

Lab 2: Docker bash scripting

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EXECUTIVE SUMMARY

In a medium sized organization, it is crucial to keep systems secure so that easy exploits from something like Kali Linux cannot disrupt your organization. As an offensive security specialist, it is necessary to learn effective bash scripting skills to be able to exploit organizations that do not efficiently secure their systems. Not securing systems will cost a company hundreds of thousands of dollars in repair and damage control. Offensive security professions should be able to write scripts to start docker instances, store docker container information, IP addresses, and format information correctly to be piped into scans. Nmap scans can be used to iterate through files and scan all IP addresses in the file. Scripts can be utilized to speed up this process and do a one-run port scan of all of an organizations docker containers. This is crucial to be aware of as a defensive or offensive security specialist.

STATEMENT OF WORK

The objectives of Lab 2 include the creation of bash scripts for lab testing of offensive security tactics. Project scope includes grabbing information about docker containers, active and inactive, parsing information between files and commands, and outputting commands to files to be analyzed by security analysts.

Objectives of Lab 2 include:

- Write a bash script to store docker container IDs
- Write a bash script to start all docker machines
- Create a bash script to stop all docker machines
- Create a script to grab all docker IP addresses
- Pipe IP addresses into an Nmap scan
- Separate active docker containers from inactive containers
- Utilize Nmap to scan all TCP and UDP ports through a bash script.

The purpose of these created scripts is to train offensive security and automation without having to manually run scans on each individual docker container and store it in different files. Automation is incredibly important in offensive security as it allows for quick effective methods of exploiting systems.

PROCEDURES

The following procedures outline the steps taken to complete this project. For reference,

Italicized words represent options, **bold** words represent buttons, and words in Courier New represent inputs that are typed.

Task 1 includes a proof of concept of a bash script automating pulling all docker images' container IDs and storing it in a file. Figures 1-8 show the created scripts to automate this process.

Task 1:

```
[-(group11@giikali)-[~]
$ sudo docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
e80d3c653409 tleemcj/r/metasploitable2:latest "sh -c '/bin/service..." 5 days ago Exited (134) 5 days ago container-name
d8c98a9bc15c santosomar/juice-shop "docker-entrypoint.s..." 5 days ago Exited (0) 5 days ago juice-shop
d18e3f82de88 santosomar/rtv-safemode "/run.sh" 5 days ago Exited (137) 5 days ago rtv-safemode
196a28f3d490 santosomar/mutillidae_2 "/run.sh" 5 days ago Exited (137) 5 days ago mutillidae_2
19a975263f1b santosomar/dwva "/main.sh" 5 days ago Exited (137) 5 days ago dwva
c0332f0455de santosomar/webgoat "/bin/sh -c '/bin/ba..." 5 days ago Exited (137) 5 days ago webgoat
e8d4361cd935 santosomar/dc31_02:latest "/opt/druid/bin/star..." 5 days ago Exited (1) 5 days ago dc31_02
8df2f9000d7091 santosomar/dc31_01:latest "redis-server /etc/r..." 5 days ago Exited (0) 5 days ago dc31_01
32d3cbe01086 santosomar/yascon-hackme "/start.sh" 5 days ago Exited (137) 5 days ago yascon-hackme
1179487d0bb6d santosomar/secretcorp-branch1 "/start.sh" 5 days ago Exited (137) 5 days ago secretcorp-branch1
8f05c62739e2 santosomar/dc30_02:latest "/opt/solr/bin/solr ..." 5 days ago Exited (143) 5 days ago dc30_02
1a6e45715bbf santosomar/hackme-rtov "nginx -g 'daemon off..." 5 days ago Exited (0) 5 days ago hackme-rtov
141247429e2f santosomar/mayhem "nginx -g 'daemon off..." 5 days ago Exited (0) 5 days ago mayhem
6d93f275b733 santosomar/dvna "npm start" 5 days ago Exited (0) 5 days ago dvna
a7ef559509b9 santosomar/gravemind "/bin/sh -c '/root/st..." 5 days ago Exited (137) 5 days ago gravemind
895c791340df santosomar/dc31_03:latest "/mnt/openfire/bin/o..." 5 days ago Exited (143) 5 days ago dc31_03
55be0997f43f santosomar/hackazon "/bin/bash /start.sh" 5 days ago Exited (137) 5 days ago hackazon
dbf00fcbe161 santosomar/ywing:latest "/run.sh" 5 days ago Exited (0) 5 days ago Y-wing
80f6a7c92a1c santosomar/galactic-archives "./start.sh" 5 days ago Exited (137) 5 days ago galactic-archives
0472cb9fd2c0 santosomar/dc30_01:latest "/usr/bin/entrypoint..." 5 days ago Exited (0) 5 days ago dc30_01
```

Figure 1: Current running docker images

```
(group11㉿kali)-[~]
└─$ sudo ./cliContainerID
e80d3c653409
d8c98a9bc15c
d18e3f82de88
196a28f3d490
19a975263f1b
c0332f0455de
e8d4361cd935
8d2f900d7091
32d3cbe01086
1179487d0b6d
8f05c62739e2
1a6e45715bbf
141247429e2f
6d93f275b733
a7ef559509b9
895c791340df
55be0997f43f
dbf00fcceb161
80f6a7c92a1c
0472cb9fd2c0

(group11㉿kali)-[~]
└─$ sudo ./containerID
Storing all docker container IDs in ./docker_ids.txt.

(group11㉿kali)-[~]
└─$
```

Figure 2: Bash script showing all IDs and bash script printing it to the screen

```
#!/bin/bash

# This script takes all docker containers and stores their IDs in a text file
echo "" > docker_ids.txt;
docker ps -a | awk '{print $1}' | tail -n +2 > docker_ids.txt;

echo "Storing all docker container IDs in ./docker_ids.txt."
```

Figure 3: Bash script to put docker IDs in a file

```
#!/bin/bash

# This script takes all docker containers and stores their IDs in a text file
echo "" > docker_ids.txt;
a="";
docker ps -a | awk '{print $1}' | tail -n +2;
```

Home

Figure 5: Output of cliContainerID.sh

```
└─(group11㉿g11kali)-[~]
└─$ sudo ./containerID
Storing all docker container IDs in ./docker_ids.txt
List of IDs:

e80d3c653409
d8c98a9bc15c
d18e3f82de88
196a28f3d490
19a975263f1b
c0332f0455de
e8d4361cd935
8d2f900d7091
32d3cbe01086
1179487d0b6d
8f05c62739e2
1a6e45715bbf
141247429e2f
6d93f275b733
a7ef559509b9
895c791340df
55be0997f43f
dbf00fcceb161
80f6a7c92a1c
0472cb9fd2c0
```

```
└─(group11㉿g11kali)-[~]
└─$ ┌
```

Figure 6: Concatenated scripts to accomplish

```
[group11@kali ~]$ ls
Desktop Downloads Pictures Templates cliContainerID docker_ids.txt
Documents Music Public Videos containerID

[group11@kali ~]
```

Figure 7: Docker_ids.txt file in home directory

```
File Actions Edit View Help
GNU nano 7.2                               docker_ids.txt
e80d3c653409
d8c98a9bc15c
d18e3f82de88
196a28f3d490
19a975263f1b
c0332f0455de
e8d4361cd935
8d2f900d7091
32d3cbe01086
1179487d0b6d
8f05c62739e2
1a6e45715bbf
141247429e2f
6d93f275b733
a7ef559509b9
895c791340df
55be0997f43f
dbf00fcceb161
80f6a7c92a1c
0472cb9fd2c0
```

Figure 8: docker_ids.txt contents

Task 2:

Task 2 provides insight of bash starting all docker containers on the machine automatically based on container IDs from earlier scripts. Figures 9-10 show the docker container starting script.

```
GNU nano 7.2                               dockerStart.sh
#!/bin/bash

# This script starts all docker machines by parsing containerID.sh

/home/group11/containerID.sh;
containerIDFile=/home/group11/docker_ids.txt;
echo & echo;
echo "Docker containers listed above are automatically starting now.";
echo & echo;
#docker start containerID
while IFS= read -r containerID; do
{
    echo "Container starting: $containerID";
    docker start "$containerID" > /dev/null 2>&1;
    sleep 2;
}
done < "$containerIDFile";
echo;
echo "All docker containers available are now running";
echo "Execution time: $SECONDS seconds";
```

Figure 9: dockerStart.sh script to start all docker containers in the text file.

```
c0332f0455de
e8d4361cd935
8d2f900d7091
32d3cbe01086
1179487d0b6d
8f05c62739e2
1a6e45715bbf
141247429e2f
6d93f275b733
a7ef559509b9
895c791340df
55be0997f43f
dbf00fcceb161
80f6a7c92a1c
0472cb9fd2c0
```

Docker containers listed above are automatically starting now.

```
Container starting: e80d3c653409
Container starting: d8c98a9bc15c
Container starting: d18e3f82de88
Container starting: 196a28f3d490
Container starting: 19a975263f1b
Container starting: c0332f0455de
Container starting: e8d4361cd935
Container starting: 8d2f900d7091
Container starting: 32d3cbe01086
Container starting: 1179487d0b6d
Container starting: 8f05c62739e2
Container starting: 1a6e45715bbf
Container starting: 141247429e2f
Container starting: 6d93f275b733
Container starting: a7ef559509b9
Container starting: 895c791340df
Container starting: 55be0997f43f
Container starting: dbf00fcceb161
Container starting: 80f6a7c92a1c
Container starting: 0472cb9fd2c0
```

```
All docker containers available are now running
Execution time: 41 seconds
```

Figure 10: Output of dockerStart.sh

Task 3:

Task 3 outlines a similar objective of task 2 but stopping the docker containers instead of starting them. Figures 11-12 show the script content and output.

```
GNU nano 7.2                               dockerStop.sh
#!/bin/bash

# This script stops all docker machines by parsing containerID.sh

/home/group11/containerID.sh;
containerIDFile=/home/group11/docker_ids.txt;
echo & echo;
echo "Docker containers listed above are being immediately stopped now.";
echo & echo;
#docker stop containerID
while IFS= read -r containerID; do      # While iterating file lines
{
    echo "Container stop: $containerID";
    docker stop "$containerID" > /dev/null 2>&1;    # Stop container
    sleep 2;          # Pause
}
done < "$containerIDFile";      # Finish loop
echo;
echo "All docker containers available are now stopped";
echo "Execution time: $SECONDS seconds";
```

Figure 11: dockerStop.sh script content

```
Docker containers listed above are being immediately stopped now.
```

```
Container stop: e80d3c653409
Container stop: d8c98a9bc15c
Container stop: d18e3f82de88
Container stop: 196a28f3d490
Container stop: 19a975263f1b
Container stop: c0332f0455de
Container stop: e8d4361cd935
Container stop: 8d2f900d7091
Container stop: 32d3cbe01086
Container stop: 1179487d0b6d
Container stop: 8f05c62739e2
Container stop: 1a6e45715bbf
Container stop: 141247429e2f
Container stop: 6d93f275b733
Container stop: a7ef559509b9
Container stop: 895c791340df
Container stop: 55be0997f43f
Container stop: dbf00fce8161
Container stop: 80f6a7c92a1c
Container stop: 0472cb9fd2c0

All docker containers available are now stopped
Execution time: 146 seconds

└─(group11@kali)-[~]
```

Figure 12: dockerStop.sh output

Task 4:

Task 4 creates the automation of grabbing IP addresses from the docker container IDs using the docker inspect command and storing the IP addresses in a host file. Figures 13-15 show the script contents and its output. The script grabs all IPs from the dockers trimming off gateways and external text leaving just the addresses behind.

Figure 13: containerIP.sh script

```
GNU nano 7.2  Edit  View  Help
#!/bin/bash
# This script takes all docker containers and stores their IDs in a text file called docker_ids.txt.
sudo rm /home/group11/docker_ips.txt;
touch /home/group11/docker_ids.txt; # live docker containers from the data in the group file
sudo rm /home/group11/temp.txt;
touch /home/group11/temp.txt;
/home/group11/containerID.sh;

containerIPFile=/home/group11/docker_ips.txt;
containerIDFile=/home/group11/docker_ids.txt;
while IFS= read -r line
do      # While iterating file lines
{
    sudo docker inspect $line | grep -E -o '[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}' | sort | uniq >> /home/group11/temp.txt;
} done < "$containerIDFile";      # Finish loop

while IFS= read -r line2
do
{
grep -E -o '[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}' | grep -v -E '\b[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.\b' | sort >> $containerIPFile
} done < /home/group11/temp.txt;
echo "Storing all docker container IPs in ./docker_ips.txt";
echo "List of IPs: ";
cat $containerIPFile;
echo;
```

Figure 13: containerIP.sh script

```
Storing all docker container IPs in ./docker_ips.txt
List of IPs:
10.6.6.11
10.6.6.12
10.6.6.13
10.6.6.14
10.6.6.15
10.6.6.16
10.6.6.17
10.6.6.18
10.6.6.19
10.6.6.20
10.6.6.21
10.6.6.22
10.6.6.23
10.6.6.24
10.6.6.25
10.6.6.26
10.7.7.21
10.7.7.22
10.7.7.23
172.17.0.2

[(group11@g11kali)-~]
$
```

Figure 14: containerIP.sh execution output



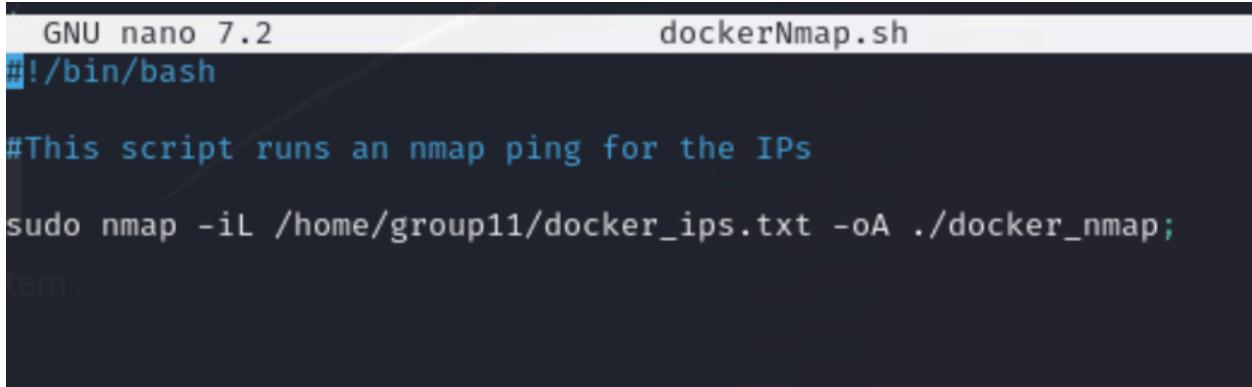
```
File Actions Edit View Help group11@ethan: ~
GNU nano 7.2 docker_ips.txt
10.6.6.11 10.6.6.12 10.6.6.13 10.6.6.14 10.6.6.15 10.6.6.16 10.6.6.17 10.6.6.18 10.6.6.19 10.6.6.20 10.6.6.21 10.6.6.22 10.6.6.23 10.6.6.24 10.6.6.25 10.6.6.26 10.7.7.21 10.7.7.22 10.7.7.23 172.17.0.2
```

The terminal window shows the contents of a file named "docker_ips.txt". The file contains a list of IP addresses, each followed by a Docker container ID and a corresponding Nmap output file name. The IP addresses listed are 10.6.6.11 through 10.6.6.26, 10.7.7.21 through 10.7.7.23, and 172.17.0.2. The Nmap output files are named docker_start.sh, docker_stop.sh, docker_ids.txt, docker_nmap.gnmap, docker_nmap.nmap, and docker_nmap.xml.

Figure 15: Docker_ips.txt contents

Task 5:

Task 5 provides a proof of concept of scripts to scan docker images automatically via Nmap. This was done through the -iL flag in Nmap to make it iterate through a text file scanning all IP addresses. The script and its output into different file types can be seen in Figures 16-19 below.



```
GNU nano 7.2 dockerNmap.sh
#!/bin/bash

#This script runs an nmap ping for the IPs

sudo nmap -iL /home/group11/docker_ips.txt -oA ./docker_nmap;
```

The terminal window shows the contents of a script file named "dockerNmap.sh". The script is written in Bash and uses the "nmap" command with the "-iL" flag to scan Docker images from a list in "docker_ips.txt". The output is directed to files named "docker_nmap.*".

Figure 16: dockerNmap.sh script

```
Nmap scan report for 10.7.7.22
Host is up (0.0000050s latency).
Not shown: 995 closed tcp ports (reset)
PORT      STATE SERVICE
8080/tcp  open  http-proxy
8081/tcp  open  blackice-icecap
8082/tcp  open  blackice-alerts
8083/tcp  open  us-srv
8888/tcp  open  sun-answerbook
MAC Address: 02:42:0A:07:07:16 (Unknown)

Nmap scan report for 10.7.7.23
Host is up (0.0000050s latency).
Not shown: 995 closed tcp ports (reset)
PORT      STATE SERVICE
5222/tcp  open  xmpp-client
5269/tcp  open  xmpp-server
7070/tcp  open  realserver
7777/tcp  open  cbt
9090/tcp  open  zeus-admin
MAC Address: 02:42:0A:07:07:17 (Unknown)

Nmap done: 20 IP addresses (19 hosts up) scanned in 1.98 seconds

└─$ █
```

Figure 17: dockerNmap.sh output

```
(group11㉿kali)-[~]
└─$ ls -l
total 172
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Desktop
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Documents
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Downloads
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Music
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Pictures
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Public
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Templates
drwxr-xr-x 2 group11 group11 4096 Jan 18 19:37 Videos
-rwxr-xr-x 1 group11 group11 161 Jan 24 20:01 cliContainerID.sh
-rwxrwxrwx 1 group11 group11 339 Jan 24 20:03 containerID.sh
-rwxr-xr-x 1 group11 group11 1042 Jan 25 12:20 containerIP.sh
-rwxrwxrwx 1 group11 group11 119 Jan 26 19:21 dockerNmap.sh
-rwxrwxrwx 1 group11 group11 634 Jan 24 20:35 dockerStart.sh
-rwxr-xr-x 1 root      root    613 Jan 24 20:39 dockerStop.sh
-rw-r--r-- 1 group11 group11 260 Jan 26 19:22 docker_ids.txt
-rw-r--r-- 1 root      root    201 Jan 26 19:22 docker_ips.txt
-rw-r--r-- 1 root      root    2713 Jan 26 19:24 docker_nmap.gnmap
-rw-r--r-- 1 root      root    4272 Jan 26 19:24 docker_nmap.nmap
-rw-r--r-- 1 root      root    93754 Jan 26 19:24 docker_nmap.xml
-rw-r--r-- 1 root      root    383 Jan 26 19:22 temp.txt

((group11㉿kali)-[~]
└─$
```

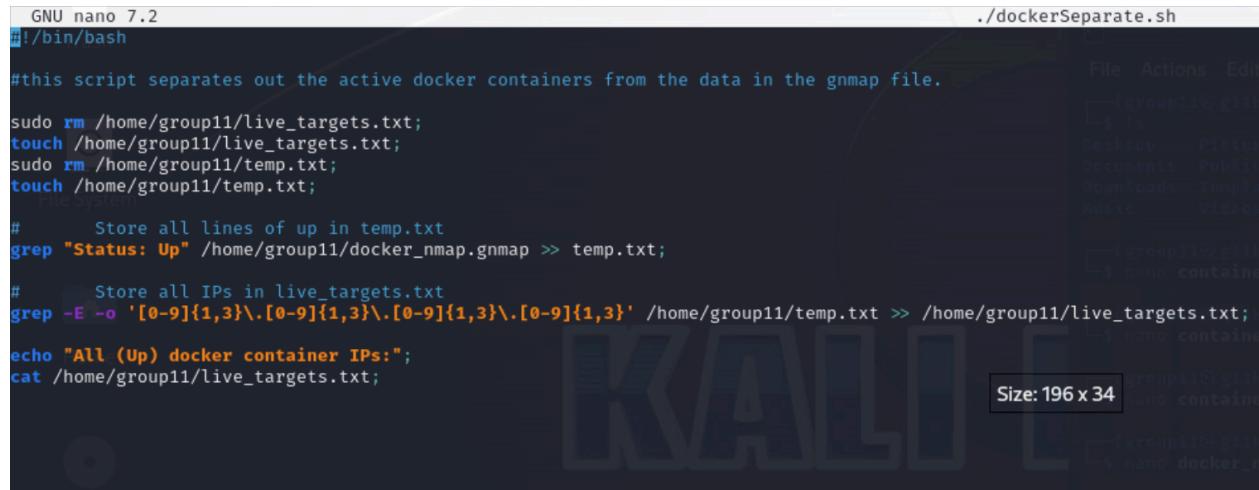
Figure 18: dockerNmap.sh files created in xml, nmap, and gnmap formats

```
GNU nano 7.2
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE nmaprun>
<?xmlstylesheet href="file:///usr/bin/../share/nmap/nmap.xsl" type="text/xsl"?>
<!-- Nmap 7.94SVN scan initiated Fri Jan 26 19:24:24 2024 as: nmap -iL /home/group11/
<nmaprun scanner="nmap" args="nmap -iL /home/group11/docker_ips.txt -oA ./docker_nmap
<scaninfo type="syn" protocol="tcp" numservices="1000" services="1,3-4,6-7,9,13,17,19
<verbose level="0"/>
<debugging level="0"/>
<hosthint><status state="up" reason="arp-response" reason_ttl="0"/>
<address addr="10.6.6.12" addrtype="ipv4"/>
<address addr="02:42:0A:06:06:0C" addrtype="mac"/>
<hostnames>
</hostnames>
</hosthint>
<hosthint><status state="up" reason="arp-response" reason_ttl="0"/>
<address addr="10.6.6.13" addrtype="ipv4"/>
<address addr="02:42:0A:06:06:0D" addrtype="mac"/>
<hostnames>
</hostnames>
</hosthint>
<hosthint><status state="up" reason="arp-response" reason_ttl="0"/>
<address addr="10.6.6.14" addrtype="ipv4"/>
<address addr="02:42:0A:06:06:0E" addrtype="mac"/>
<hostnames>
</hostnames>
</hosthint>
<hosthint><status state="up" reason="arp-response" reason_ttl="0"/>
<address addr="10.6.6.15" addrtype="ipv4"/>
<address addr="02:42:0A:06:06:0F" addrtype="mac"/>
<hostnames>
```

Figure 19: dockerNmap.xml output

Task 6:

Task 6 shows the process of bash scripts being able to separate active docker containers from inactive docker containers to just hold the live targets that can be attacked or exploited in the future. Figures 20-22 below outline the process and output of this script.



```
GNU nano 7.2
#!/bin/bash

#this script separates out the active docker containers from the data in the gnmap file.

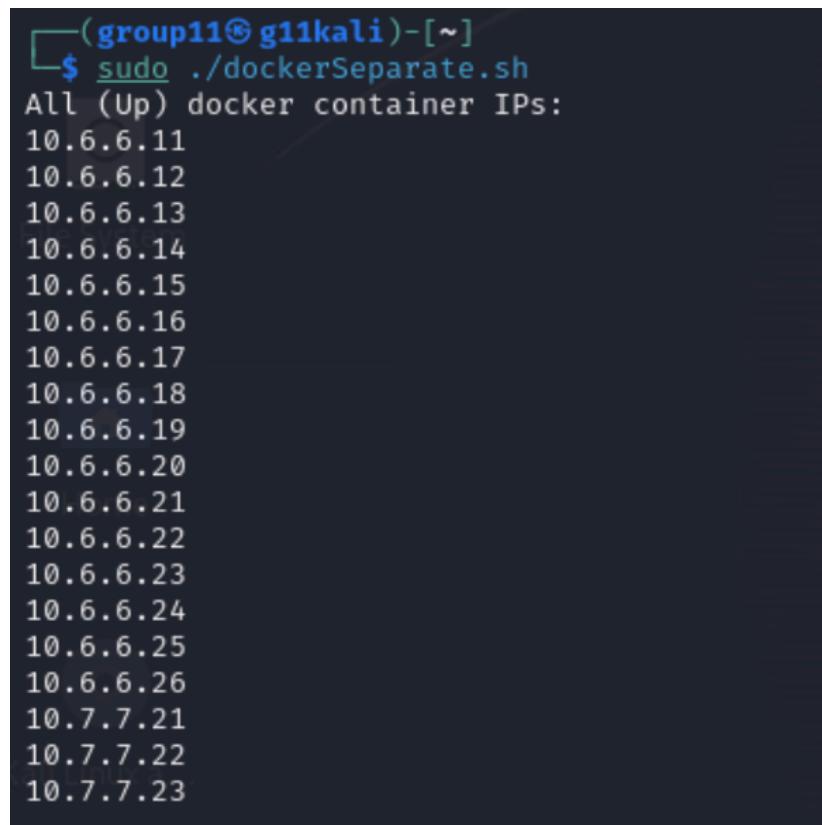
sudo rm /home/group11/live_targets.txt;
touch /home/group11/live_targets.txt;
sudo rm /home/group11/temp.txt;
touch /home/group11/temp.txt;

#      Store all lines of up in temp.txt
grep "Status: Up" /home/group11/docker_nmap.gnmap >> temp.txt;

#      Store all IPs in live_targets.txt
grep -E -o '[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}' /home/group11/temp.txt >> /home/group11/live_targets.txt;

echo "All (Up) docker container IPs:";
cat /home/group11/live_targets.txt;
```

Figure 20: dockerSeparate.sh contents



```
└─(group11㉿kali)-[~]
$ sudo ./dockerSeparate.sh
All (Up) docker container IPs:
10.6.6.11
10.6.6.12
10.6.6.13
10.6.6.14
10.6.6.15
10.6.6.16
10.6.6.17
10.6.6.18
10.6.6.19
10.6.6.20
10.6.6.21
10.6.6.22
10.6.6.23
10.6.6.24
10.6.6.25
10.6.6.26
10.7.7.21
10.7.7.22
10.7.7.23
```

Figure 21: dockerSeparate.sh output into command line

```
GNU nano 7.2                                live_targets.txt
10.6.6.11
10.6.6.12
10.6.6.13
10.6.6.14
10.6.6.15
10.6.6.16
10.6.6.17
10.6.6.18
10.6.6.19
10.6.6.20
10.6.6.21
10.6.6.22
10.6.6.23
10.6.6.24
10.6.6.25
10.6.6.26
10.7.7.21
10.7.7.22
10.7.7.23
```

Figure 22: Live_targets.txt contents after running

Task 7:

Task 7 shows the process of using bash scripts to scan all TCP and UDP ports in all live target IP addresses through Nmap. The -sS, -sU, and -iL flags are used to iterate through the text file and scan all TCP and UDP ports in Figures 23-25 below.

```
GNU nano 7.2                               ./portScan.sh
#!/bin/bash

#This script uses nmap to port scan all IPs in the live_targets.txt file

sudo rm /home/group11/ports.txt;
touch /home/group11/ports.txt;

# Scan all TCP and UDP ports and save in ports.txt
nmap -sS -sU -iL /home/group11/live_targets.txt >> /home/group11/ports.txt;
echo "Saving all UDP and TCP port scan output in ports.txt"
```

Figure 23: Contents of portScan.sh bash script

```
Nmap scan report for 10.7.7.22
Host is up (0.000026s latency).
Not shown: 1000 closed udp ports (port-unreach), 995 closed tcp ports (reset)
PORT      STATE SERVICE
8080/tcp  open  http-proxy
8081/tcp  open  blackice-icecap
8082/tcp  open  blackice-alerts
8083/tcp  open  us-srv
8888/tcp  open  sun-answerbook
MAC Address: 02:42:0A:07:07:16 (Unknown)

Nmap scan report for 10.7.7.23
Host is up (0.000060s latency).
Not shown: 1000 closed udp ports (port-unreach), 995 closed tcp ports (reset)
PORT      STATE SERVICE
5222/tcp  open  xmpp-client
5269/tcp  open  xmpp-server
7070/tcp  open  realserver
7777/tcp  open  cbt
9090/tcp  open  zeus-admin
MAC Address: 02:42:0A:07:07:17 (Unknown)

Nmap done: 19 IP addresses (19 hosts up) scanned in 2015.21 seconds
```

Figure 24: portScan.sh bash script output in ports.txt

```
(group11㉿kali)-[~]
└─$ ls
Desktop   Public          containerIP.sh    docker_ids.txt  live_targets.txt
Documents  Templates       dockerNmap.sh   docker_ips.txt  portScan.sh
Downloads  Videos          dockerSeparate.sh docker_nmap.gnmap ports.txt
Music     cliContainerID.sh dockerStart.sh  docker_nmap.nmap  temp.txt
Pictures  containerID.sh   dockerStop.sh   docker_nmap.xml
```

Figure 25: Final directory content after all 7 scripts

CONCLUSIONS AND RECOMMENDATIONS

The takeaways from this lab are extensive knowledge increase in bash scripting, automation in Linux, and offensive security tactics. Even if a professional is going into something like defensive security, it is important for them to know the tactics of an offensive security professional. Using bash to automate, extract information, and exploit systems is a very important tactic to learn in an educational environment. Recommendations for this lab are to go above the requested tasks. Scripts can be extended in scope a small bit to make eligible for usage outside of the classroom environment. Adding features such as working REGEX parameters to be used on any IP address range instead of just the targeted docker container ranges can be very beneficial for a security specialist after the course is over and in the field. These scripts can not only be used in the class environment, but can also be used or tweaked for future use. Bash scripts for offensive security can be reused and carried on into a professional environment or for legal monetary benefit.

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