction Scan Tising; About 27, 598 done; ETC: 13:27 (e19:147 remaining)
Completed Scan 13:28, 6.18 elapsed (5535 total ports)
Distinction Scan 13:28, 6.18 elapsed (553
```

Before (left) and after (right) configuring iptables

```
| Table | Tabl
```

Before iptables configuring

```
Sudo nmap -0 --osscan-guess 192.168.56.101

Starting Mmap 7.80 ( https://mmap.org ) at 2020-09-22 13:30 +07

Nmap scan report for 192.168.56.101

Not shown: 998 filtered ports

PORT STATE SERVICE
22/tcp open ssh

80/tcp open http

MAC Address: 08:00:27:E8:37:D3 (Oracle VirtualBox virtual NIC)

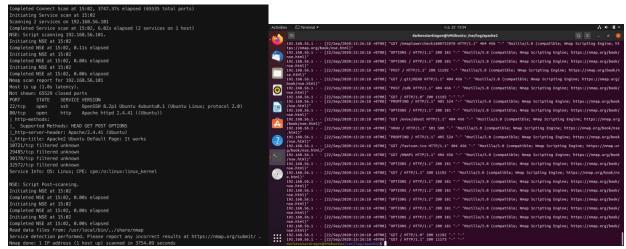
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port

Aggressive OS guesses: Linux 2.6.32 (93%), Linux 3.10 (93%), Linux 3.10 - 4.11 (93%), Linux 3.2 - 4.9 (93%), Linux 3.4 - 3.10 (93%)

Linux 2.6.32 - 3.10 (92%), Linux 2.6.32 - 3.13 (92%), Synology DiskStation Manager 5.2-5644 (91%), Linux 2.6.22 - 2.6.36 (89%), Linux 2.6.32 - 3.10 (92%) Results of the start o
```

After iptables configuring

The logs aren't the exact same but are still quite similar to each other, here's the comparing result of access.log before and after iptables rules added.



Nmap scanning without iptables rules (left) and access.log (right)

```
| 192.188.56.10 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.101 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.56.11 | 192.188.
```

Nmap scanning with iptables rules configured (left) and access.log after enabling the rules (right)

Q8

Firewall can be configured to drop any packets that is not related to the service. Use the policy DROP by default and only let the legit packets to the service ports in.

Firewall can also cut off the attack if the system has been scanned too frequently, like 10 times per minute or 100 times.

Source: https://nmap.org/book/nmap-defenses-firewalls.html

```
darkenstardragongVMUbuntu:/var/log/apache2$ sudo iptables -F INPUT
darkenstardragongVMUbuntu:/var/log/apache2$ sudo iptables --append INPUT -p tcp -d 192.168.56.101 --dport 80 -j ACCEPT
darkenstardragongVMUbuntu:/var/log/apache2$ sudo iptables --append INPUT -p tcp -s 192.168.56.1 -d 192.168.56.101 --dport 22 -j ACCEPT
darkenstardragongVMUbuntu:/var/log/apache2$ sudo iptables -L
Chain INPUT (policy DROP)
target prot opt source destination
ACCEPT tcp -- anywhere 192.168.56.101 tcp dpt:http
ACCEPT tcp -- 192.168.56.1 192.168.56.101 tcp dpt:ssh

Chain FORWARD (policy ACCEPT)
target prot opt source destination

Chain OUTPUT (policy ACCEPT)
target prot opt source destination
```