CMPT 489

Assignment 1

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Part One: Passive Information Gathering

1.1: Open Source Intelligence

*T*ask 1:
Select a technology company that you have never heard of. Perform a thorough passive information gathering on the selected company and present your results in a brief report. Include your methodology and rationale in information gathering. Report the results of using at least two open source intelligence tools such as Maltego, theHarvester in your information gathering process.

Note: For the passive information gather section, I chose the technology company **eventbase** as the target.

Using Maltego, I was able to construct a graph containing information on the company eventbase. Figure 1 provides a high-level view of all the information gathered using basic transforms.

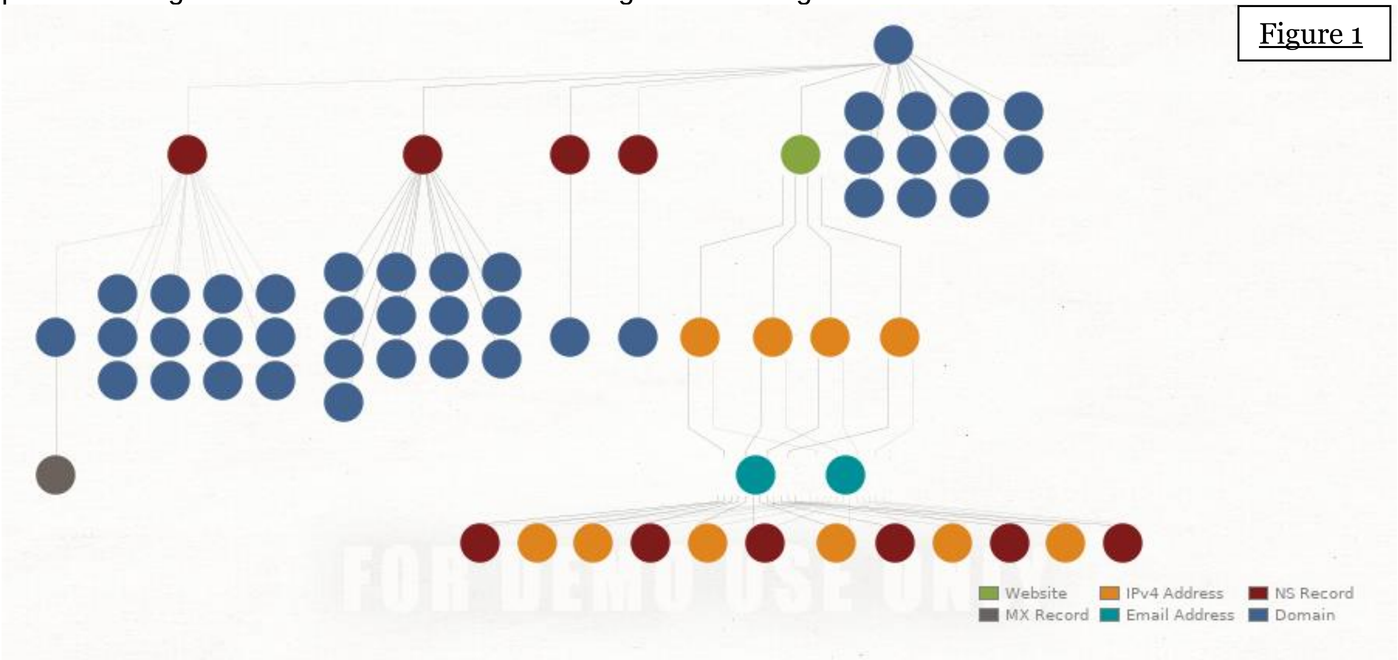


Figure 1

In figure 2, the "to website" transform, looks up the website for eventbase and verifies that it exists. The website exists since the transform ran successfully and a new node in the shape of a green monitor appeared on the graph.

Moreover, using the "to domain" transform, I was able to get all the sub-domains that belong to eventbase. We can see that they have different domains for different geographical regions.

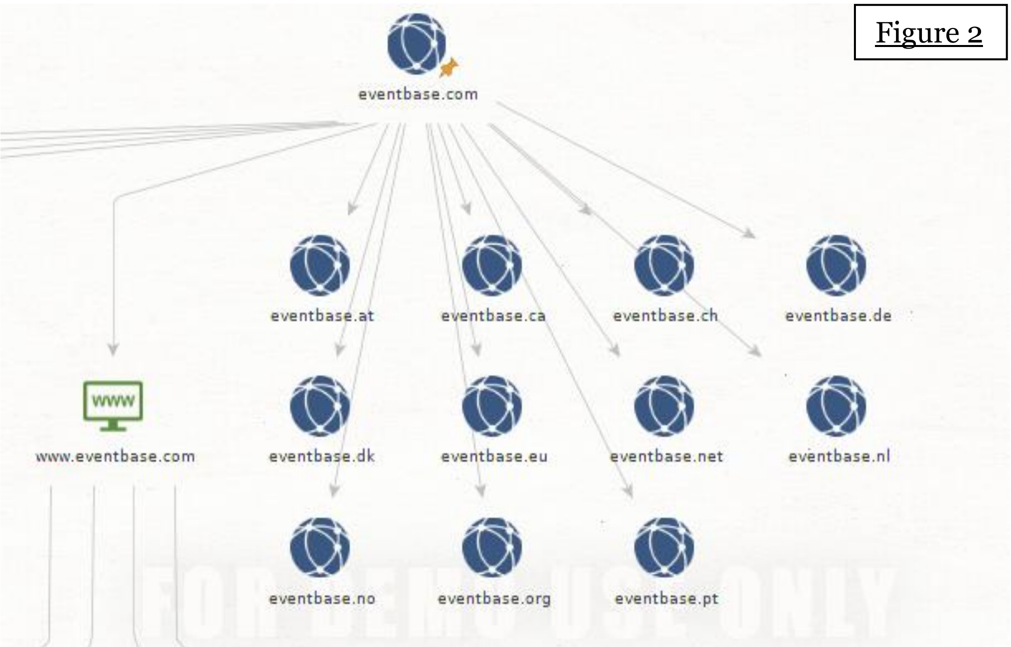


Figure 2

Figure 3 uses the transform “to IP” to obtain the IP addresses of the host website. The transform returns four IP addresses that belong to the eventbase domain. From here, the next step I took was to look at the email addresses that belonged to the four IP addresses the transform returned. The four IP addresses mapped back to two email addresses. The result is show in figure 4 below.

Figure 4

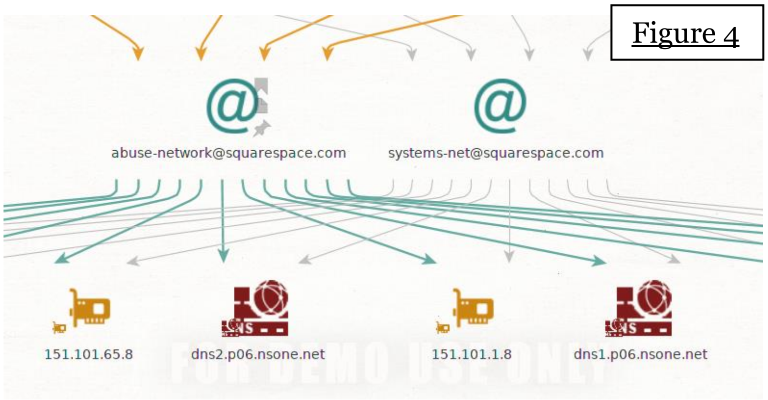
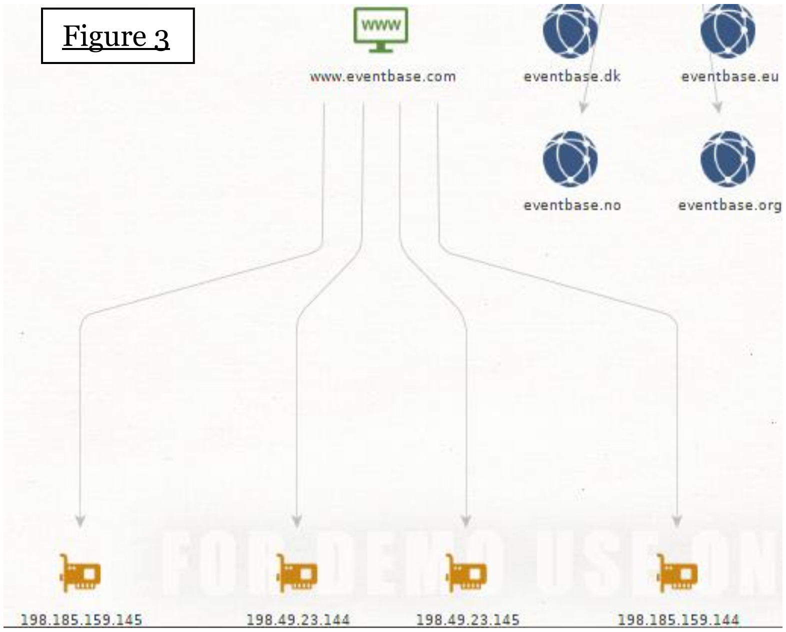


Figure 3



To gather more information about eventbase, I used theHarverster tool to find a series of employee emails, hosts and a list of employee’s names and their role at the company.

Using the following theHarverster command:

```
theharvester -d eventbase.com -l 100 -b google -h results.html
```

I got information such as employee emails and hosts that were found using google as a data source.

```
[+] Emails found:
------------------
info@eventbase.com
kevin.lorch@eventbase.com
marketing@eventbase.com
jobs@eventbase.com
sapsupport@eventbase.com
sarah.blackmore@eventbase.com
last@eventbase.com
john@eventbase.com
support@eventbase.com
event_tech@eventbase.com

[+] Hosts found in search engines:
------------------------------------

Total hosts: 4

[-] Resolving hostnames IPs...

free.eventbase.com:100.24.231.193
live.eventbase.com:52.201.101.201
rsa1-webservice.eventbase.com:184.73.41.244
www.eventbase.com:198.185.159.144\
```

Editing theHarvester command to use LinkedIn as a data source instead got us a list of employee names and their role at eventbase:

```
theharvester -d eventbase.com -l 100 -b linkedin -h results.html
```

```
Users from Linkedin:
--------------------
Ben West - Co-Founder - Eventbase
Sanit Jain - Senior Product Manager - Eventbase
Miriam Trotscha - Account Manager - Eventbase
Stacey Louie - Intermediate Accountant - Eventbase
Angela Stogre - Vice President Finance - Eventbase
April Andrews - Senior Account Manager - Eventbase
Chris Seto - Backend Software Developer - Pixieset
Hannah Coffey - Product Manager - Eventbase
Stephanie Forbes - Producer - Eventbase
Vivian Lau - Associate Producer - Eventbase
Savannah Boyd - Producer - Eventbase
Sharon Chong - Android Developer - VRIFY
Won Ng - Chief Operating Officer - Canalyst
Tavis Paquette - Lead DevOps Engineer - Eventbase
Curtis Strome - Product Manager - Lendesk
Kosta S. - Python Developer - Eventbase
AJ Brigden - Android Developer - Eventbase
Michelle Osborne - Producer - Eventbase
Shayne J. - Lead QA Engineer - Evolve Biologix
Callum Davies - Associate Tech Lead - Eventbase
Kevin Chen - Mobile Developer - Eventbase
Eugene Chong - Technical Lead - Eventbase
Brendan DeBrincat - IT Systems - Eventbase
James Kelly - Quality Assurance Analyst - Eventbase
Sukwhan Chung - Associate Producer - Eventbase
Sophie Donnison - Producer - Eventbase
Christina Looker - Exploratory QA - HSBC
Abhiraj Bhatia - Foundation QA Lead - Eventbase
Himani Dutta - Quality Assurance Analyst - Eventbase
Will Nguyen - Frontend Web Developer - Eventbase
Jenna Cho - Producer - Eventbase
Kyle Wang - Technical Product Specialist - Eventbase
Lovedeep Malik - Front End Developer - Eventbase
Vanessa Lai - Events - Eventbase
Jas Rowinski - Devops Engineer - Eventbase
Andrew Whitman - Technical Lead - Eventbase
Ashli Ahn - UI Designer - Eventbase
Jay Tollefson - Solutions Architect - Eventbase
Luke Basso - Senior Software Engineer - realtor.com
Nicole Farley - Producer - Eventbase
Jesse Scott - Senior Android Engineer - Mojio
Stephen Tynan - Producer - Eventbase
Jared Zecchel - UI Designer - Eventbase
Angela Stogre - Vice President Finance - Eventbase
Lyndsay Imrie - Account Executive - Eventbase
Kasey Sherwood - Co-Founder - irevu
Jomar Santos - Web Developer - Eventbase
```

1.2: DNS Server Interrogating

1.2.1: Basics

Task 2:
Using dig find the IP address of www.sfu.com. What is the IP address?

```
dig www.sfu.com

; <<>> DiG 9.11.5-P4-5.1+b1-Debian <<>> www.sfu.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 18640
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.sfu.com.                   IN     A

;; ANSWER SECTION:
www.sfu.com.     86400     IN     CNAME     www.sfu.ca.
www.sfu.ca.      250     IN     A     142.58.102.68 🡐 This is the IP Address

;; Query time: 126 msec
;; SERVER: 10.0.0.1#53(10.0.0.1)
;; WHEN: Tue Sep 17 12:59:01 PDT 2019
;; MSG SIZE  rcvd: 80
```

Task 3:
The returned answer from the previous task includes a CNAME part. What does this mean?

CNAME means canonical name, which is the properly denoted host name of a computer or a network server.

1.2.2: Understanding Hierarchy

Task 4:
Run a query to ask a root server about **mail.sfu.ca** without using recursion (Hint use the @ for directing the query to a specific root server). What command did you use? What is the result of the query?

The following command was used to as a root server about mail.sfu.ca:

```
dig +norecurse @a.root-servers.net mail.sfu.ca
```

This is the result of the query:

```
; <<>> DiG 9.11.5-P4-5.1+b1-Debian <<>> +norecurse @a.root-servers.net mail.sfu.ca
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 12812
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 4, ADDITIONAL: 9
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1472
;; QUESTION SECTION:
```

```
;mail.sfu.ca.                   IN     A

;; AUTHORITY SECTION:
ca.             172800    IN     NS     c.ca-servers.ca.
ca.             172800    IN     NS     j.ca-servers.ca.
ca.             172800    IN     NS     x.ca-servers.ca.
ca.             172800    IN     NS     any.ca-servers.ca.

;; ADDITIONAL SECTION:
c.ca-servers.ca.    172800    IN     A     185.159.196.2
j.ca-servers.ca.    172800    IN     A     198.182.167.1
x.ca-servers.ca.    172800    IN     A     199.253.250.68
any.ca-servers.ca.    172800    IN     A     199.4.144.2
c.ca-servers.ca.    172800    IN     AAAA     2620:10a:8053::2
j.ca-servers.ca.    172800    IN     AAAA     2001:500:83::1
x.ca-servers.ca.    172800    IN     AAAA     2620:10a:80ba::68
any.ca-servers.ca.    172800    IN     AAAA     2001:500:a7::2

;; Query time: 93 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Tue Sep 17 12:54:52 PDT 2019
;; MSG SIZE  rcvd: 293
```

Task 5:
The answer to the previous task will not give you the IP address of **mail.sfu.ca**. Instead follow the “path” down in the hierarchy of the nameservers to find the address of **mail.sfu.ca** without using recursion. What commands did you use? What is the IP you found?

Commands used to find the IP address of **mail.sfu.ca** in order:

```
dig +norecurse @a.root-servers.net mail.sfu.ca
```

```
dig +norecurse @any.ca-servers.ca mail.sfu.ca
```

```
dig +norecurse @whistler.sfu.ca mail.sfu.ca
```

The last command gives us the IP address of mail.sfu.ca in the answer section of the command output:

```
;; ANSWER SECTION:
mail.sfu.ca.     300     IN     A     142.58.225.1 ← This is the IP Address
```

Part Two: Active Information Gathering

2.1: Network Mapping and Port Scanning

Task 6:
What is the IP address of the local network in the form of IP/netmask? What command did you use to find this?

The following is the IP address of the local network in the form of IP/netmask:

```
Network:   10.0.0.0/24
```

For this task, I used **ifconfig** to get IP address assigned to my computer by the local network. Then used **ipcalc** to get the IP address of the local network in the form of IP/netmask

```
ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.0.16  netmask 255.255.255.0  broadcast 10.0.0.255
```

```
ipcalc 10.0.0.16
Address:   10.0.0.16            00001010.00000000.00000000. 00010000
Netmask:   255.255.255.0 = 24    11111111.11111111.11111111. 00000000
Wildcard:  0.0.0.255            00000000.00000000.00000000. 11111111
=>
Network:   10.0.0.0/24          00001010.00000000.00000000. 00000000
HostMin:   10.0.0.1             00001010.00000000.00000000. 00000001
HostMax:   10.0.0.254           00001010.00000000.00000000. 11111110
Broadcast: 10.0.0.255           00001010.00000000.00000000. 11111111
Hosts/Net: 254                  Class A, Private Internet
```

Task 7:
Perform a **full ping** scan in the local network using Nmap and identify all potential targets. Report the results of the scan and point the IPs of the potential target machines. What commands did you use to scan the network?

Command used to scan the network:

```
nmap 10.0.0.0/24
```

The IPs of the potential target machines are pointed at with ← **Target IP Address** in the result output below:

```
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 12:27 PDT
Nmap scan report for pfSense.localdomain (10.0.0.1) ← Target IP Address
Host is up (0.00048s latency).
Not shown: 998 filtered ports
PORT   STATE SERVICE
53/tcp open  domain
80/tcp open  http
MAC Address: 08:00:27:34:4F:F8 (Oracle VirtualBox virtual NIC)

Nmap scan report for 10.0.0.15 ← Target IP Address
Host is up (0.00045s latency).
Not shown: 987 closed ports
PORT     STATE SERVICE
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
554/tcp   open  rtsp
2869/tcp  open  icslap
5357/tcp  open  wsdapi
10243/tcp open  unknown
49152/tcp open  unknown
49153/tcp open  unknown
49154/tcp open  unknown
49155/tcp open  unknown
49156/tcp open  unknown
49157/tcp open  unknown
MAC Address: 08:00:27:6C:52:84 (Oracle VirtualBox virtual NIC)

Nmap scan report for 10.0.0.17 ← Target IP Address
Host is up (0.00068s latency).
Not shown: 997 closed ports
PORT    STATE SERVICE
135/tcp open  msrpc
139/tcp open  netbios-ssn
445/tcp open  microsoft-ds
```

```
MAC Address: 08:00:27:13:52:EB (Oracle VirtualBox virtual NIC)

Nmap scan report for 10.0.0.16
Host is up (0.000012s latency).
Not shown: 999 closed ports
PORT    STATE SERVICE
111/tcp open  rpcbind

Nmap done: 256 IP addresses (4 hosts up) scanned in 10.63 seconds
```

<u>Task 8</u>:
Perform a TCP SYN scan on a specific target using Nmap. Report the result. What command did you use to perform the scan? Perform a TCP full scan in a specific target **different** than the target you used for TCP SYN scan. Report the result. What command did you use to perform the scan? What is the difference between this method of scanning and the one that you used for TCP SYN scan?

Command used to do a TPC SYN scan on target machine with IP 10.0.0.17:

```
nmap -sS 10.0.0.17
```

Result output:

```
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 12:33 PDT
Nmap scan report for 10.0.0.17
Host is up (0.00044s latency).
Not shown: 997 closed ports
PORT    STATE SERVICE
135/tcp open  msrpc
139/tcp open  netbios-ssn
445/tcp open  microsoft-ds
MAC Address: 08:00:27:13:52:EB (Oracle VirtualBox virtual NIC)

Nmap done: 1 IP address (1 host up) scanned in 1.39 seconds
```

Command used to do TCP full scan on target machine with IP 10.0.0.15:

```
nmap -sT 10.0.0.15
```

Result output:

```
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 13:55 PDT
Nmap scan report for 10.0.0.15
Host is up (0.024s latency).
Not shown: 987 closed ports
PORT    STATE SERVICE
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
554/tcp   open  rtsp
2869/tcp  open  icslap
5357/tcp  open  wsdapi
10243/tcp open  unknown
49152/tcp open  unknown
49153/tcp open  unknown
49154/tcp open  unknown
49155/tcp open  unknown
49156/tcp open  unknown
49157/tcp open  unknown
MAC Address: 08:00:27:6C:52:84 (Oracle VirtualBox virtual NIC)
```

```
Nmap done: 1 IP address (1 host up) scanned in 2.85 seconds
```

The main difference between performing a TCP SYN scan vs a TPC full scan, is that a TCP full scan is easily detectible since the target host logs will show a bunch of connection and error messages for the services which accept() the connection just have it immediately shut down. Where as a TCP SYN is harder to trace since fewer sites log it.

Task 9:
Perform two full port scanning in two different targets separately. Report the results. Can you infer the operating system from these results? If yes, indicate how. If not explain why.

Full scan on target machine with IP 10.0.0.15:

```
nmap -p0-65535 10.0.0.15
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 15:43 PDT
Nmap scan report for 10.0.0.15
Host is up (0.00022s latency).
Not shown: 65523 closed ports
PORT    STATE SERVICE
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
554/tcp   open  rtsp
2869/tcp  open  icslap
5357/tcp  open  wsdapi
10243/tcp open  unknown
49152/tcp open  unknown
49153/tcp open  unknown
49154/tcp open  unknown
49155/tcp open  unknown
49156/tcp open  unknown
49157/tcp open  unknown
MAC Address: 08:00:27:6C:52:84 (Oracle VirtualBox virtual NIC)

Nmap done: 1 IP address (1 host up) scanned in 18.20 seconds
```

Full scan on target machine with IP 10.0.0.17:

```
nmap -p0-65535 10.0.0.17
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 15:46 PDT
Nmap scan report for 10.0.0.17
Host is up (0.00030s latency).
Not shown: 65533 closed ports
PORT    STATE SERVICE
135/tcp open  msrpc
139/tcp open  netbios-ssn
445/tcp open  microsoft-ds
MAC Address: 08:00:27:13:52:EB (Oracle VirtualBox virtual NIC)

Nmap done: 1 IP address (1 host up) scanned in 17.16 seconds
```

You can infer the type operating system the target machines are running from this output (ie. Windows). However, you cannot tell what version of the operating system they are running.

Task 10:
There are different ways to identify a target’s operating system. Using Nmap show **two** different ways to do that. Execute these for both of the target machines. In total there should be **four** results (two for the first target and two for the second). Report the results and associate the IPs with the operating systems.

The two commands used to identify the target's OS:

```
nmap -sV [IP Address]
```

```
nmap -p0-65535 -A -T4 [IP Address]
```

Result output on target machine with IP address 10.0.0.15:

```
nmap -sV 10.0.0.15
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 15:53 PDT
Nmap scan report for 10.0.0.15
Host is up (0.00034s latency).
Not shown: 987 closed ports
PORT    STATE SERVICE   VERSION
135/tcp   open  msrpc         Microsoft Windows RPC
139/tcp   open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp   open  microsoft-ds Microsoft Windows 7 - 10 microsoft-ds (workgroup: WORKGROUP)
554/tcp   open  rtsp?
2869/tcp  open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
5357/tcp  open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
10243/tcp open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
49152/tcp open  msrpc         Microsoft Windows RPC
49153/tcp open  msrpc         Microsoft Windows RPC
49154/tcp open  msrpc         Microsoft Windows RPC
49155/tcp open  msrpc         Microsoft Windows RPC
49156/tcp open  msrpc         Microsoft Windows RPC
49157/tcp open  msrpc         Microsoft Windows RPC
MAC Address: 08:00:27:6C:52:84 (Oracle VirtualBox virtual NIC)
Service Info: Host: ADMIN-PC; OS: Windows; CPE: cpe:/o:microsoft:windows

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 129.24 seconds
```

```
nmap -p0-65535 -A -T4 10.0.0.15
Starting Nmap 7.80 ( https://nmap.org ) at 2019-09-20 15:57 PDT
Nmap scan report for 10.0.0.15
Host is up (0.00097s latency).
Not shown: 65523 closed ports
PORT    STATE SERVICE   VERSION
135/tcp   open  msrpc         Microsoft Windows RPC
139/tcp   open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp   open  microsoft-ds Windows 7 Professional 7601 Service Pack 1 microsoft-ds
(workgroup: WORKGROUP)
554/tcp   open  rtsp?
|_rtsp-methods: ERROR: Script execution failed (use -d to debug)
2869/tcp  open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
5357/tcp  open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
|_http-server-header: Microsoft-HTTPAPI/2.0
|_http-title: Service Unavailable
10243/tcp open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
|_http-server-header: Microsoft-HTTPAPI/2.0
|_http-title: Not Found
49152/tcp open  msrpc         Microsoft Windows RPC
49153/tcp open  msrpc         Microsoft Windows RPC
49154/tcp open  msrpc         Microsoft Windows RPC
49155/tcp open  msrpc         Microsoft Windows RPC
49156/tcp open  msrpc         Microsoft Windows RPC
49157/tcp open  msrpc         Microsoft Windows RPC
MAC Address: 08:00:27:6C:52:84 (Oracle VirtualBox virtual NIC)
```

```
Device type: general purpose|media device
Running: Microsoft Windows 2008|10|7|8.1, Microsoft embedded
OS CPE: cpe:/o:microsoft:windows_server_2008::sp2 cpe:/o:microsoft:windows_10
cpe:/h:microsoft:xbox_one cpe:/o:microsoft:windows_7::- cpe:/o:microsoft:windows_7::sp1
cpe:/o:microsoft:windows_8 cpe:/o:microsoft:windows_8.1
OS details: Microsoft Windows Server 2008 SP2 or Windows 10 or Xbox One, Microsoft
Windows 7 SP0 - SP1, Windows Server 2008 SP1, Windows Server 2008 R2, Windows 8, or
Windows 8.1 Update 1
Network Distance: 1 hop
Service Info: Host: ADMIN-PC; OS: Windows; CPE: cpe:/o:microsoft:windows

Host script results:
|_clock-skew: mean: 2h19m59s, deviation: 4h02m29s, median: 0s
|_nbstat: NetBIOS name: ADMIN-PC, NetBIOS user: <unknown>, NetBIOS MAC: 08:00:27:6c:52:84
(Oracle VirtualBox virtual NIC)
| smb-os-discovery:
|   OS: Windows 7 Professional 7601 Service Pack 1 (Windows 7 Professional 6.1)
|   OS CPE: cpe:/o:microsoft:windows_7::sp1:professional
|   Computer name: admin-PC
|   NetBIOS computer name: ADMIN-PC\x00
|   Workgroup: WORKGROUP\x00
|_  System time: 2019-09-20T15:59:19-07:00
| smb-security-mode:
|   account_used: guest
|   authentication_level: user
|   challenge_response: supported
|_  message_signing: disabled (dangerous, but default)
| smb2-security-mode:
|   2.02:
|_    Message signing enabled but not required
| smb2-time:
|   date: 2019-09-20T22:59:19
|_  start_date: 2019-09-20T17:34:49

TRACEROUTE
HOP RTT     ADDRESS
1   0.97 ms 10.0.0.15

OS and Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 211.78 seconds
```

Shortened result output on target machine with IP address 10.0.0.17:

```
nmap -sV 10.0.0.17
...
PORT    STATE SERVICE   VERSION
135/tcp open  msrpc          Microsoft Windows RPC
139/tcp open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp open  microsoft-ds Microsoft Windows XP microsoft-ds
...
```

```
nmap -p0-65535 -A -T4 10.0.0.17
...
Running: Microsoft Windows XP|2003
OS CPE: cpe:/o:microsoft:windows_xp cpe:/o:microsoft:windows_server_2003
OS details: Microsoft Windows XP SP2 or SP3, or Windows Server 2003
...
MAC: 08:00:27:13:52:eb (Oracle VirtualBox virtual NIC)
| smb-os-discovery:
|   OS: Windows XP (Windows 2000 LAN Manager)
|   OS CPE: cpe:/o:microsoft:windows_xp::-
|   Computer name: admin-2bdbd2ba8
|   NetBIOS computer name: ADMIN-2BDBD2BA8\x00
|   Workgroup: WORKGROUP\x00
|_  System time: 2019-09-20T16:02:58-07:00
...
```

IP address 10.0.0.15 has operating system: Windows 7

IP address 10.0.0.17 has operating system: Windows XP

2.2 Vulnerability Scanning

Task 11:
Perform an advanced scan on the Windows XP target machine. Report the critical vulnerabilities of the system. Which of these could be used directly to exploit and gain access to the target system and which to gain more info or perform a denial of service attack according to your opinion?

There are five critical vulnerabilities on the Windows XP target machine:

- **MS08-067**: Microsoft Windows Server Service Crafted RPC Request Handling Remote Code Execution (958644) (ECLIPSEDWING) (uncredentialed check)

- **MS09-001**: Microsoft Windows SMB Vulnerabilities Remote Code Execution (958687) (uncredentialed check)

- **MS17-010**: Security Update for Microsoft Windows SMB Server (4013389) (ETERNALBLUE) (ETERNALCHAMPION) (ETERNALROMANCE) (ETERNALSYNERGY) (WannaCry) (EternalRocks) (Petya) (uncredentialed check)

- Unsupported Windows OS (remote)

- Microsoft Windows XP Unsupported Installation Detection

In my opinion, **MS08-067, MS09-001** and **MS17-010** can be used to exploit and gain access to the target system. However, I believe that only **MS17-010** can be used to gather more information on the target system. As for denial of service attacks, **MS09-001** and **MS17-010** can be used.