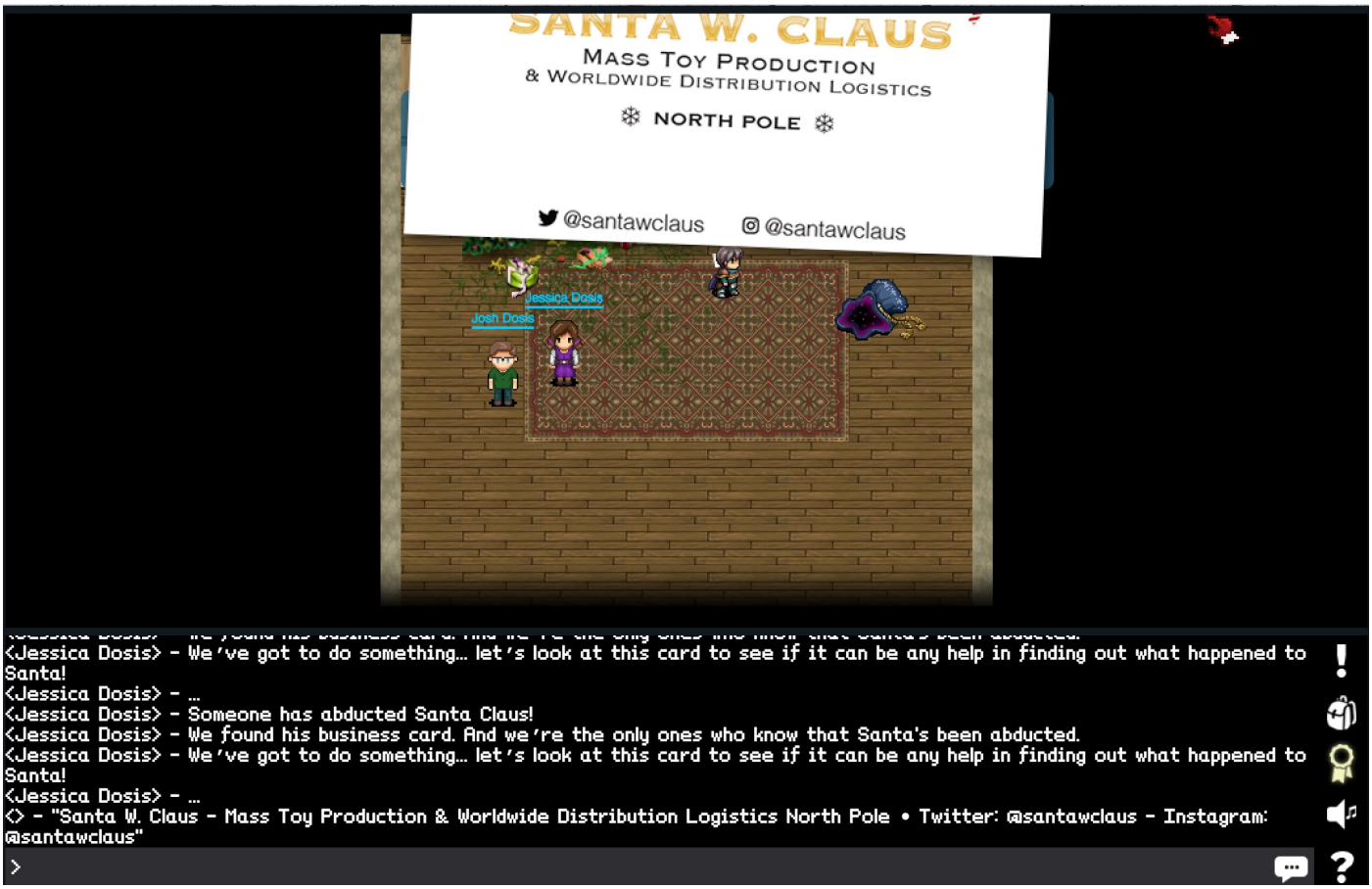
2016-sans-holiday-hack-challenge

About

This is a write-up for the 2016 SANS Holiday Hack Challenge.

Part 1: A Most Curious Business Card

You start of in a room. Talk to Jessica and Josh to get some info and the first two quests. Browse the room for Santa's business card (it is lying in front of the fireplace).



This gives us two pieces of information to have a look at:

- Santa's Twitter account `@santawclaus`
- Santa's Instagram account `@santawclaus`

We will check out the Twitter account first.

Santa's tweets look a bit odd. Since the first question directly asks for a secret message in them, we decided to pull them all down via the Twitter API.

Turns out that there is a Python package for talking to Twitter called tweepy. They do offer a solid documentation. The most challenging part was to actually create the necessary Twitter API credentials here. With that out of the way, a small python script like the following will pull all 350 tweets from `@santawclaus`.

```
import tweepy

consumer_key='<YOUR CONSUMER KEY>'
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consumer_secret='<YOUR CONSUMER SECRET>'
access_token='<YOUR ACCESS TOKEN>'
access_token_secret='<YOUR ACCESS TOKEN SECRET>'

auth = tweepy.OAuthHandler(consumer_key, consumer_secret)
auth.set_access_token(access_token, access_token_secret)

all_tweets = api.user_timeline('santawclaus', count=200)

max_id = all_tweets[-1].id - 1

all_tweets.extend(api.user_timeline('santawclaus', count=200, max_

for tweet in all_tweets:
    print tweet.text
```

The code is a bit messy. Since the maximum count that you can specify is 200, and Santa has done 350 tweets, we have to call the API twice. The `max_id` parameter ensures that we get only older tweets in the second call compared to the first one. At first, I overlooked this issue - getting an incomplete secret message.

The correct result looks as follows on the terminal:

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SANTAELFHOHOHOCHRISTMASSANTACHRISTMASPEACEONEARTHCHRISTMASELFSANTA
GOODWILLTOWARDSMENSANTAPEACEONEARTHHOHOHOJOYSANTAGOODWILLTOWARDSME
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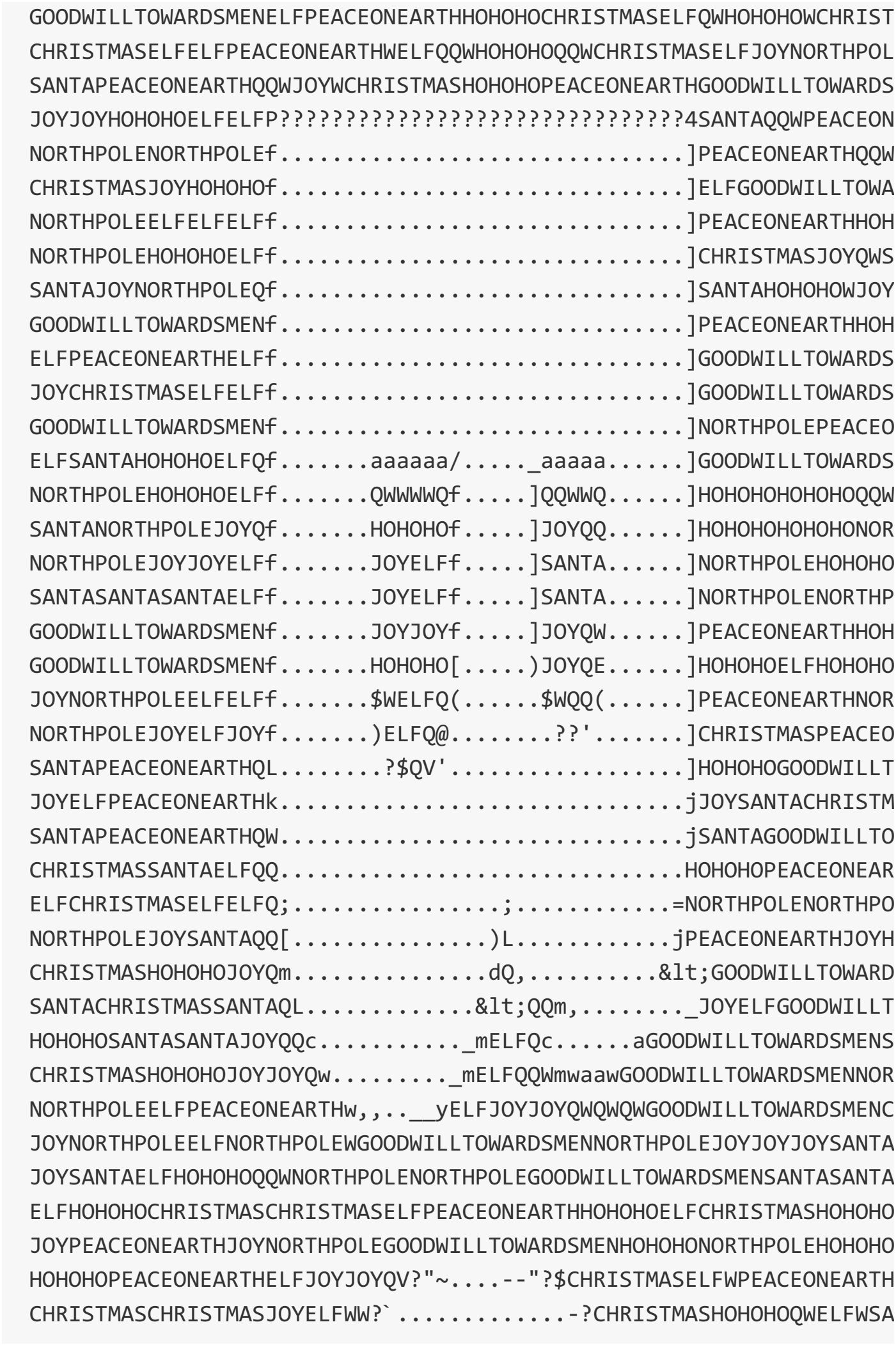
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NORTHPOLESANTASANTANORTHPOLESANTAPEACEONEARTHCHRISTMASELFHOHOHOELF
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JOYPEACEONEARTHSANTAGOODWILLTOWARDSMENJOYPEACEONEARTHJOYELFJOYCHRI
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JOYSANTAELFJOYELFQf.............................]PEACEONEARTHSAN
CHRISTMASCHRISTMASf.............................]GOODWILLTOWARDS
PEACEONEARTHSANTAQf.............................]HOHOHOHOHOHOJOY
JOYELFHOHOHOJOYELFf.............................]GOODWILLTOWARDS
SANTANORTHPOLEJOYQf.............................]PEACEONEARTHNOR
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GOODWILLTOWARDSMENHOHOHOCHRISTMASF.............._yWWPEACEONEARTHELF
SANTAGOODWILLTOWARDSMENQQWELFQQ@'.............sQWGOODWILLTOWARDSME
NORTHPOLECHRISTMASNORTHPOLEQQWF.............._yQWELFELFELFSANTASANT
NORTHPOLECHRISTMASELFQQWELFQ@'.............aWCHRISTMASELFPEACEONEA
SANTAHOHOHOHOHOHOJOYWSANTAQ?.............._yQWPEACEONEARTHCHRISTMAS
CHRISTMASSANTACHRISTMASQQ@'.............aJOYNORTHPOLESANTAELFHOHOH
SANTACHRISTMASNORTHPOLEW?.............._yCHRISTMASCHRISTMASCHRISTMA
PEACEONEARTHHOHOHOQWQQD'.............aHOHOHOHOHOHONORTHPOLEHOHOHOE
HOHOHOCHRISTMASELFELF!.............._mGOODWILLTOWARDSMENCHRISTMASSA
JOYPEACEONEARTHELFQD'.............aCHRISTMASPEACEONEARTHSANTAHOHOH
NORTHPOLEJOYHOHOHOF.............."????????????????4PEACEONEARTHQQW
HOHOHOELFSANTAELFQf.............................]SANTAQWJOYWNORT
HOHOHOPEACEONEARTHf.............................]PEACEONEARTHPEA
JOYPEACEONEARTHELFf.............................]HOHOHOSANTASANT
GOODWILLTOWARDSMENf.............................]PEACEONEARTHNOR
NORTHPOLEHOHOHOELFf.............................]HOHOHOCHRISTMAS
ELFSANTACHRISTMASQf.............................]SANTAJOYJOYQWSA
HOHOHONORTHPOLEJOYf.............................]PEACEONEARTHSAN
GOODWILLTOWARDSMENf.............................]CHRISTMASCHRIST
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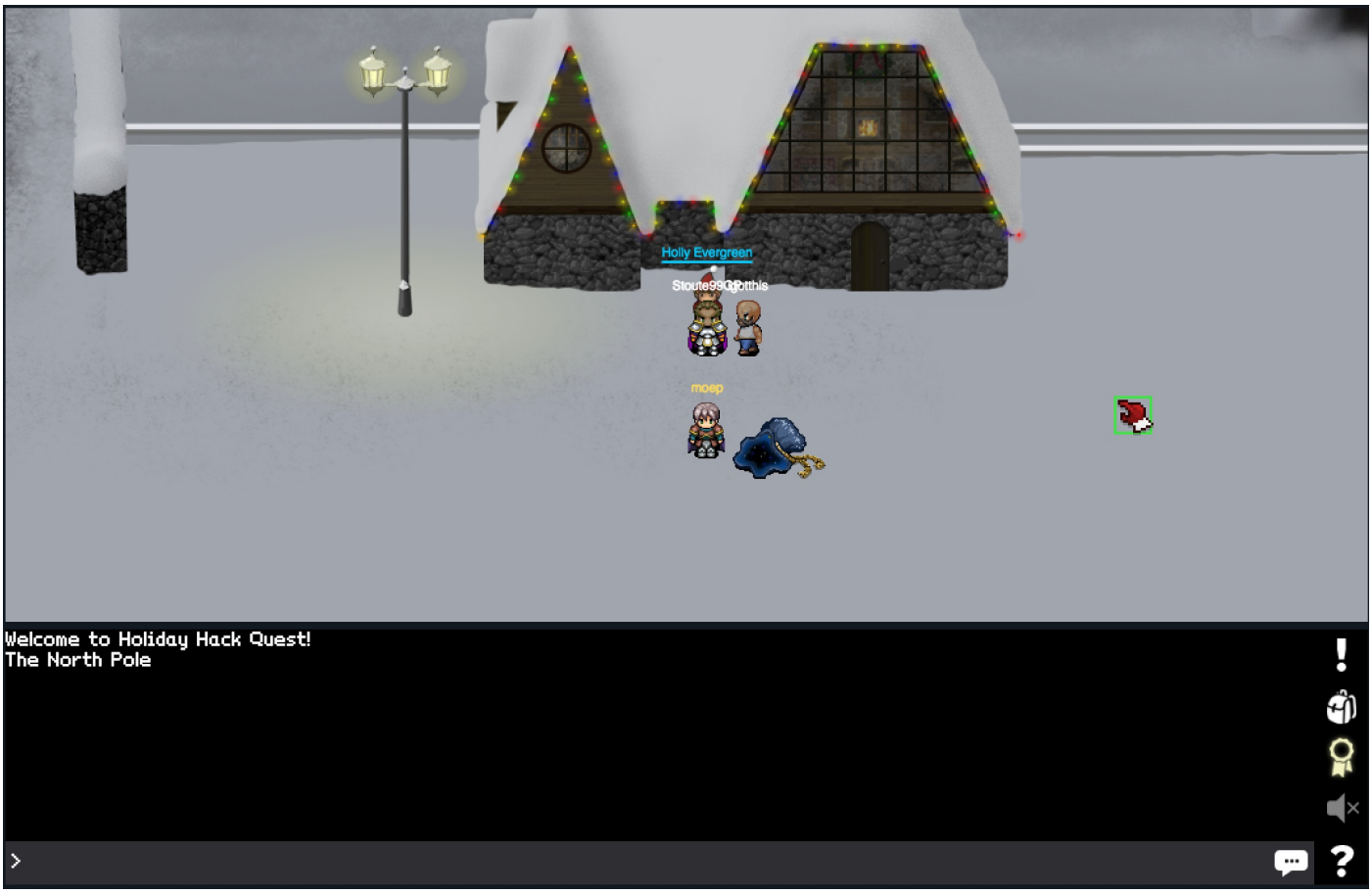
HOHOHOELFHOHOHOJOYNORTHPOLEHOHOHOCHRISTMASQ??????4GOODWILLTOWARDS
NORTHPOLECHRISTMASQQWELFWELFWPEACEONEARTHQQ.......]HOHOHOCHRISTMAS
JOYJOYGOODWILLTOWARDSMENSANTAELFQWNORTHPOLE.......]PEACEONEARTHCHR
JOYELFCHRISTMASELFHOHOHOPEACEONEARTHJOYJOYQ.......]GOODWILLTOWARDS
NORTHPOLESANTAELFQQWGOODWILLTOWARDSMENELFQQ.......]CHRISTMASCHRIST
HOHOHOSANTAELFNORTHPOLEPEACEONEARTHELFQWELF.......]SANTAHOHOHOELFS
HOHOHOSANTAPEACEONEARTHELFWJOYWSANTAQWELFQQ.......]NORTHPOLENORTHP
```

```
SANTAHOHOHOELFELFNORTHPOLENORTHPOLEWELFJOYQ.......]GOODWILLTOWARDS
GOODWILLTOWARDSMENHOHOHOWGOODWILLTOWARDSMEN.......]SANTASANTAHOHOH
SANTANORTHPOLESANTAWGOODWILLTOWARDSMENELFQQ.......]CHRISTMASPEACEO
ELFHOHOHONORTHPOLEP?????????????????????.......]CHRISTMASSANTAQ
PEACEONEARTHSANTAQf.............................]ELFHOHOHOSANTAE
ELFCHRISTMASELFELFf.............................]GOODWILLTOWARDS
PEACEONEARTHHOHOHOf.............................]GOODWILLTOWARDS
CHRISTMASNORTHPOLEf.............................]HOHOHONORTHPOLE
ELFPEACEONEARTHELFf.............................]GOODWILLTOWARDS
JOYJOYELFSANTAELFQf.............................]SANTANORTHPOLEE
JOYHOHOHOSANTAJOYQf.............................]PEACEONEARTHNOR
SANTAELFELFHOHOHOQf.............................]CHRISTMASPEACEO
HOHOHONORTHPOLEELFf.............................]NORTHPOLEHOHOHO
PEACEONEARTHELFJOY6aaaaaaaaaaaaaaaaaaaaaaa.......]PEACEONEARTHHOH
CHRISTMASELFELFJOYQQWWWWWWWWWWWWWWWWWWWWQQ.......]NORTHPOLENORTHP
NORTHPOLECHRISTMASHOHOHONORTHPOLEHOHOHOJOYQ.......]PEACEONEARTHELF
JOYPEACEONEARTHJOYCHRISTMASPEACEONEARTHELFQ.......]NORTHPOLEJOYPEA
NORTHPOLECHRISTMASPEACEONEARTHHOHOHOSANTAQQ.......]PEACEONEARTHCHR
HOHOHOHOHOHONORTHPOLEELFCHRISTMASHOHOHOELFQ.......]HOHOHONORTHPOLE
NORTHPOLEJOYHOHOHOQQWPEACEONEARTHCHRISTMASQ.......]ELFHOHOHOELFSAN
ELFJOYJOYJOYNORTHPOLEJOYPEACEONEARTHSANTAQQ.......]CHRISTMASELFELF
SANTASANTACHRISTMASNORTHPOLENORTHPOLEELFJOY.......]PEACEONEARTHPEA
ELFPEACEONEARTHJOYQWJOYJOYSANTAHOHOHOJOYELF.......]GOODWILLTOWARDS
JOYCHRISTMASJOYCHRISTMASJOYWNORTHPOLEJOYJOYaaaaaaajCHRISTMASPEACEO
PEACEONEARTHCHRISTMASPEACEONEARTHWELFWSANTAWWWWWWCHRISTMASJOYNORTH
SANTACHRISTMASSANTAELFJOYQWNORTHPOLEELFSANTAELFQQP]NORTHPOLESANTAJ
ELFJOYCHRISTMASNORTHPOLEWPEACEONEARTHNORTHPOLEQ@^.]HOHOHOHOHOHOELF
HOHOHOELFSANTASANTAWNORTHPOLENORTHPOLEJOYQWELFP` ..]CHRISTMASPEACEO
CHRISTMASJOYPEACEONEARTHJOYSANTAQWCHRISTMASQ@"....]JOYGOODWILLTOWA
GOODWILLTOWARDSMENJOYJOYWHOHOHOHOHOHOQQWELFP` .....]GOODWILLTOWARDS
ELFSANTAHOHOHOGOODWILLTOWARDSMENCHRISTMASW".......]PEACEONEARTHELF
GOODWILLTOWARDSMENNORTHPOLEPEACEONEARTHQP` ........]GOODWILLTOWARDS
CHRISTMASHOHOHOELFQWJOYWSANTAJOYWELFQQW".........]GOODWILLTOWARDS
JOYHOHOHOGOODWILLTOWARDSMENHOHOHOELFQP` ..........]NORTHPOLENORTHP
PEACEONEARTHGOODWILLTOWARDSMENWJOYQW"............]HOHOHOHOHOHONOR
ELFPEACEONEARTHJOYCHRISTMASHOHOHOQP` ............]PEACEONEARTHSAN
NORTHPOLEHOHOHOJOYELFSANTAQQWJOYW!..............yPEACEONEARTHCHR
CHRISTMASELFELFJOYP???????????` ..............sPEACEONEARTHJOYJO
JOYHOHOHOELFHOHOHOf........................_mWQWNORTHPOLECHRIST
```

```
GOODWILLTOWARDSMENf.......................jCHRISTMASNORTHPOLESA
NORTHPOLEHOHOHOELFf......................_JOYPEACEONEARTHELFJOYJ
GOODWILLTOWARDSMENf.....................yGOODWILLTOWARDSMENCHRIS
NORTHPOLENORTHPOLEf.....................:GOODWILLTOWARDSMENSANTASA
ELFNORTHPOLEJOYJOYf.....................-9NORTHPOLEPEACEONEARTHCH
NORTHPOLEELFSANTAQf.....................?WGOODWILLTOWARDSMENHOH
GOODWILLTOWARDSMENf.....................4WJOYPEACEONEARTHHOHO
PEACEONEARTHSANTAQf.....................-$SANTACHRISTMASHOHO
HOHOHOELFJOYJOYJOY6aaaaaaaaaaaaa,.............?WWPEACEONEARTHPEA
JOYELFHOHOHOJOYSANTAWWWWWWWWWWQQc.............-4NORTHPOLEHOHOHO
NORTHPOLEGOODWILLTOWARDSMENSANTAWWg,...........]GOODWILLTOWARDS
NORTHPOLEHOHOHOELFHOHOHOCHRISTMASELFc..........]HOHOHOELFSANTAW
PEACEONEARTHJOYJOYNORTHPOLESANTAJOYWWg,........]GOODWILLTOWARDS
ELFHOHOHOELFHOHOHOCHRISTMASCHRISTMASJOYc.......]HOHOHOJOYELFQWC
PEACEONEARTHSANTAJOYWCHRISTMASJOYSANTAWWw,.....]PEACEONEARTHHOH
CHRISTMASJOYPEACEONEARTHSANTAPEACEONEARTHQc....]PEACEONEARTHSAN
NORTHPOLEPEACEONEARTHJOYNORTHPOLEJOYELFQQWWw...]PEACEONEARTHWHO
GOODWILLTOWARDSMENQWHOHOHOQWNORTHPOLEELFELFQQ/....]PEACEONEARTHNOR
ELFGOODWILLTOWARDSMENCHRISTMASJOYWJOYWSANTAJOYg...]SANTASANTAHOHOH
NORTHPOLEPEACEONEARTHGOODWILLTOWARDSMENELFELFQWQ,.]PEACEONEARTHNOR
CHRISTMASCHRISTMASJOYSANTAWGOODWILLTOWARDSMENQQWQwjPEACEONEARTHSAN
ELFPEACEONEARTHJOYJOYJOYWSANTAQQWPEACEONEARTHCHRISTMASGOODWILLTOWA
CHRISTMASJOYJOYJOYQWGOODWILLTOWARDSMENSANTAQQWGOODWILLTOWARDSMENJO
PEACEONEARTHSANTACHRISTMASSANTAELFELFQQWJOYWGOODWILLTOWARDSMENHOHO
PEACEONEARTHELFELFSANTAQWJOYNORTHPOLEPEACEONEARTHELFSANTAHOHOHOPEA
NORTHPOLECHRISTMASELFNORTHPOLEELFJOYQWCHRISTMASGOODWILLTOWARDSMENN
JOYJOYSANTAJOYSANTACHRISTMASJOYQWPEACEONEARTHNORTHPOLECHRISTMASJOY
JOYPEACEONEARTHELFQWELFWCHRISTMASSANTASANTANORTHPOLEQWPEACEONEARTH
```

This allows us to answer the first question: BUGBOUNTY.

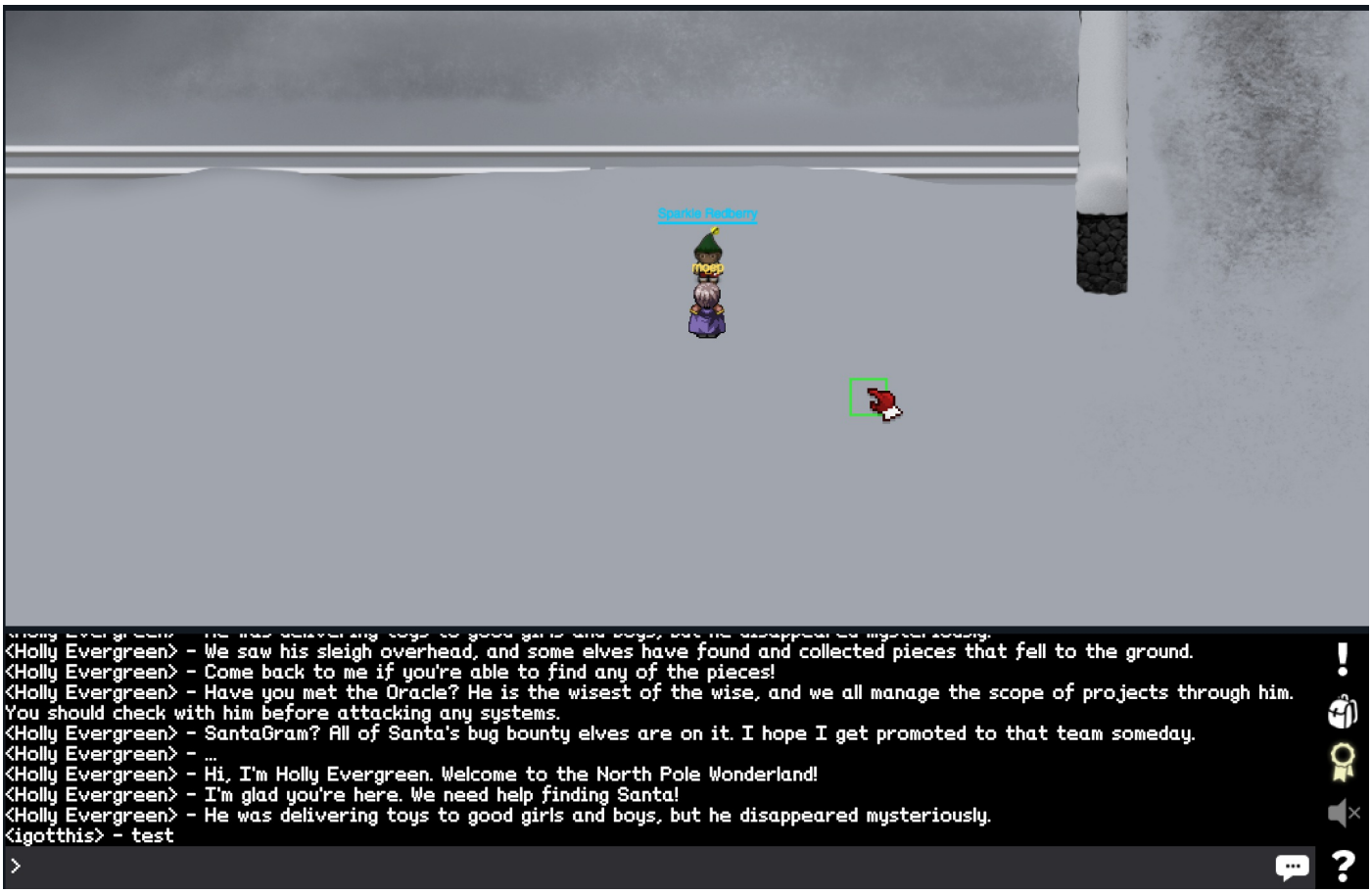
Next, it is time to take a first step outside (through the weird looking sack).



The next question is about a ZIP file. So in order to make progress, we started to walk around and literally speak to anybody there is.

First, we talked to Holly Evergreen. She said something about missing pieces that fell of Santa's sleigh, that we need to talk to the Oracle, and that basically all of Santa's bug bounty elves are on SantaGram.

Heading towards the left, you will find Sparkle Redberry.



He tells you about the NetWars challenge coins. To gather all of them is a new quest which you receive from him. Since they do not contribute to the answering of the questions, we will omit these coins for the rest of the write-up.

If you cross the bridge to the north (and keep going north a bit), you will run into Wunorse Openslae.

She mentions that Santa's sleigh is managed by a SCADA interface, for which you need a Cranberry Pi with a Cranbian Linux. You get a link to a SANS website which details how to mount a raspberry pi image. As of SantaGram, you get the intel that it is popular, and a hashtag: `#elflife!`.

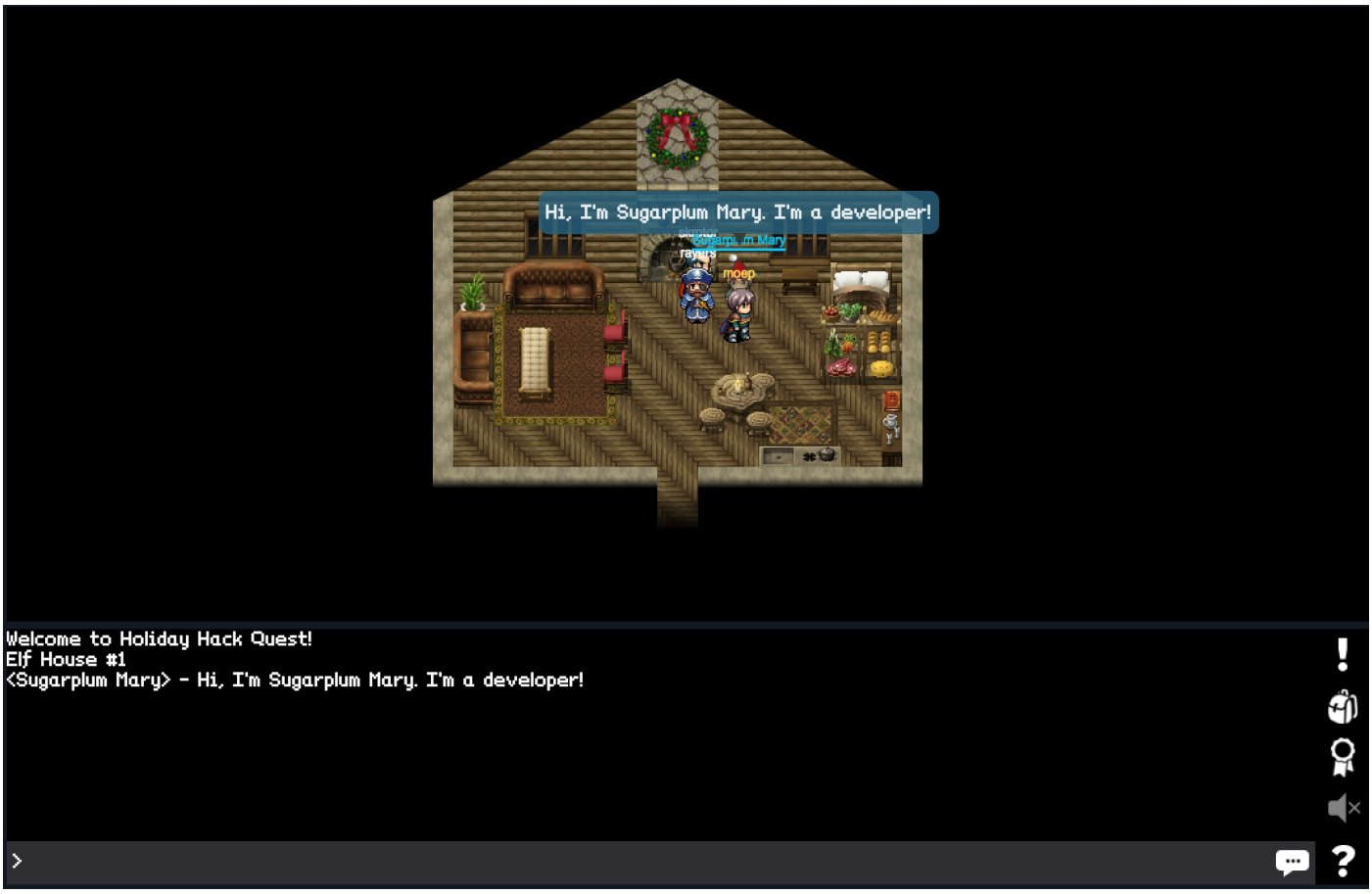
If you back off to the bridge again, and then go to the right, you will be able to enter `Elf House #2`.

Enter it, go up the stairs and through the doorway, and you will find yourself in this room.

On the left of the position of my avatar, there lies a heatsink. Go collect it. We will need it later on to assemble our Cranberry Pi.

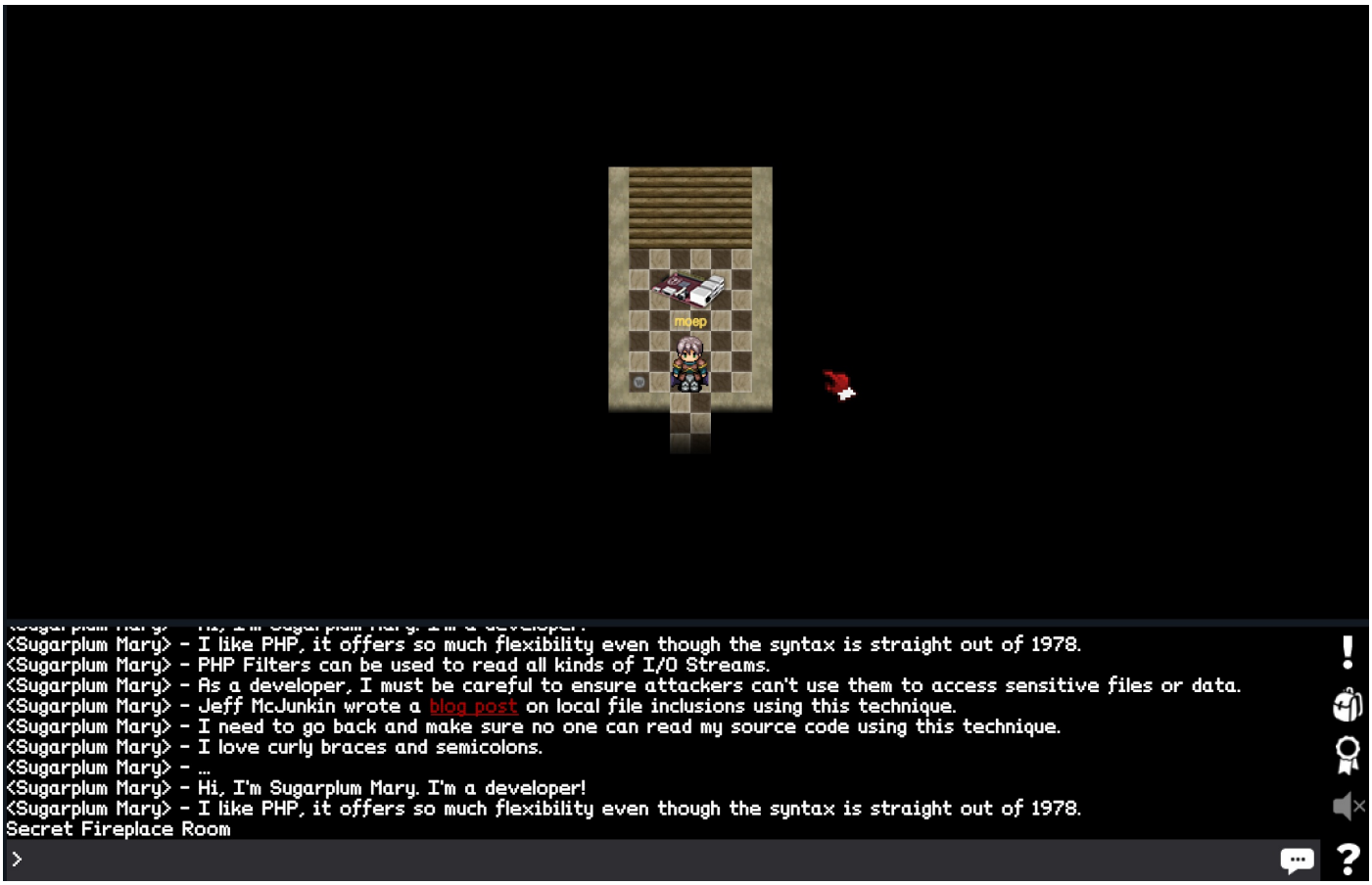
Next, head over all the way to the left until you reach this house.

Enter it. Then talk to Sugarplum Mary.



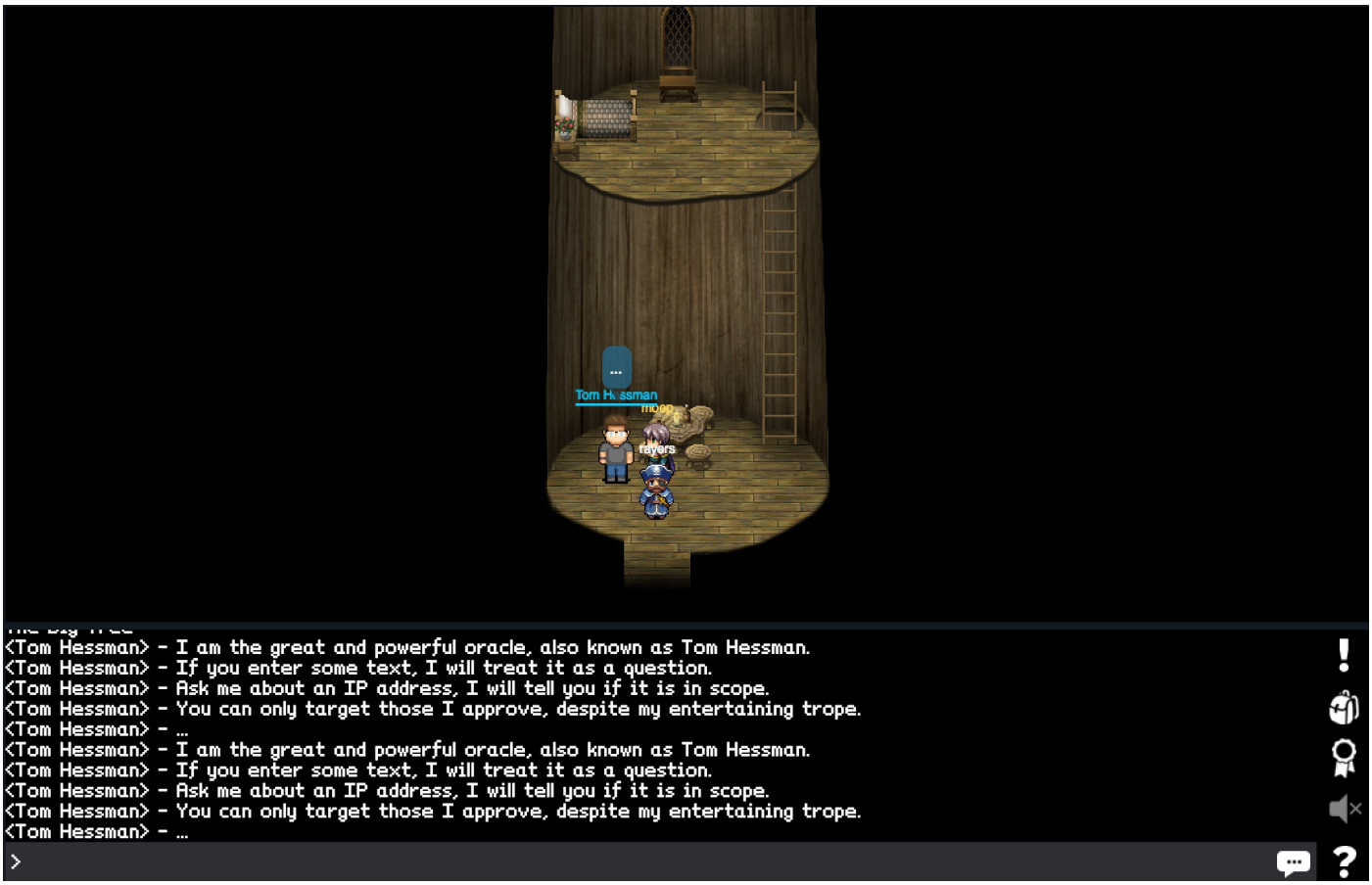
She is a PHP developer (and apparently loves it). You will get a link to another SANS website which is about PHP local file inclusion vulnerabilities.

Besides PHP stuff, there is also a secret in this room. You can just walk through the fireplace and enter a small chamber. There you will find the Cranberry PI board.



Heading back all the way to the right, you will find the big tree.

Inside, you will find Tom Hessman who apparently is an oracle.



He offers you to tell you whether a certain IP address is in scope or not. I guess this is a safety net so that SANS cannot be blamed for people going crazy with offensive security while blaming the SANS holiday hack challenge :D

If we go further north, there is a snow man. He holds a power cord, which we can collect.

Up the three, you will enter the NetWars room.

You can leave it on the right side. Follow the path and enter the next

house.

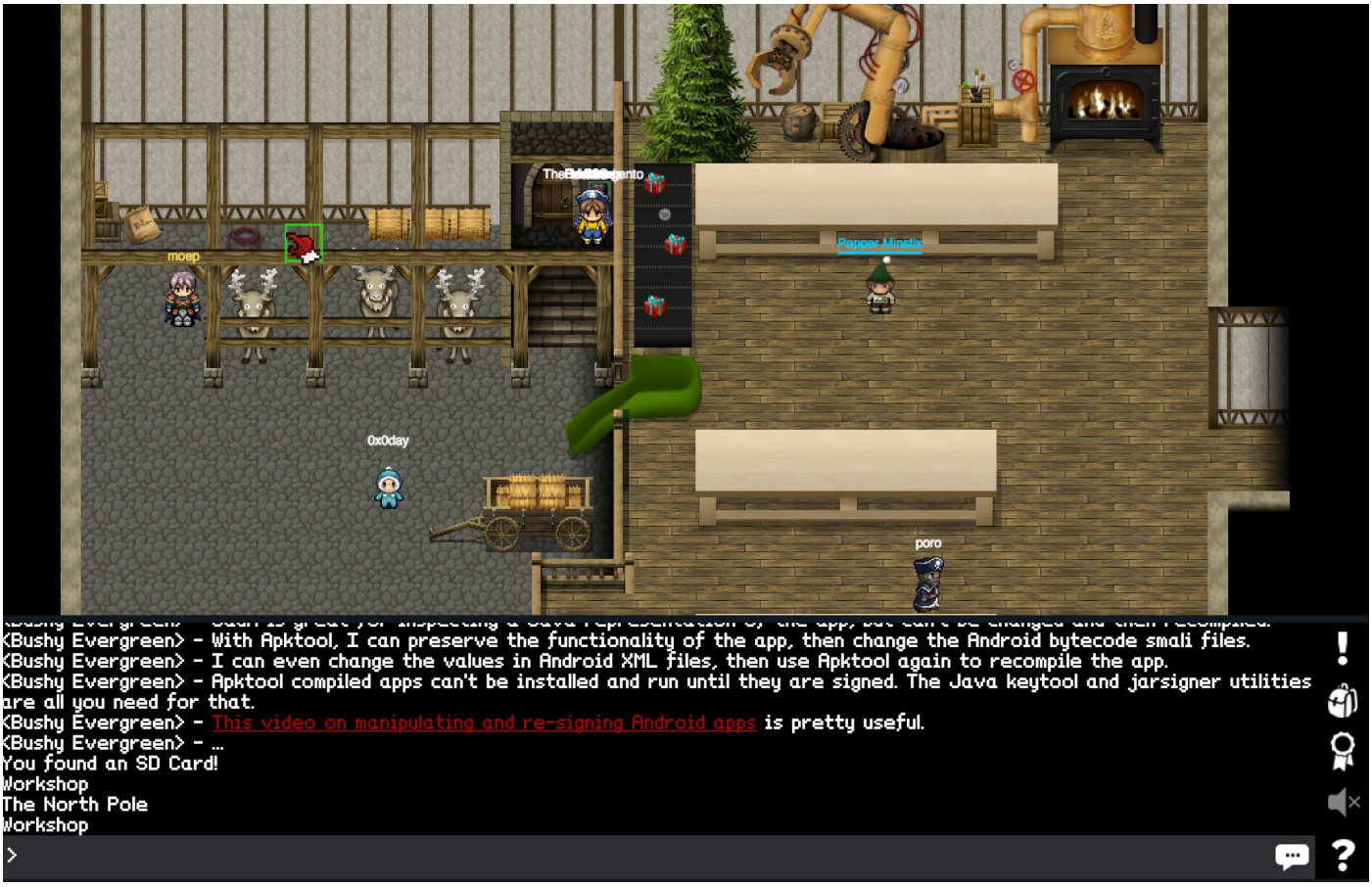
Minty Candycane is the NPC. She talks about tools such as NMAP, John the Ripper and also provides a link to the RockYou dictionary.

Exit the house again and continue to follow the path. You will go up all the way to the top of a mountain.

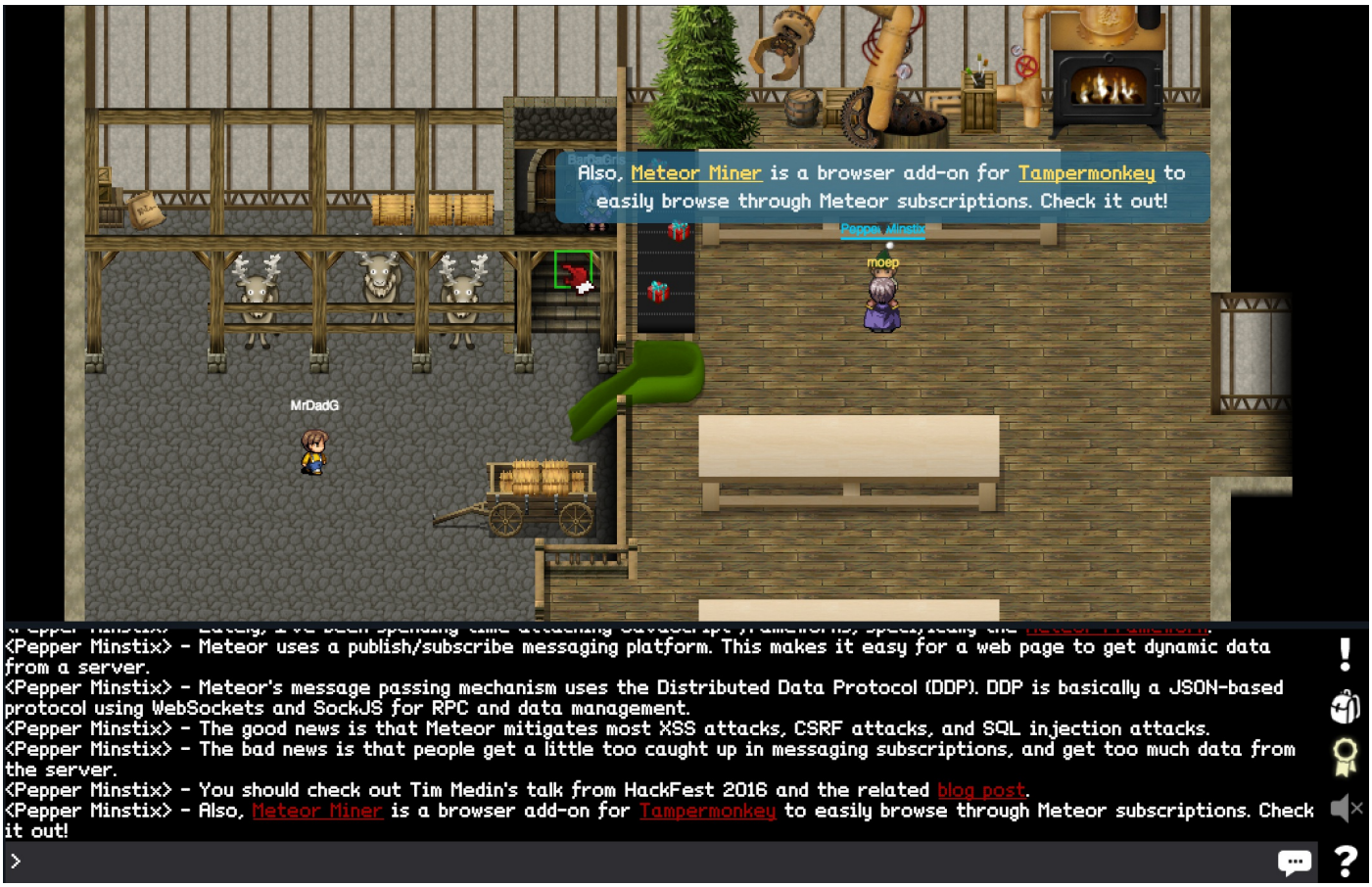
Talk to Bushy Evergreen on the right. He will provide you with two links regarding Android hacking (here and here).

Head over to the left and collect the SD card.

Enter the house, go to the top left corner, and collect the HDMI cable.

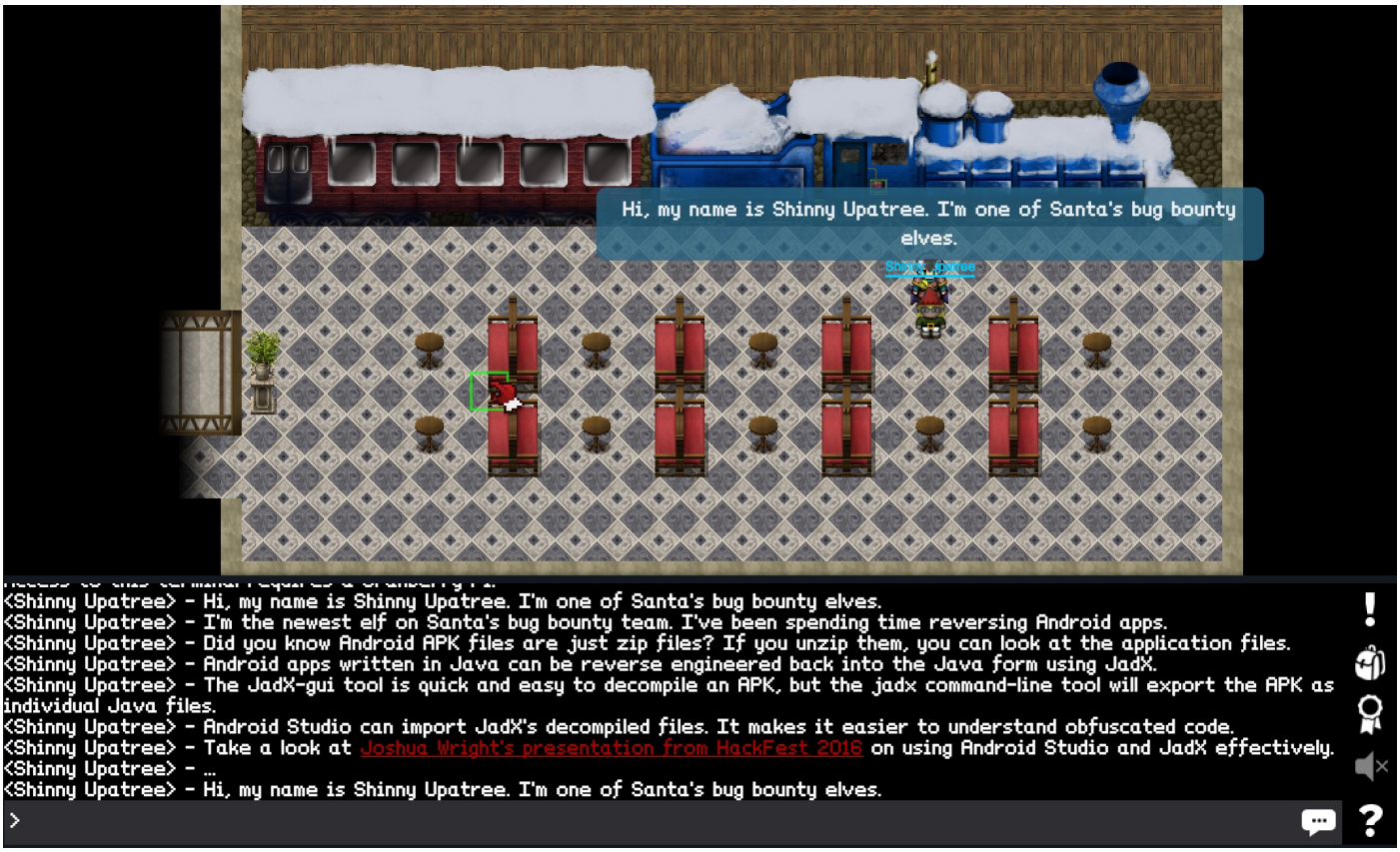


Go back to the center of the room and talk to Pepper Minstix.



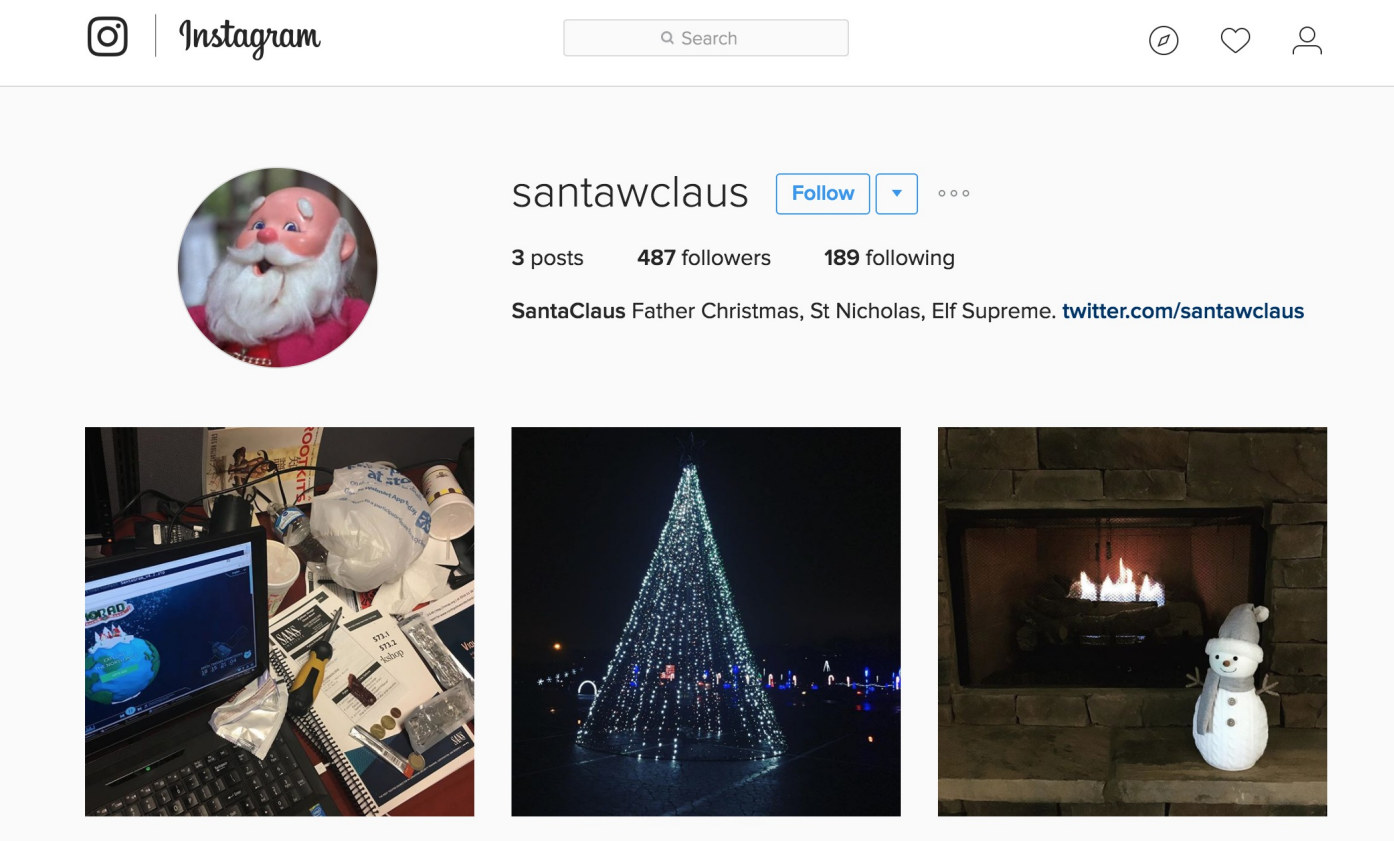
He will provide with links to Meteor, SANS training on hacking Meteor, a tool called MetorMiner and to TamperMonkey.

Enter the room on the right.



You cannot interact with the train (as it requires a Cranberry Pi). Talking to Shinny Upatree in the room gives you a link to a .pptx file.

At this point, we decided that we did enough reconnaissance (by actually walking around and talking to NPCs). Let's get back to the very first intel that we gathered. We checked the Twitter account, but we omitted the Instagram account. Let's to that now.



If you look closely on the left most image, you will get two important pieces of intel:

1. The name `www.northpolewonderland.com` which is printed on the sheet of paper that show the NMAP scan result.
2. The file name `SantaGram_v4.2.zip`

If you browse to http://www.northpolewonderland.com/, you will see Santa's business card again. If you browse to http://www.northpolewonderland.com/SantaGram_v4.2.zip, you can actually download a file.

We first check what type of file we got:

```
file SantaGram_v4.2.zip
SantaGram_v4.2.zip: Zip archive data, at least v2.0 to extract
```

So it seems to be a `ZIP` file indeed. However, it has a password on it.

```
unzip SantaGram_v4.2.zip
Archive:  SantaGram_v4.2.zip
[SantaGram_v4.2.zip] SantaGram_4.2.apk password:
```

Using the secret message from the tweets as password gives us the content. To be fair, at first I went down a completely different road. I tried to break the ZIP password with John the Ripper. We already got a hint to the RockYou dictionary. In order to get a hash out of the ZIP file that we can crack, Google let us to http://www.cybercrimetech.com/2014/07/how-to-cracking-zip-and-rar-protected.html. Using `zip2john`, I got the following hash.

```
SantaGram_v4.2.zip:$pkzip2$1*2*3*0*1df34a*2271ee*ede16a54*0*4b*8*1
```

Unfortunately, just throwing john and the rockyou wordlist on the hash did not yield any results. But just calling `john hashfile` did the trick. It took approximately 20minutes on my MacBook Pro to complete.

But be it as it may - directly using the password from the tweets was likely the intended way to do things :)

Digging further, we can now have a deeper look at the `apk` file. Earlier, Bushy Evergreen mentioned `apktool`. Let's give it a try.

```
apktool d SantaGram_4.2.apk
```

This gives us the extracted contents of the file in the folder `SantaGram_4.2`. The next two questions are about contents of the APK file (username/password and the name of the audible component). By browsing the directory structure, we soon found the file `res/raw/discombobulatedaudio1.mp3`. Which seems to be the answer to question 4.

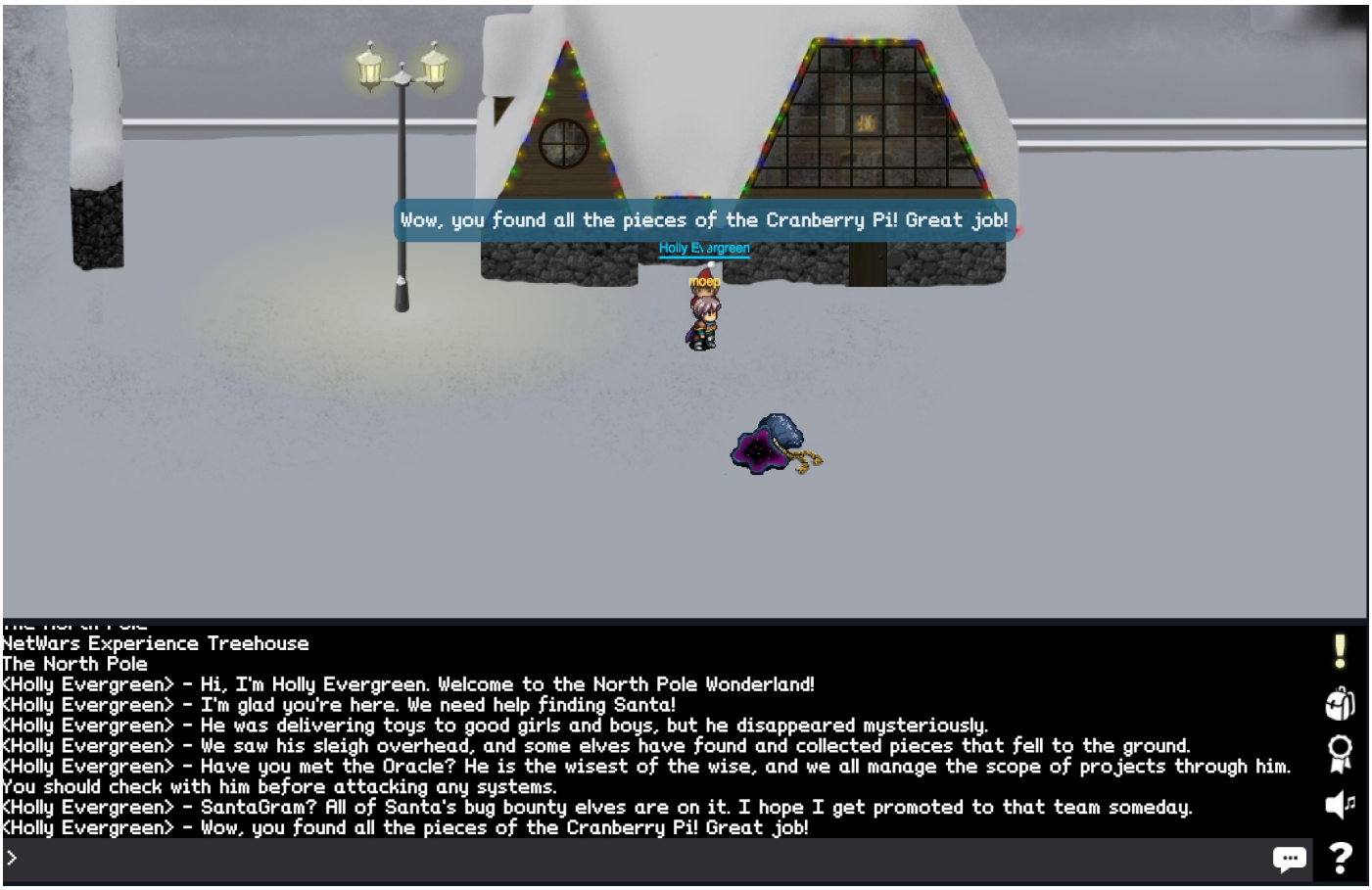
Now for the username and password. We suspected them to be in the code (rather than hidden in some other resources). So we navigated to the folder that contains the `smali` files. We even further navigated to the folder that I guess represents the Java classes that are in the `com.northpolewonderland.santagram` Java package. After that, `grep` did the trick.

In `SantaGram_4.2/smali/com/northpolewonderland/santagram`:

```
grep -C3 -rin "password" .
./b.smali-414-
./b.smali-415-    invoke-virtual {v0, v1, v2}, Lorg/json/JSONObjec
./b.smali-416-
./b.smali:417:    const-string v1, "password"
./b.smali-418-
./b.smali-419-    const-string v2, "busyreindeer78"
./b.smali-420-
--
[...]
```

Inspecting the file, we get the next flag: `username=guest`, `password=busyreindeer78`.

Next, we can have a look at the Cranberry Pi. As it turns out, we do have collected all the necessary pieces. We can return the quest to Holly Evergreen (right in front of the first house).



We also get a download link to the Cranbian image. Since the next question is about the username of what seems to be a local account on the Cranbian image, it is a good idea to mount it. Earlier in the game, we already got a link to a howto for that.

Unfortunately, the `fdisk` utility on OS X does not work the way that is mentioned in the howto. So I had to switch to a Kali VM for the first time during this holiday hack.

```
fdisk -l cranbian-jessie.img
Disk cranbian-jessie.img: 1.3 GiB, 1389363200 bytes, 2713600 secto
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

```
Disklabel type: dos
Disk identifier: 0x5a7089a1

Device                Boot  Start     End Sectors  Size Id Type
cranbian-jessie.img1        8192  137215  129024   63M  c W95 FAT3
cranbian-jessie.img2      137216 2713599 2576384  1.2G 83 Linux
```

In order to mount the Linux image, we have to calculate the offset in bytes.

```
echo $((512*137216))
70254592
```

And then mount the image.

```
mount -v -o offset=70254592 cranbian-jessie.img mnt/
mount: /dev/loop0 mounted on ... ./mnt
```

Now, a `cat` on the `mnt/etc/shadow` file reveals the password hash for the cranpi user.

```
cranpi:$6$2AXLbEoG$zZlWSwrUSD02cm8ncL6pmaYY/39DUai3OGfnBbDNjtx2G99
```

This is a pretty strong hash, as `hashid` confirms:

```
hashid cranpi.hash
--File 'cranpi.hash'--
Analyzing '$6$2AXLbEoG$zZlWSwrUSD02cm8ncL6pmaYY/39DUai3OGfnBbDNjtx
[+] SHA-512 Crypt
--End of file 'cranpi.hash'
```

Nevertheless, I gave it a try with John the Ripper and with hashcat. The cracking speed was - well - a desaster: `Speed/sec.: 441 plains, 441 words` for hashcat. John had a similar speed. All this on an early 2015 MacBook Pro with a 2,7 GHz Intel Core i5. The John the Ripper speed declined however during the course of the cracking. So I stopped the process. It took hashcat 66 minutes to crack the hash, giving us the answer to question 5: `yummycookies`.

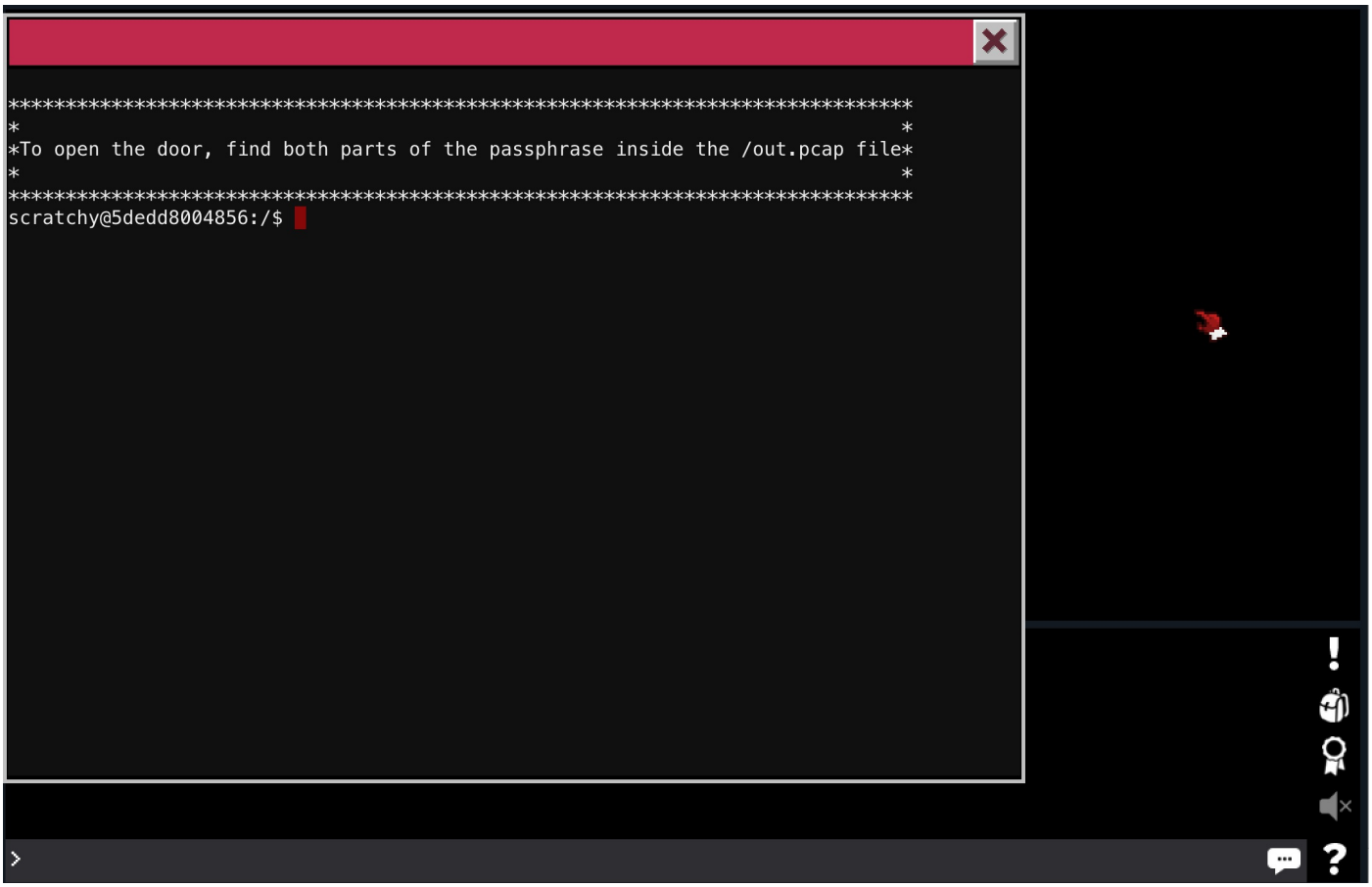
```
$6$2AXLbEoG$zZlWSwrUSD02cm8ncL6pmaYY/39DUai3OGfnBbDNjtx2G99qKbhnid

All hashes have been recovered

Input.Mode: Dict (02_rockyou.txt)
Index.....: 1/5 (segment), 3627172 (words), 33550343 (bytes)
Recovered.: 1/1 hashes, 1/1 salts
Speed/sec.: - plains, 452 words
Progress..: 1814156/3627172 (50.02%)
Running...: 00:01:06:46
Estimated.: 00:01:06:51
```

In order to proceed, you need to tell the password to Holly Evergreen.

With that out of the way, we can use the Cranberry Pi to interact with the terminals. We start at the elf house number 2.



We find ourselves at a terminal, which seems to be a freshly spawned Docker container. The task is to find two parts of a passphrase inside the `/out.pcap` file.

```
scratchy@2a1a07f0bfaa:/$ ls -al out.pcap
-r-------- 1 itchy itchy 1087929 Dec  2 15:05 out.pcap
scratchy@2a1a07f0bfaa:/$ id
uid=1001(scratchy) gid=1001(scratchy) groups=1001(scratchy)
scratchy@2a1a07f0bfaa:/$
```

The first obstacle are the file permissions. We are the user `scratchy`, but the file can only be read by the user `itchy`. In such cases, it is a good idea to check `sudo` as well as to look for binaries with the `s-bit` set. `sudo -l` gives us some pretty useful information.

```
scratchy@2a1a07f0bfaa:/$ sudo -l
sudo: unable to resolve host 2a1a07f0bfaa
Matching Defaults entries for scratchy on 2a1a07f0bfaa:
    env_reset, mail_badpass,
    secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/b
User scratchy may run the following commands on 2a1a07f0bfaa:
    (itchy) NOPASSWD: /usr/sbin/tcpdump
    (itchy) NOPASSWD: /usr/bin/strings
scratchy@2a1a07f0bfaa:/$
```

As user `scratchy`, we are allowed to run the commands `tcpdump` and `strings` as the user `itchy`, without having to authenticate via a password. Perfect. Let's start with `strings`. Since we are operating in a somewhat limited environment (for example there is no `less`), we will print the output to a file and use `vim` to have a look at it.

```
scratchy@2a1a07f0bfaa:/$ sudo -u itchy strings out.pcap >/tmp/out.
```

```
sudo: unable to resolve host 2a1a07f0bfaa
scratchy@2a1a07f0bfaa:/$
```

We see some HTTP traffic. And already in line 32, we get the first half of the passphrase: `santasli`. From there on, you could almost guess the full passphrase. But we will do it the hard way and actually look for the second half. Things start to get trickier here, because the second half seems to be hidden in a binary file.

```
DGET /secondhalf.bin HTTP/1.1
User-Agent: Wget/1.17.1 (darwin15.2.0)
Accept: */*
Accept-Encoding: identity
Host: 192.168.188.130
Connection: Keep-Alive
ZAX
THTTP/1.0 200 OK
TServer: SimpleHTTP/0.6 Python/2.7.12+
ZAX"
,#"=X
TDate: Fri, 02 Dec 2016 11:28:00 GMT
Content-type: application/octet-stream
ZAXr
,#o=X
UContent-Length: 1048097
Last-Modified: Fri, 02 Dec 2016 11:26:12 GMT
```

It took me almost 3 hours to get behind that. I struggled with `tcpdump` for a long time. Trying to extract the binary file for further processing. After I did not make any reasonable progress, I noticed in the chat that another player was having issues with this particular challenge, too. The answer he got was basically: 'Do not overthink it. Read the manpages of your tools. Try harder.' Well - I did :).

I had a look at the `tcpdump` again an noticed that the `User-Agent` suggest the binary was downloaded to an OS X El Capitan system. So maybe the binary file was also compiled for that specific architecture, or maybe another one? Be it as it may, this lead me to look at the manpage for `strings` again, where I noticed that you can specify the encoding with the `-e` option. Since Intel x86 processors use little endian, I started with the respective options. And I got a hit.

```
scratchy@681628e3e251:/$ sudo -u itchy strings -e l out.pcap
sudo: unable to resolve host 681628e3e251
part2:ttlehelper
```

So the password for the door in the same room is `santaslittlehelper`. Behind the door, you meet Alabaster Snowball.

He tells you something about JSON, Burp and how to export request from Burp so that you can directly use them as a `cURL` command on the

shell. Also, he mentions a dungeon (which I apparently have not found yet).

On to the next terminal. This time, the task is '*To open the door, find the passphrase file deep in the directories.*' It is located in the building on the top of the mountain. This was easier than expected. A simple `find` lists all the directories.

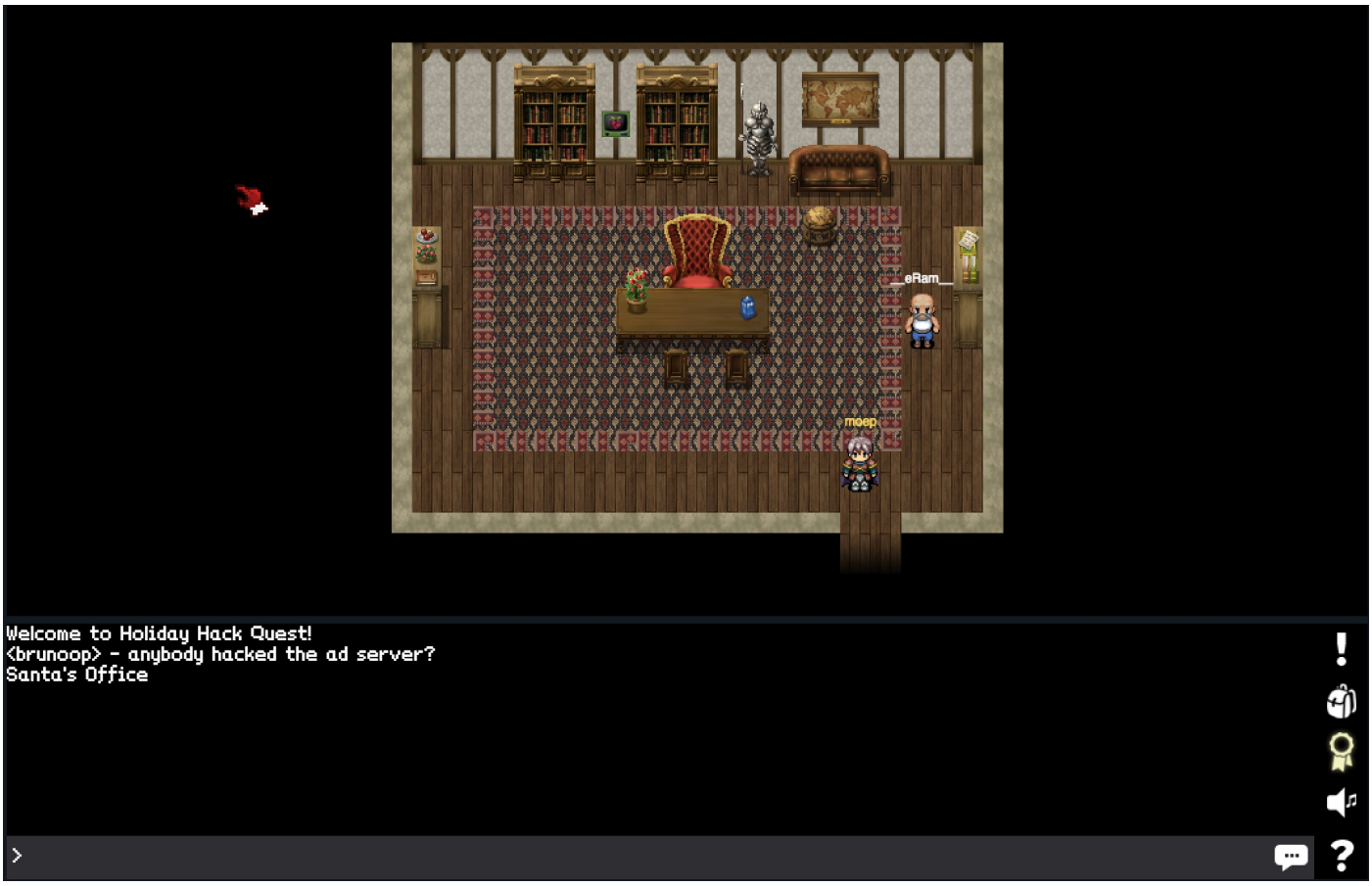
```
**************************************************************
*
* To open the door, find the passphrase file deep in the directori
*
**************************************************************
elf@5f09ad2e85a2:~$ find
.
./.bashrc
./.doormat
./.doormat/.
./.doormat/. /
./.doormat/. / /\
./.doormat/. / /\/\\
./.doormat/. / /\/\\/Don't Look Here!
./.doormat/. / /\/\\/Don't Look Here!/You are persistent, aren't y
./.doormat/. / /\/\\/Don't Look Here!/You are persistent, aren't y
./.doormat/. / /\/\\/Don't Look Here!/You are persistent, aren't y
.txt
./.doormat/. / /\/\\/Don't Look Here!/You are persistent, aren't y
./.doormat/. / /\/\\/Don't Look Here!/You are persistent, aren't y
./.doormat/. / /\/\\/Don't Look Here!/secret
./.doormat/. / /\/\\/Don't Look Here!/files
./.doormat/. / /\/\\/holiday
./.doormat/. / /\/\\/temp
./.doormat/. / /\/santa
./.doormat/. / /\/ls
./.doormat/. / /opt
./.doormat/. / /var
./.doormat/. /bin
```

```
./.doormat/. /not_here
./.doormat/share
./.doormat/temp
./var
./temp
./.profile
./.bash_logout
elf@5f09ad2e85a2:~$
```

In order to access the file with the password, I choose to use the `print0` option of `find`, so that a binary 0 is used as delimiter (instead of space).

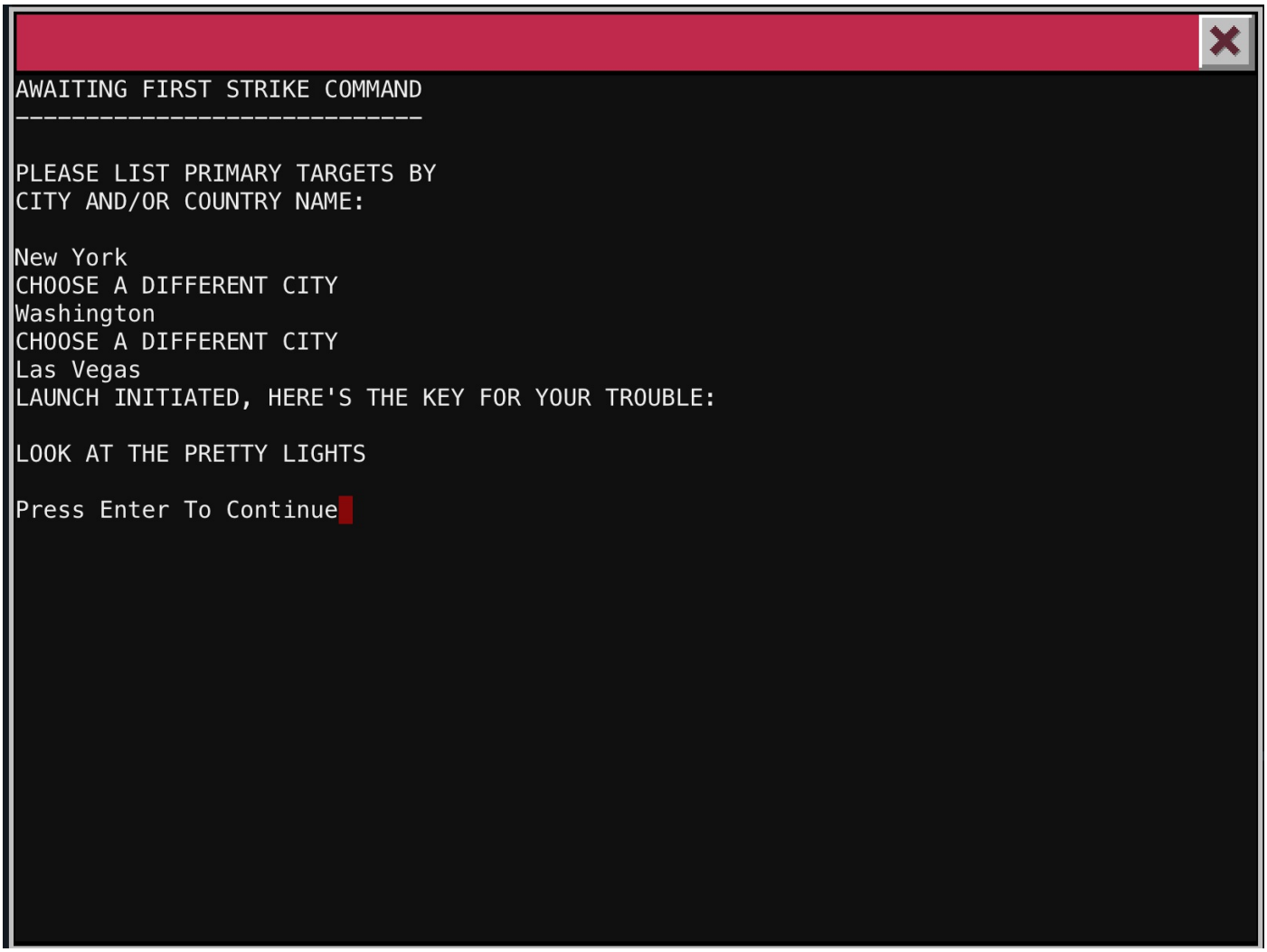
```
elf@5f09ad2e85a2:~$ find . -iname '*for_*' -print0 | xargs -0 cat
key: open_sesame
```

So the password is `open_sesame`. The reward is access to Santa's office.



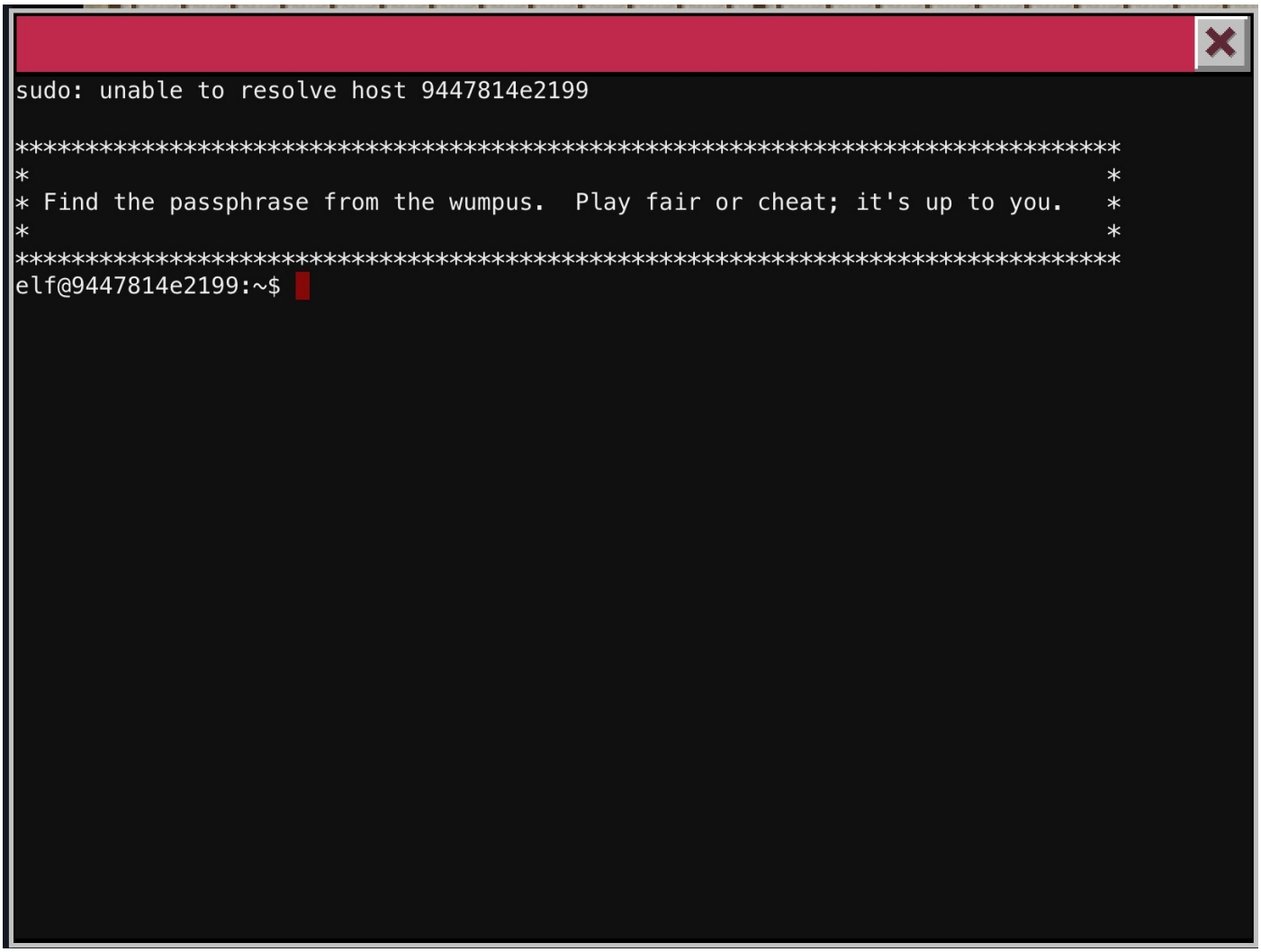
In it, there is another terminal. When you interact with it, you can actually

replay a part of the movie Wargames. The challenge here is simply to look up a good transcript of the movie or to watch the respective YouTube clips.

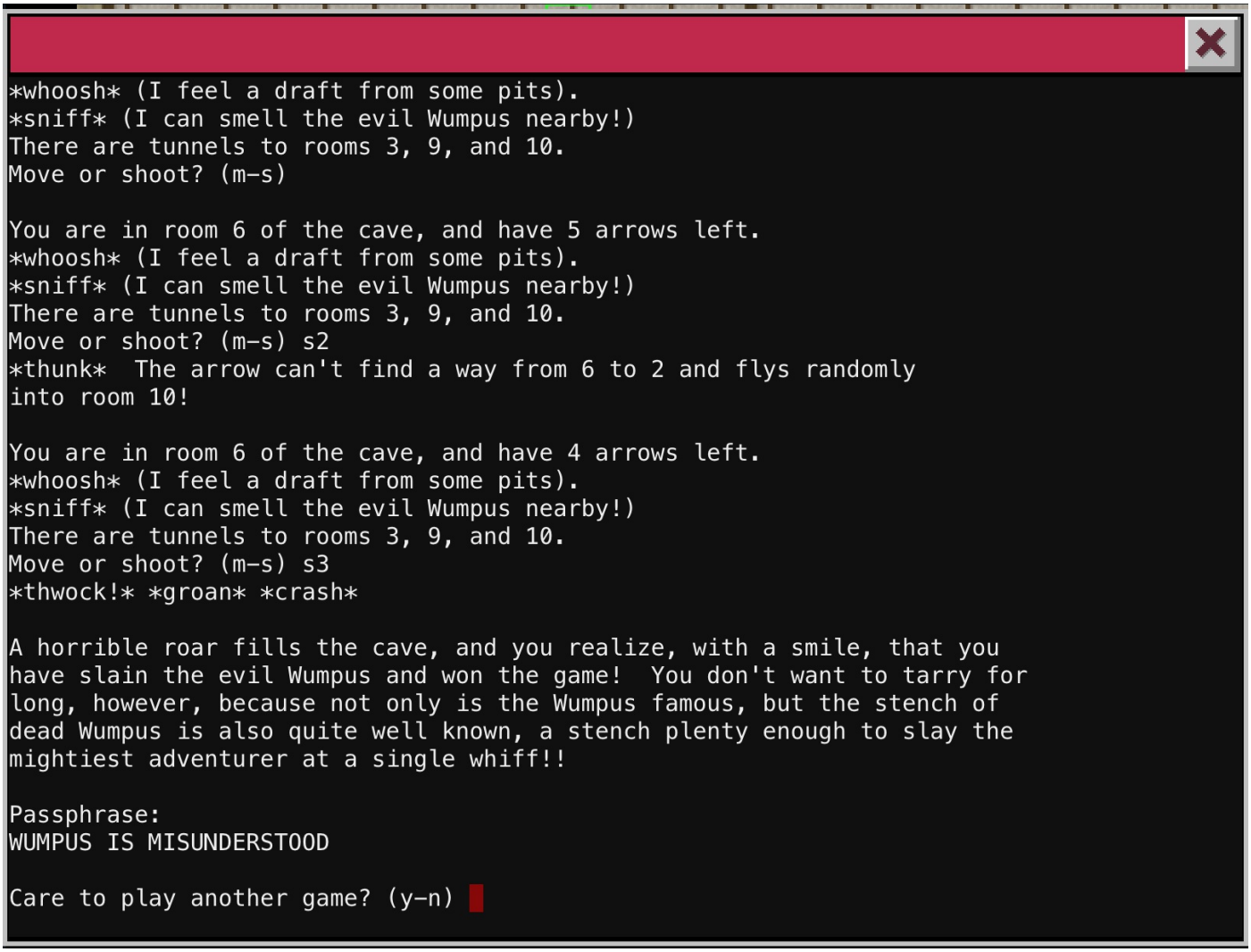


The flag you get is: `LOOK AT THE PRETTY LIGHTS`.

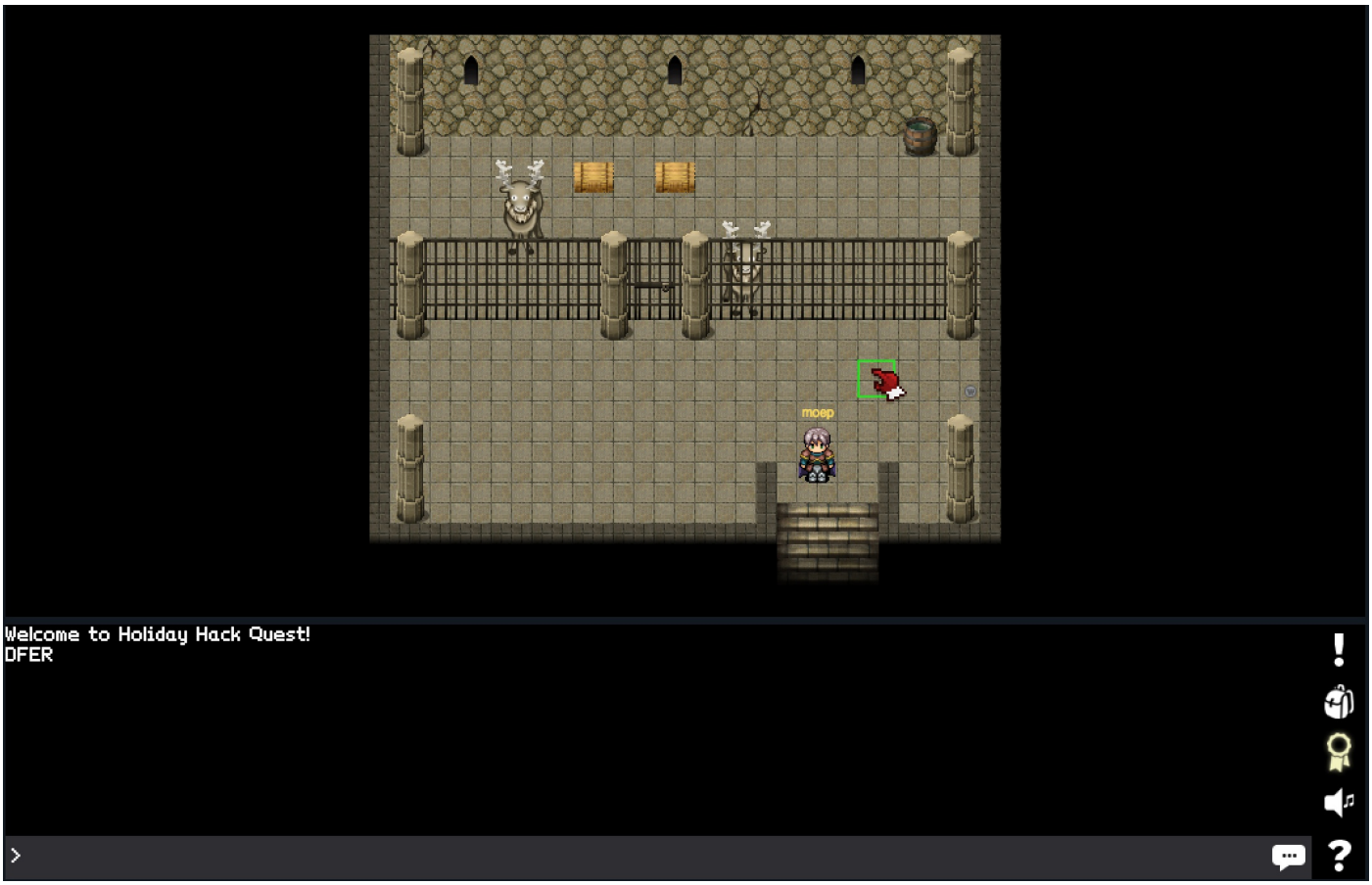
Back in the workshop, I noticed that there is a second terminal.



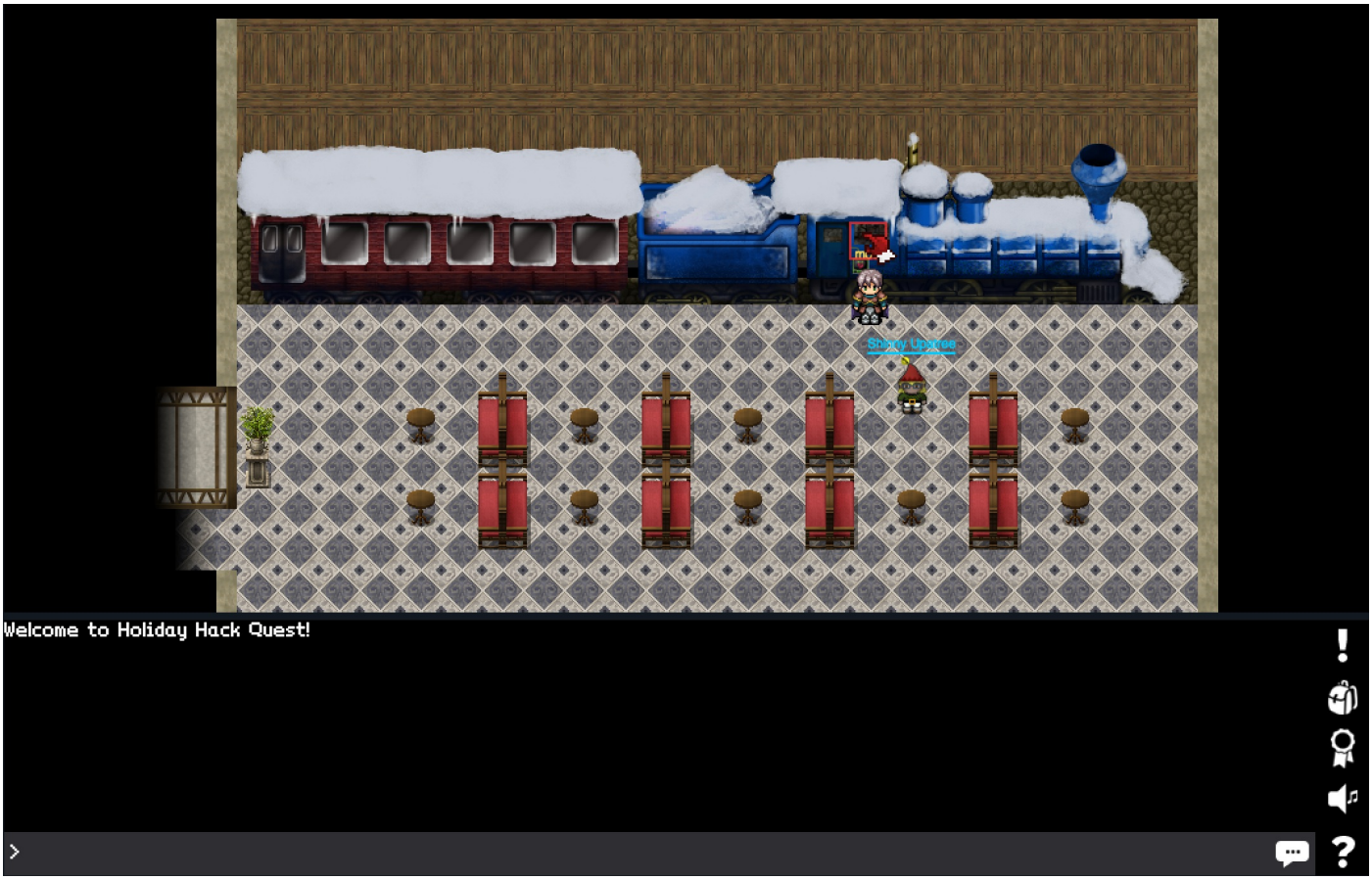
Start the game `wumpus`. I just played it, until I finally got the Wumpus. The passphrase is `WUMPUS IS MISUNDERSTOOD`.

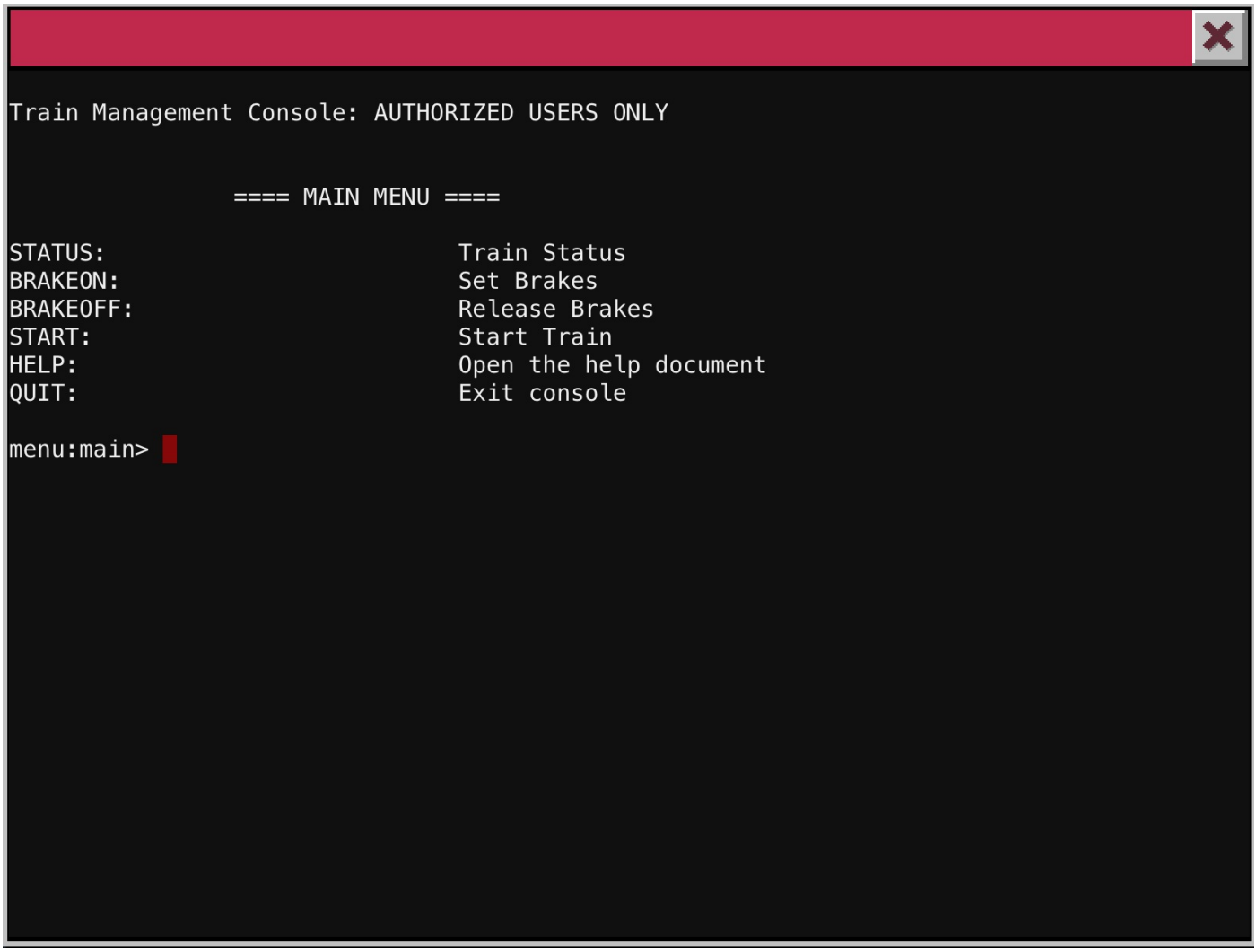


With the passphrase, we can pass the door next to the terminal.



Right now, I could not find anything of interest in it. Next, we will check out the terminal at the train.





If we set the brakes to off, and then try to start the train, we are asked for a password which we do not know. The hint to make progress is buried in the `HELP` message.

> **HELP** brings you to this file. If it's not here, this console cannot do it, unLESS you know something I don't.

So it seems that the `less` command is executed to display the message. Which is neat, cause we can do SHELL commands this way by leveraging the `! <command>` feature of `less` as described in the mangpage. An `ls -al` gives the following.

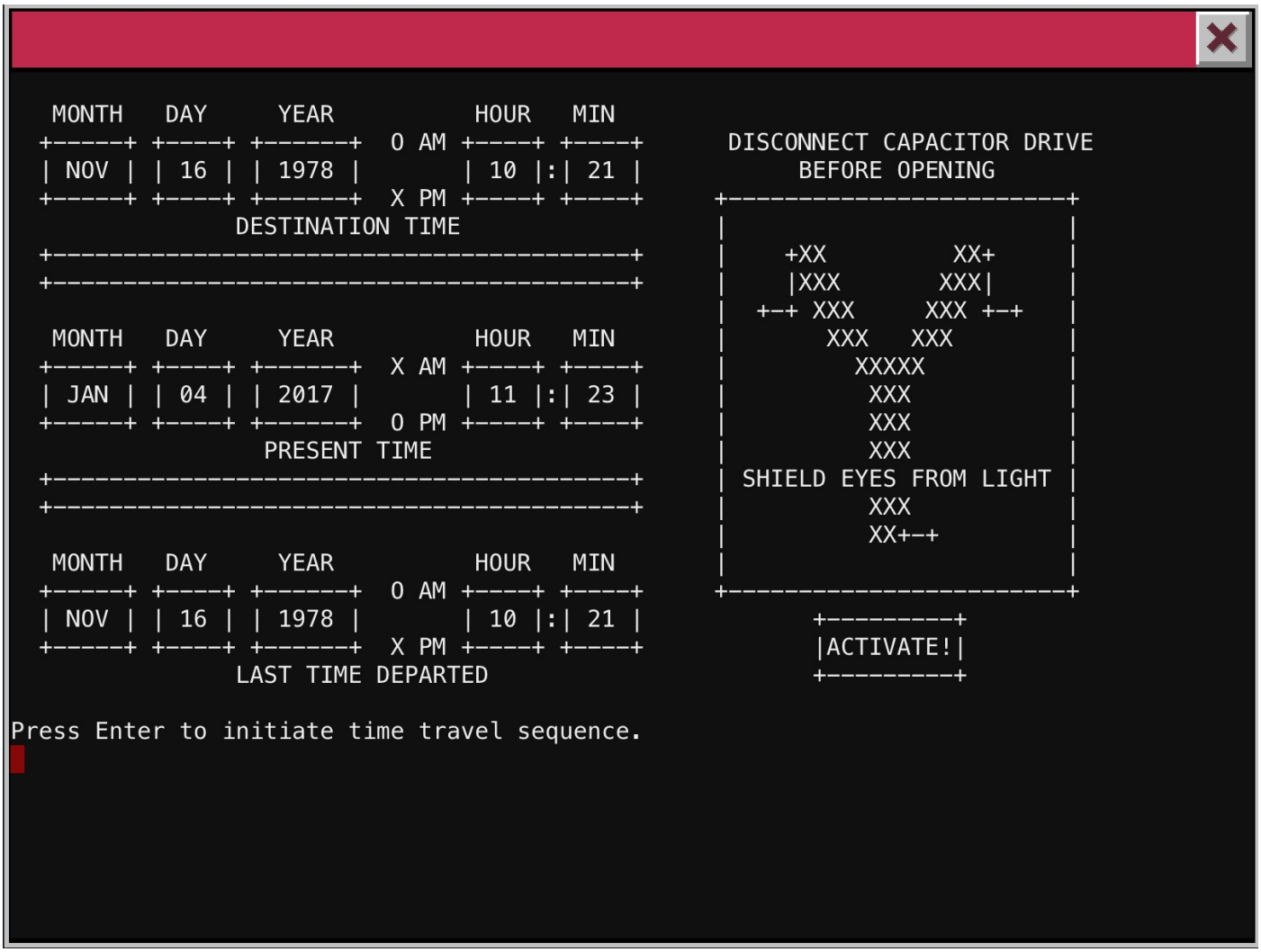
```
menu:main> HELP
total 40
drwxr-xr-x 2 conductor conductor  4096 Dec 10 19:39 .
drwxr-xr-x 6 root      root       4096 Dec 10 19:39 ..
```

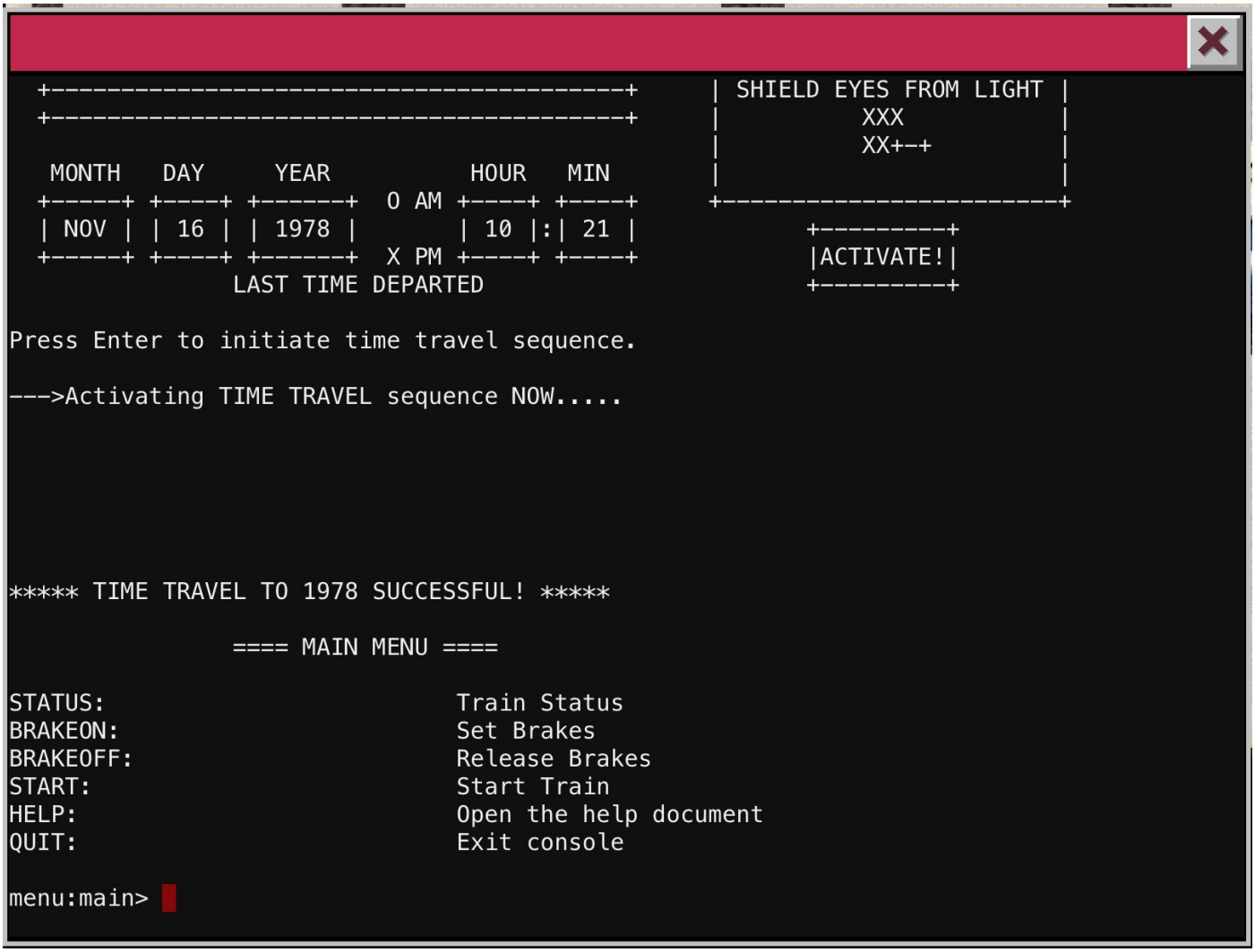
```
-rw-r--r-- 1 conductor conductor   220 Nov 12  2014 .bash_logout
-rw-r--r-- 1 conductor conductor  3515 Nov 12  2014 .bashrc
-rw-r--r-- 1 conductor conductor   675 Nov 12  2014 .profile
-rwxr-xr-x 1 root      root      10528 Dec 10 19:36 ActivateTrain
-rw-r--r-- 1 root      root       1506 Dec 10 19:36 TrainHelper.tx
-rwxr-xr-x 1 root      root       1588 Dec 10 19:36 Train_Console
!done  (press RETURN)
```

We get the password by doing a `grep -in pass Train_Console`.

```
menu:main> HELP
7:PASS="24fb3e89ce2aa0ea422c3d511d40dd84"
72:                             read -s -p "Enter Password: " pass
73:                             [ "$password" == "$PASS" ] && QUES
ivateTrain || echo "Access denied"
!done  (press RETURN)
```

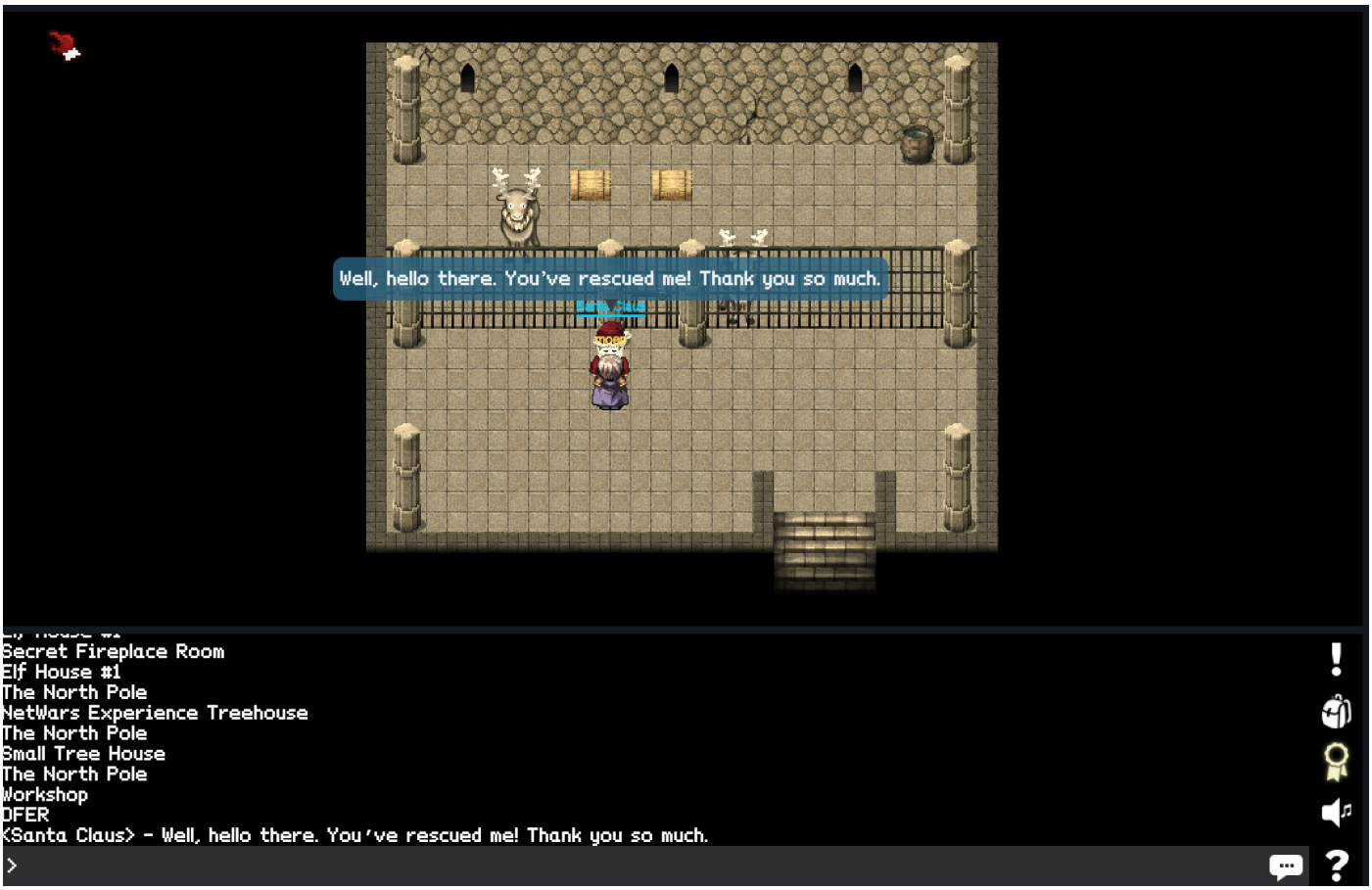
And off we go, back in time to 1978.


MONTH DAY YEAR HOUR MIN
NOV 16 1978 10 : 21
O AM
X PM
DESTINATION TIME
MONTH DAY YEAR HOUR MIN
JAN 04 2017 11 : 23
X AM
O PM
PRESENT TIME
MONTH DAY YEAR HOUR MIN
NOV 16 1978 10 : 21
O AM
X PM
LAST TIME DEPARTED
DISCONNECT CAPACITOR DRIVE
BEFORE OPENING
SHIELD EYES FROM LIGHT
ACTIVATE!
Press Enter to initiate time travel sequence.

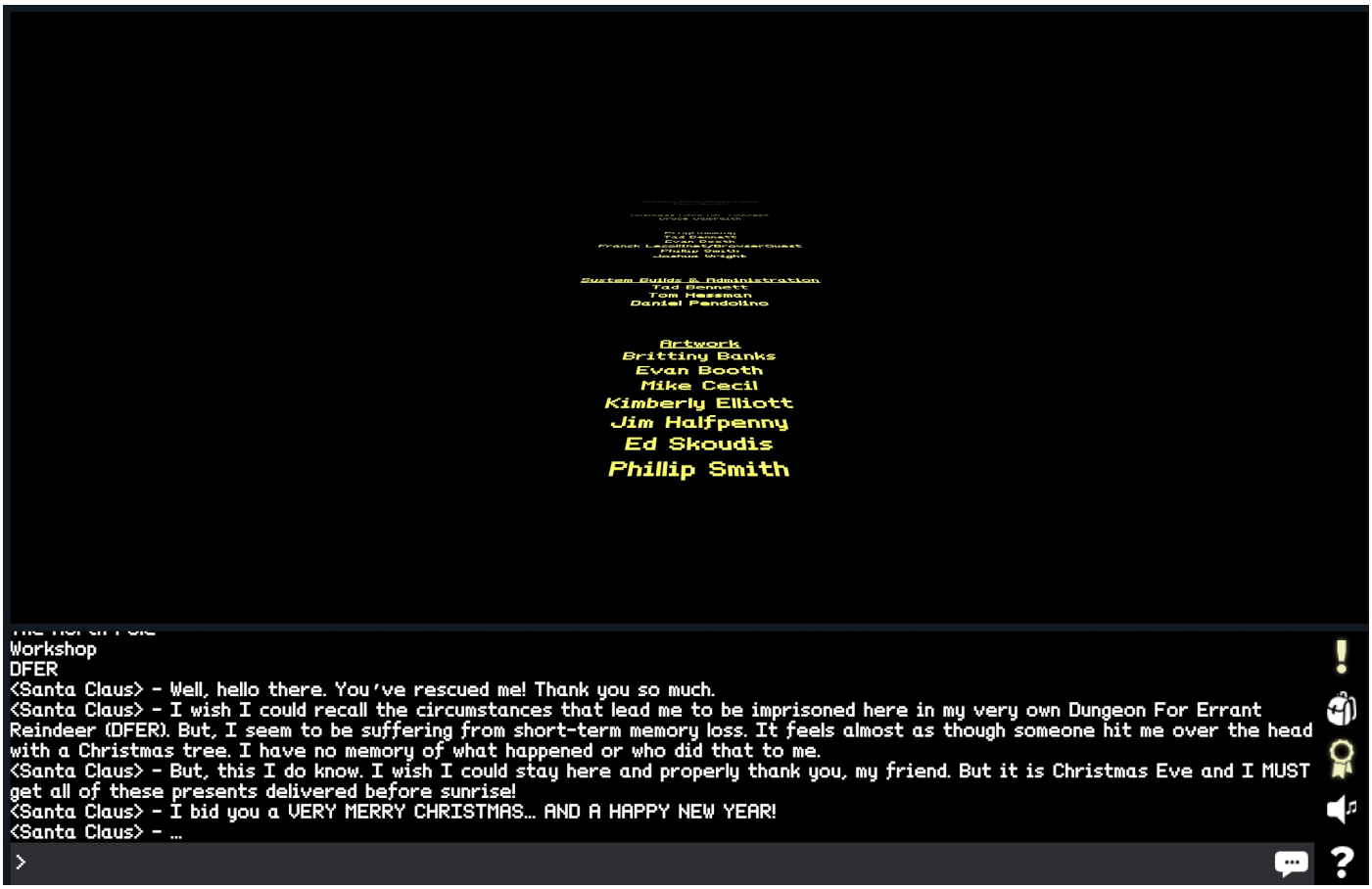


> &token=335BC464-BB2C-11E6-A4A6-CEC0C932CE01 10.240.0.19

While searching the place, you will finally find Santa in the back room of the train station.



Plus - see some credits.



Unfortunately, he does not remember who kidnapped him. In order to

tackle questions 7 and 8, we have to have a look at the SantaGram app again (as clearly point out in the story text on the website). Going through the decompiled app, searching for URLs lead me to the file `./res/values/strings.xml`.

```
<string name="analytics_launch_url">https://analytics.northpolewon
<string name="analytics_usage_url">https://analytics.northpolewond
<string name="appVersion">4.2</string>
<string name="app_name">SantaGram</string>
<string name="appbar_scrolling_view_behavior">android.support.desi
<string name="banner_ad_url">http://ads.northpolewonderland.com/af
<string name="bottom_sheet_behavior">android.support.design.widget
<string name="character_counter_pattern">%1$d / %2$d</string>
<string name="debug_data_collection_url">http://dev.northpolewonde
<string name="debug_data_enabled">false</string>
<string name="dungeon_url">http://dungeon.northpolewonderland.com/
<string name="exhandler_url">http://ex.northpolewonderland.com/exc
<string name="title_activity_comments">Comments</string>
```

Which gave us some new targets to attack.

```
➜  SantaGram_4.2 git:(master) ✗ dig +short analytics.northpolewond
104.198.252.157
➜  SantaGram_4.2 git:(master) ✗ dig +short ads.northpolewonderland
104.198.221.240
➜  SantaGram_4.2 git:(master) ✗ dig +short dev.northpolewonderland
35.184.63.245
➜  SantaGram_4.2 git:(master) ✗ dig +short dungeon.northpolewonder
35.184.47.139
➜  SantaGram_4.2 git:(master) ✗ dig +short ex.northpolewonderland.
104.154.196.33
```

After checking each of the IP address with the oracle (Tom Hessman),

we had the permission to test.

analytics.northpolewonderland.com 104.198.252.157

```
nmap 104.198.252.157 --script=default


Starting Nmap 7.31 ( https://nmap.org ) at 2017-01-04 13:55 CET
Nmap scan report for 157.252.198.104.bc.googleusercontent.com (104
Host is up (0.13s latency).
Not shown: 998 filtered ports
PORT    STATE SERVICE
22/tcp  open  ssh
| ssh-hostkey:
|   1024 5d:5c:37:9c:67:c2:40:94:b0:0c:80:63:d4:ea:80:ae (DSA)
|   2048 f2:25:e1:9f:ff:fd:e3:6e:94:c6:76:fb:71:01:e3:eb (RSA)
|_  256 4c:04:e4:25:7f:a1:0b:8c:12:3c:58:32:0f:dc:51:bd (ECDSA)
443/tcp open  https
| http-git:
|   104.198.252.157:443/.git/
|     Git repository found!
|     Repository description: Unnamed repository; edit this file '
|_    Last commit message: Finishing touches (style, css, etc)
| http-title: Sprusage Usage Reporter!
|_Requested resource was login.php
| ssl-cert: Subject: commonName=analytics.northpolewonderland.com
| Subject Alternative Name: DNS:analytics.northpolewonderland.com
| Not valid before: 2016-12-07T17:35:00
|_Not valid after:  2017-03-07T17:35:00
|_ssl-date: TLS randomness does not represent time
| tls-nextprotoneg:
|_  http/1.1

Nmap done: 1 IP address (1 host up) scanned in 15.29 seconds
```

It now started to become juicy. After all, we got a full blown git repo! But - well I was running out of time. So I had to stop here. *sadface*

Thanks to you for the entertaining challenge.

1) What is the secret message in Santa's tweets?

BUGBOUNTY

2) What is inside the ZIP file distributed by Santa's team?

A file named `SantaGram_4.2.apk`.

Part 2: Awesome Package Konveyance

3) What username and password are embedded in the APK file?

```
username=guest
password=busyreindeer78
```

4) What is the name of the audible component (audio file) in the SantaGram APK file?

`discombobulatedaudio1.mp3`

Part 3: A Fresh-Baked Holiday Pi

5) What is the password for the "cranpi" account on the Cranberry Pi system?

`yummycookies`

6) How did you open each terminal door and where had the villain imprisoned Santa?

- Terminal in Elf House 2
  - Realize via `sudo -l` that you can do `tcpdump` and `strings` as user `itchy`
  - A simple `strings` call gives you part 1: `santasli`
  - A `strings` call with `-e l` (for 16bit little endian) gives you part 2: `ttlehelper`
  - `tcpdump` helps to understand what traffic was captured and gives you a hint to the endianess thing
- Terminal 1 in the Workshop
  - Do a `find` to learn the directory structure
  - Do `find . -iname '*for_*' -print0 | xargs -0 cat` to access the password
- Terminal 2 in the Workshop
  - I literally just played the Wumpus game.
- Terminal Santa's Office

- Use a transcript of Wargames / YoutTube to give the correct answers

Part 4: My Gosh... It's Full of Holes

7) ONCE YOU GET APPROVAL OF GIVEN IN-SCOPE TARGET IP ADDRESSES FROM TOM HESSMAN AT THE NORTH POLE, ATTEMPT TO REMOTELY EXPLOIT EACH OF THE FOLLOWING TARGETS:

The Mobile Analytics Server (via credentialed login access) The Dungeon Game The Debug Server The Banner Ad Server The Uncaught Exception Handler Server The Mobile Analytics Server (post authentication) For each of those six items, which vulnerabilities did you discover and exploit?

REMEMBER, YOU ARE AUTHORIZED TO ATTACK ONLY THE IP ADDRESSES THAT TOM HESSMAN IN THE NORTH POLE EXPLICITLY ACKNOWLEDGES AS "IN SCOPE." ATTACK NO OTHER SYSTEMS ASSOCIATED WITH THE HOLIDAY HACK CHALLENGE.

8) What are the names of the audio files you discovered from each system above? There are a total of SEVEN audio files (one from the original APK in Question 4, plus one for each of the six items in the bullet list above.)

Please note: Although each system is remotely exploitable, we DO NOT expect every participant to compromise every element of the SantaGram infrastructure. Gain access to the ones you can. Although we will give special consideration to entries that successfully compromise all six vulnerabilities and retrieve their audio files, we happily accept partial answers and point out that they too are eligible for any of the prizes.