Web Application Security Assessment using Burp Suite

Introduction

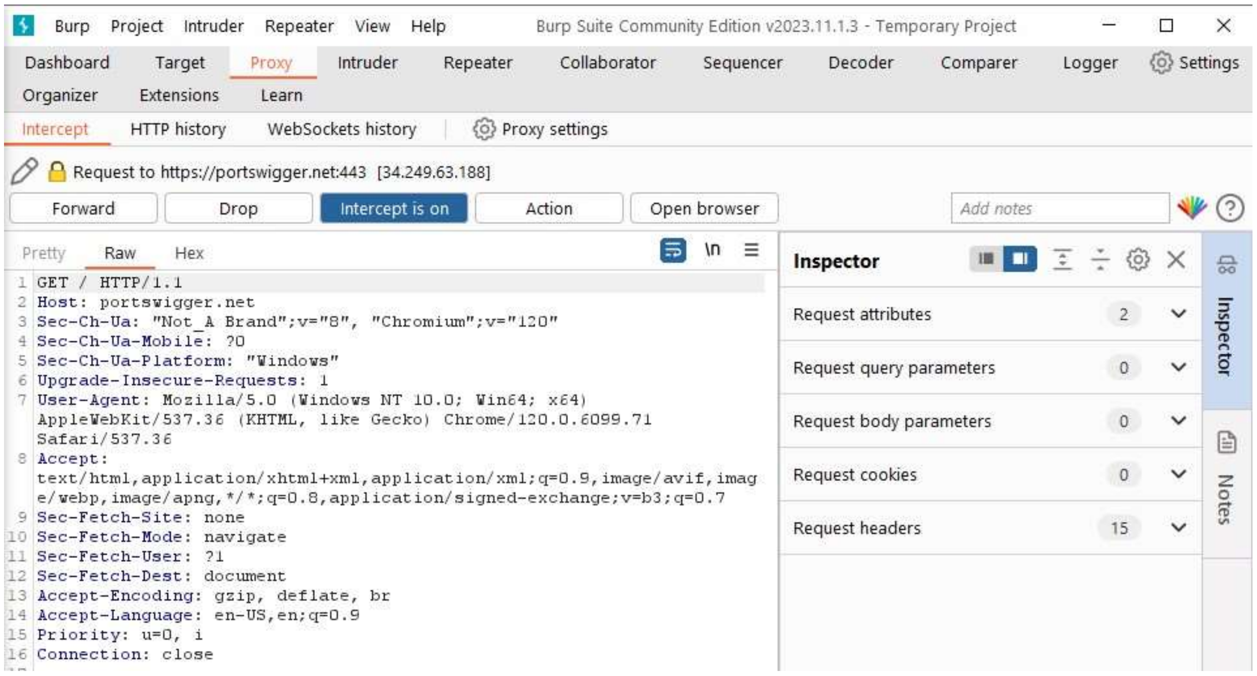
Burp Suite is a tool widely used in the cyber security field to identify and address security vulnerabilities in web applications. Developed by PortSwigger, Burp Suite provides a comprehensive platform providing a set of tools for identifying and addressing vulnerabilities, allowing professionals to proactively test and enhance the security posture of web applications. Some of these tools include a proxy, scanner, repeater and crawl to name a few. I will highlight theses tools and more in this project as well as others.

Methodology

In this project I will be running Burp Suite using Burp Suite Community and Professional for scanning. For the target website that I will be using will be https://portswigger.net, and ginandjuice.shop, which are vulnerable websites provided from Burp Suite. As listed in the introduction I will be using a list of tools for this project starting with the proxy, Burp Proxy acts as an link between the user's browser and the target web application. It allows users to intercept and modify HTTP(S) requests and responses. This feature is crucial for understanding how web applications work and identifying potential vulnerabilities. Doing activities like forwarding requests, viewing history, modifying request, and exploiting vulnerabilities. Following the Proxy is the Burp Repeater. The Repeater tool allows users to manually resend HTTP(S) requests to the server with modifications. It's useful for testing and exploiting vulnerabilities by manipulating parameters and observing the application's response. After using the Repeater I will run a vulnerability scan, you must be using Burp Suite Professional for this. If you need a license key portswigger gives a free trial where all you have to do is give you email address (note they do not accept Gmail accounts). The Scanner module automates the process of identifying security vulnerabilities in web applications. It uses a wide range of checks to find common issues such as SQL injection, cross-site scripting (XSS), and more. Users can customize scan configurations to suit their testing needs. While running the scan the tool Crawl will be in action as well. Which is used for automated crawling of web applications, helping to discover and map the structure of the application. It can follow links and identify new URLs, providing a comprehensive view of the target. And lastly you will generate your report.

Procedure

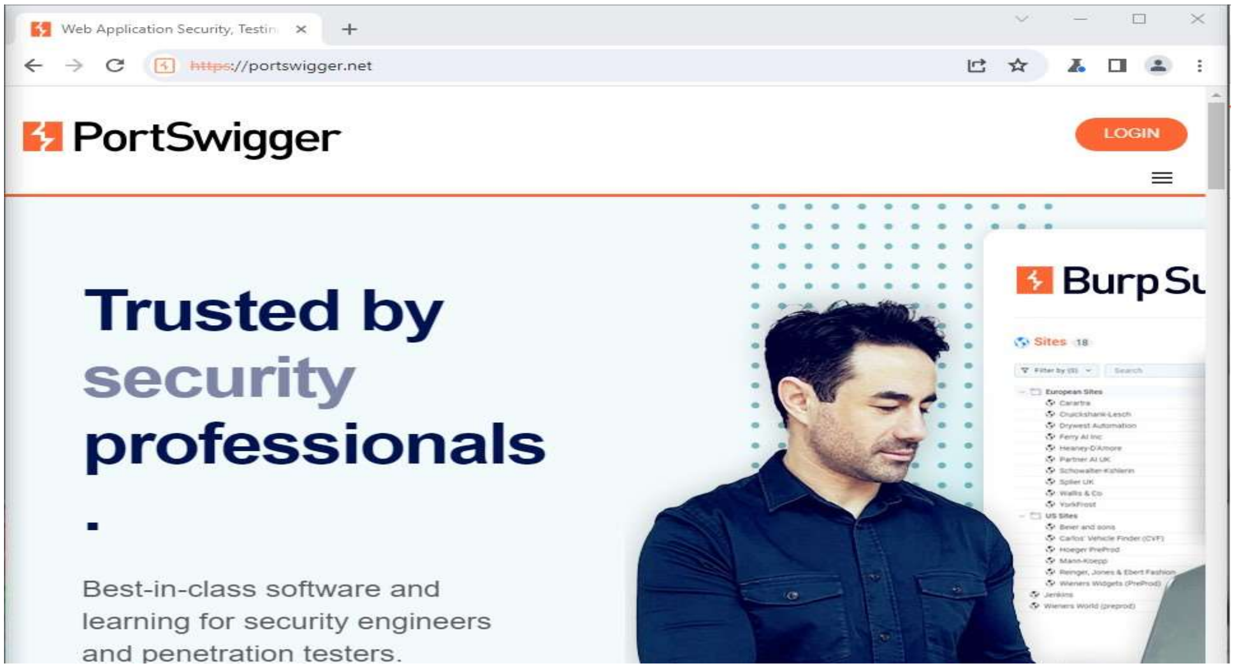
First thing I am going to intercept request with Burp Proxy. An interception in this sense is a HTTP(S) request and responses sent between Burp's browser and the target server. To get started download and install community or professional. In these first actions performed it doesn't matter which is chosen, it will only matter later when generating a scan. Once installed launch the Burp's browser to do this go to the Proxy tab and click the Intercept tab. There you will click the "Intercept is off" button which will turn the intercept on, then click "open browser". Now we will intercept a request. Via the Burp's browser attempt to visits "https://portswigger.net". Notice in Burp Suite you were able to intercept the HTTP request which was issued by the browser before it could reach the server, example shown here:



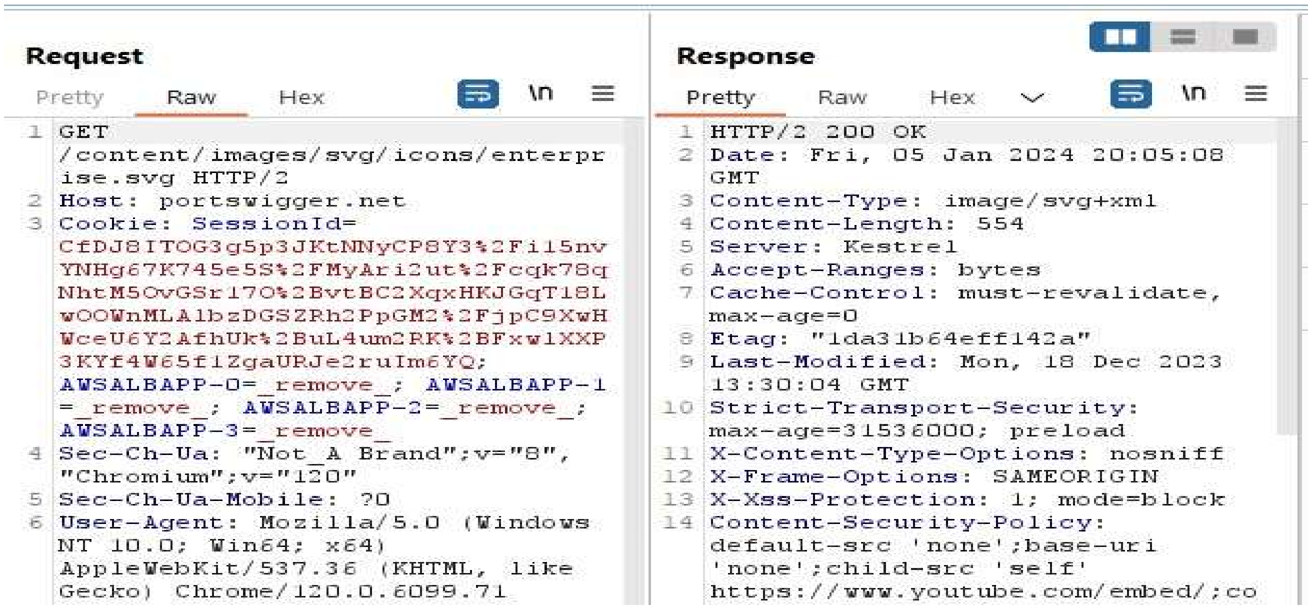
Burp Project Intruder Repeater View Help
Burp Suite Community Edition v2023.11.1.3 - Temporary Project
Dashboard Target Proxy Intruder Repeater Collaborator Sequencer Decoder Comparer Logger Settings
Organizer Extensions Learn
Intercept HTTP history WebSockets history Proxy settings
Request to https://portswigger.net:443 [34.249.63.188]
Forward Drop Intercept is on Action Open browser
Add notes
Pretty Raw Hex
Inspector
Request attributes 2
Request query parameters 0
Request body parameters 0
Request cookies 0
Request headers 15
Inspector
Notes

```
GET / HTTP/1.1
Host: portswigger.net
Sec-Ch-Ua: "Not_A Brand";v="8", "Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
Sec-Ch-Ua-Platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/120.0.6099.71
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,imag
e/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Priority: u=0, i
Connection: close
```

This can be modified before forwarding it to the target server if you would like but in this case we are going to forward the request. To do so click forward to send the intercepted request, the page should load in Burp's browser if not click the forward button again until Burp's browser is populated. Once that happens the burp browser should look like this:


Web Application Security, Testin
https://portswigger.net
PortSwigger
LOGIN
Trusted by security professionals.
Best-in-class software and learning for security engineers and penetration testers.
Burp Su
Sites 18

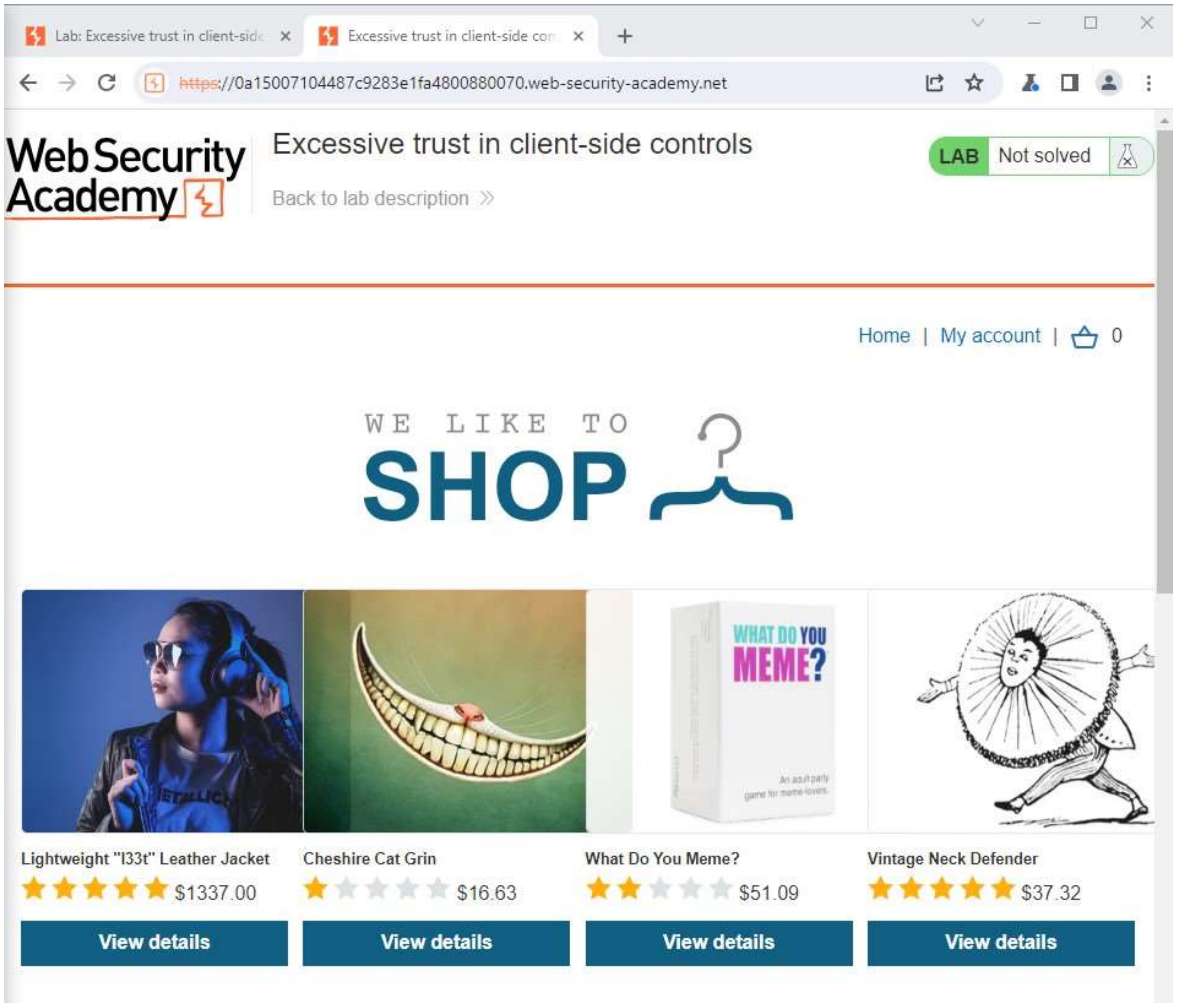
Now go back to the intercept tab and switch off interception. You don’t want to keep interception on constantly because many requests from a browser usually sends constantly while you navigate on a website and don’t want to have intercepted all of them. Once the intercept is off the burp browser should still be operating. Now view the HTTP history start by (in Burp Suite) go to the Proxy tab then go to the HTTP history tab. Here you can see all history that has passed through Burp (even while interception was switched off) (Appendix. A). Click any entry in the history to view the raw HTTP request as well as the response from the server should look like this:



```
GET
/content/images/svg/icons/enterpr
ise.svg HTTP/2
Host: portswigger.net
Cookie: SessionId=
CfDJ8ITOG3g5p3JKtNNyCP8Y3%2Fi15nv
YNHg67K745e5S%2FMyAri2ut%2Fcqk78q
NhtM5OvGSr170%2BvtBC2XqxHKJGqT18L
wOOWnMLAlbzDGSZRh2PpGM2%2FjpC9XwH
WceU6Y2AfhUk%2BuL4um2RK%2BFxw1XXP
3KYf4W65f1ZgaURJe2ruIm6YQ;
AWSALBAPP-0=_remove_; AWSALBAPP-1
=_remove_; AWSALBAPP-2=_remove_;
AWSALBAPP-3=_remove_
Sec-Ch-Ua: "Not_A Brand";v="8",
"Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
User-Agent: Mozilla/5.0 (Windows
NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/120.0.6099.71
```

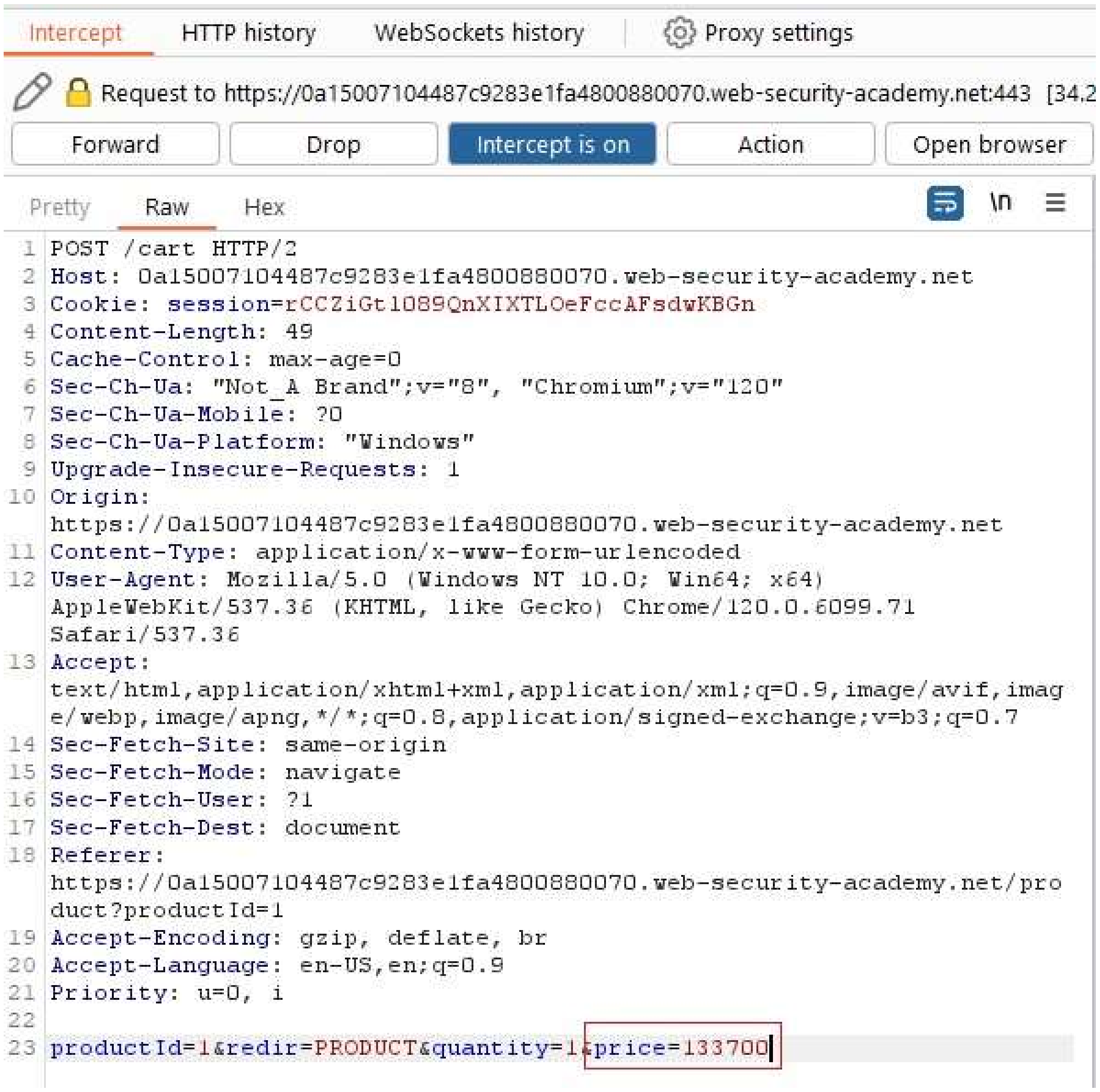
```
HTTP/2 200 OK
Date: Fri, 05 Jan 2024 20:05:08
GMT
Content-Type: image/svg+xml
Content-Length: 554
Server: Kestrel
Accept-Ranges: bytes
Cache-Control: must-revalidate,
max-age=0
Etag: "1da31b64eff142a"
Last-Modified: Mon, 18 Dec 2023
13:30:04 GMT
Strict-Transport-Security:
max-age=31536000; preload
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
X-Xss-Protection: 1; mode=block
Content-Security-Policy:
default-src 'none';base-uri
'none';child-src 'self'
https://www.youtube.com/embed/;co
```

When cyber professionals do this they are looking to dig through website per usual and study the interactions between Burp's browser and the server afterward. Next I am going to modify an intercepted request in Burp Proxy, which enables you to manipulate request differently then the website excepted to see how it responds. To do this, access the vuln website in Burp's Browser, make sure intercept is off in proxy and click intercept, launch the burp's browser and use it to visit "https://portswigger.net/websecurity/logic-flaws/examples/lab-logic-flaws-excessive-trust-in-client-side-controls". Once loaded click access the lab, then you will be sent to port swagger login page (create a account if necessary), sign in once that is done you will be sent to instance of fake shopping site like the one shown here:



Lab: Excessive trust in client-side
Excessive trust in client-side con
https://0a15007104487c9283e1fa4800880070.web-security-academy.net
Web Security Academy
Excessive trust in client-side controls
Back to lab description
LAB Not solved
Home | My account | 0
WE LIKE TO SHOP
Lightweight "l33t" Leather Jacket $1337.00
Cheshire Cat Grin $16.63
What Do You Meme? $51.09
Vintage Neck Defender $37.32
View details
View details
View details
View details

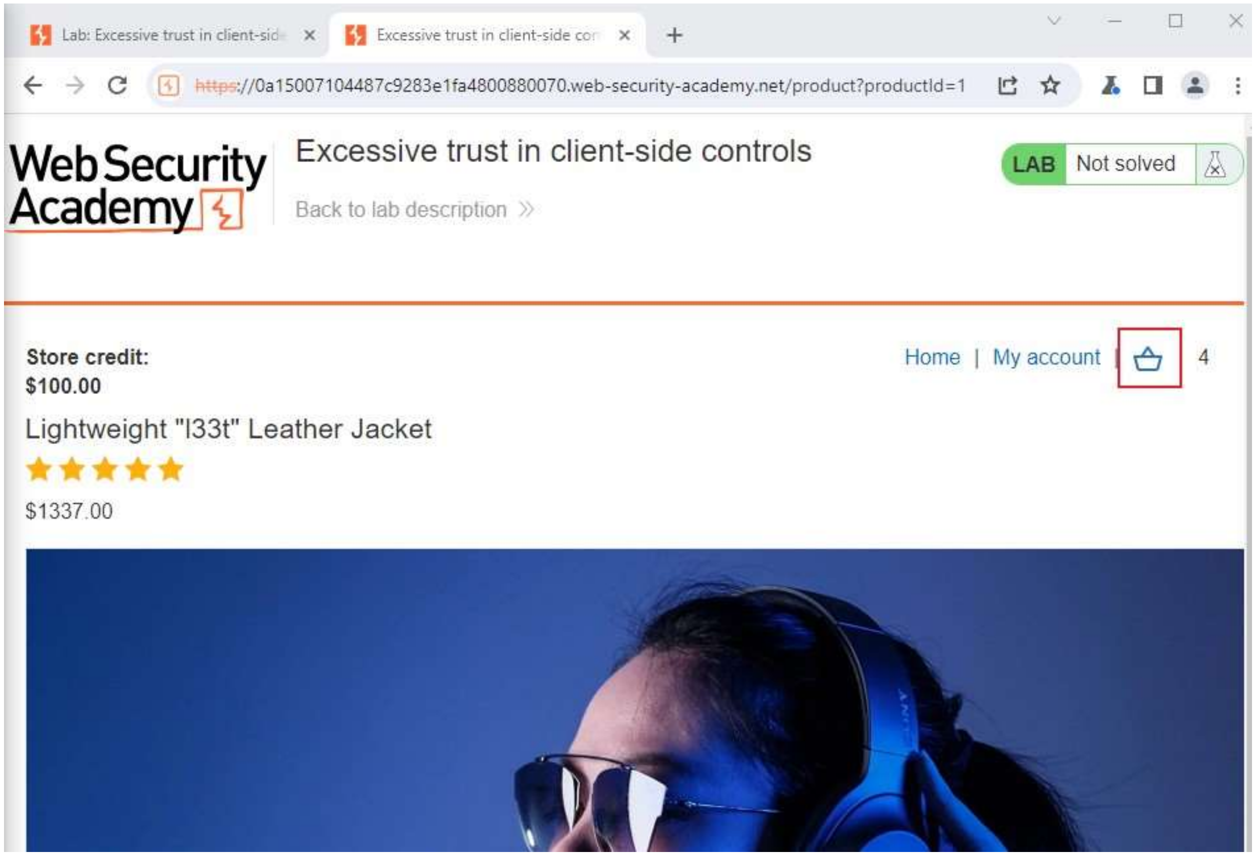
Now login to shopping account go to “my account” and use the credentials, username: wiener and password: peter then find something to buy. Notice there is currently $100 in store credit. Now click home to go back to the home page. Now click “view details” for the “lightweight “l33t” Leather Jacket”. Now Study the add to cart function to do this, in Burp go to the Proxy tab followed by the Intercept tab and switch intercept to on. Now moving in the Burp’s Browser add the jacket the cart. When this is done there should receive POST /cart request in Burp. Notice there is a parameter in the body called price, which is for the price of the item in cents shown here:



```
POST /cart HTTP/2
Host: 0a15007104487c9283e1fa4800880070.web-security-academy.net
Cookie: session=rCCZiGt1089QnXIXTLOeFccAFsdwKBGn
Content-Length: 49
Cache-Control: max-age=0
Sec-Ch-Ua: "Not_A Brand";v="8", "Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
Sec-Ch-Ua-Platform: "Windows"
Upgrade-Insecure-Requests: 1
Origin:
https://0a15007104487c9283e1fa4800880070.web-security-academy.net
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/120.0.6099.71
Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,imag
e/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Referer:
https://0a15007104487c9283e1fa4800880070.web-security-academy.net/pro
duct?productId=1
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Priority: u=0, i

productId=1&redir=PRODUCT&quantity=1&price=133700
```

Now we modify the request, change the value for the price parameter to 1 then click forward to send the request to the server (Appendix. B). Then proceed to turn the intercept off again. Since we have a vulnerability it's time to exploit it. In burps browser click the based icon to view cart.

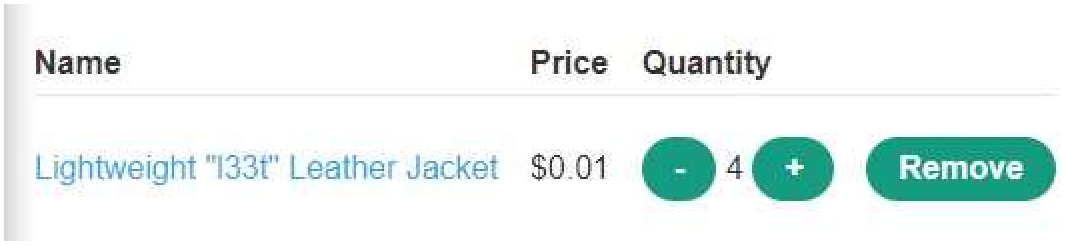

Lab: Excessive trust in client-side
Excessive trust in client-side con
https://0a15007104487c9283e1fa4800880070.web-security-academy.net/product?productId=1
Web Security Academy
Excessive trust in client-side controls
Back to lab description
LAB
Not solved
Home | My account
4

Store credit:
$100.00

Lightweight "l33t" Leather Jacket

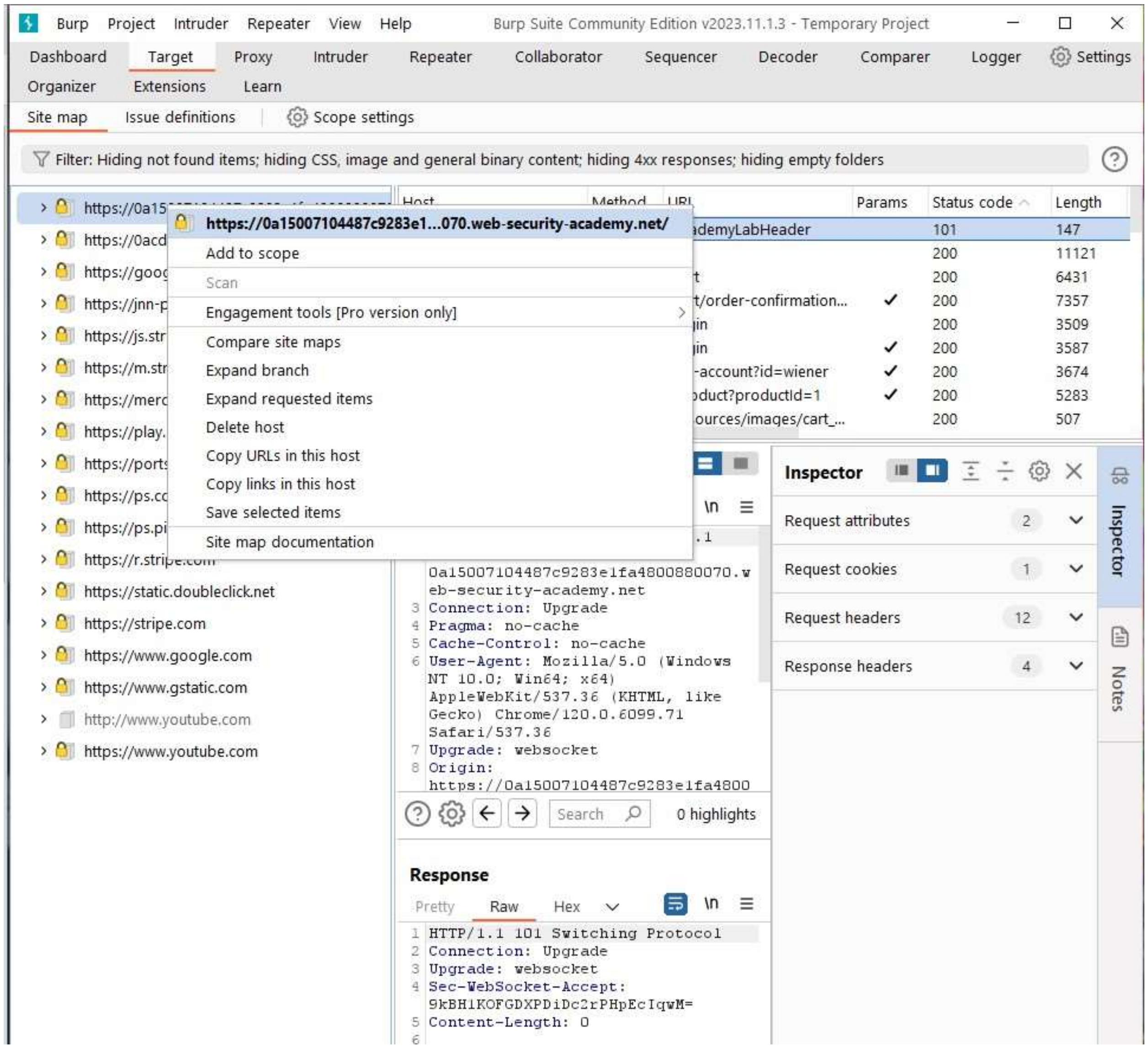
$1337.00

Notice the jacket was added for 1 cent.



Name	Price	Quantity	
Lightweight "l33t" Leather Jacket	$0.01	- 4 +	Remove

Moving forward it's time to set the target scope the objective of setting a target scope is to work in Burp Suite. The target scope tells Burp which URL and host wants to be tested, it enables us to filter out noise generated by the browser and other sites to focus on the traffic we want. To do this, launch burp's browser and use it to visit "https://portswigger.net/web-security/information-disclosure/exploiting/lab-infoleak-inerror-messages", click access the lab and browse the target site, do some shopping and click on a couple of the product pages. Now to study the HTTP history in Burp go to the proxy tab then go to the HTTP history tab, to make it easier to read click the entry '#' to re-order the requests to go to descending order (see most recent at the top). Notice that the HTTP history shows details about each request made including requests to third-party websites that you're not interested in (Google Analytics / YouTube). Now to set the target scope, head to the target tab then to site map tab, where you can see on the left side you can find the panel to see the list of hosts that the browser has interacted with. To add scope right click the node for the target site and click add to scope and proceed to click yes to exclude out-of-scope traffic as shown here:



Filter: Hiding not found items; hiding CSS, image and general binary content; hiding 4xx responses; hiding empty folders

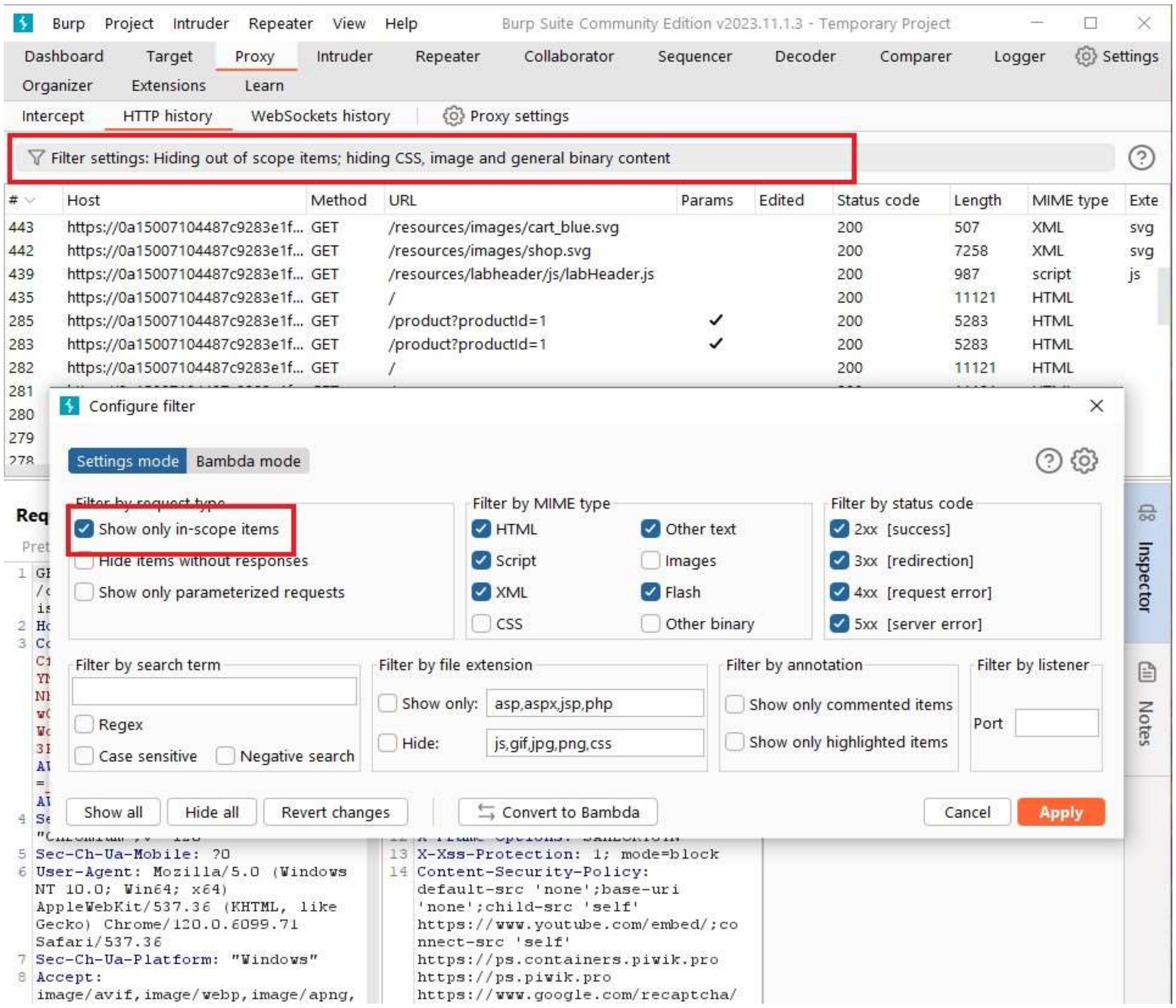
https://0a15
https://0acd
https://goog
https://jnn-p
https://js.str
https://m.str
https://merc
https://play.
https://ports
https://ps.cc
https://ps.pi
https://r.stripe.com
https://static.doubleclick.net
https://stripe.com
https://www.google.com
https://www.gstatic.com
http://www.youtube.com
https://www.youtube.com

Host	Method	URL	Params	Status code	Length
		ademyLabHeader		101	147
				200	11121
		t		200	6431
		t/order-confirmation...	✓	200	7357
		in		200	3509
		in	✓	200	3587
		-account?id=wiener	✓	200	3674
		oduct?productId=1	✓	200	5283
		ources/images/cart_...		200	507

```
.1
0a15007104487c9283e1fa4800880070.w
eb-security-academy.net
Connection: Upgrade
Pragma: no-cache
Cache-Control: no-cache
User-Agent: Mozilla/5.0 (Windows
NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/120.0.6099.71
Safari/537.36
Upgrade: websocket
Origin:
https://0a15007104487c9283e1fa4800
```

```
HTTP/1.1 101 Switching Protocol
Connection: Upgrade
Upgrade: websocket
Sec-WebSocket-Accept:
9kBH1KOFGDXPDiDc2rPHpEcIqwM=
Content-Length: 0
```

Now to filter HTTP history, this will cut time down drastically and makes it easier to evaluate the entries. Now head back to the proxy tab then to HTTP history. Click on the display filter above the HTTP history and select “Show only in-scope items”:


Burp Project Intruder Repeater View Help
Burp Suite Community Edition v2023.11.1.3 - Temporary Project
Dashboard Target Proxy Intruder Repeater Collaborator Sequencer Decoder Comparer Logger Settings
Organizer Extensions Learn
Intercept HTTP history WebSockets history Proxy settings
Inspector
Notes

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

#	Host	Method	URL	Params	Edited	Status code	Length	MIME type	Exte
443	https://0a15007104487c9283e1f...	GET	/resources/images/cart_blue.svg			200	507	XML	svg
442	https://0a15007104487c9283e1f...	GET	/resources/images/shop.svg			200	7258	XML	svg
439	https://0a15007104487c9283e1f...	GET	/resources/labheader/js/labHeader.js			200	987	script	js
435	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
285	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
283	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
282	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
281									
280									
279									
278									

Configure filter

Settings mode | Bambda mode

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
- [ ] 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

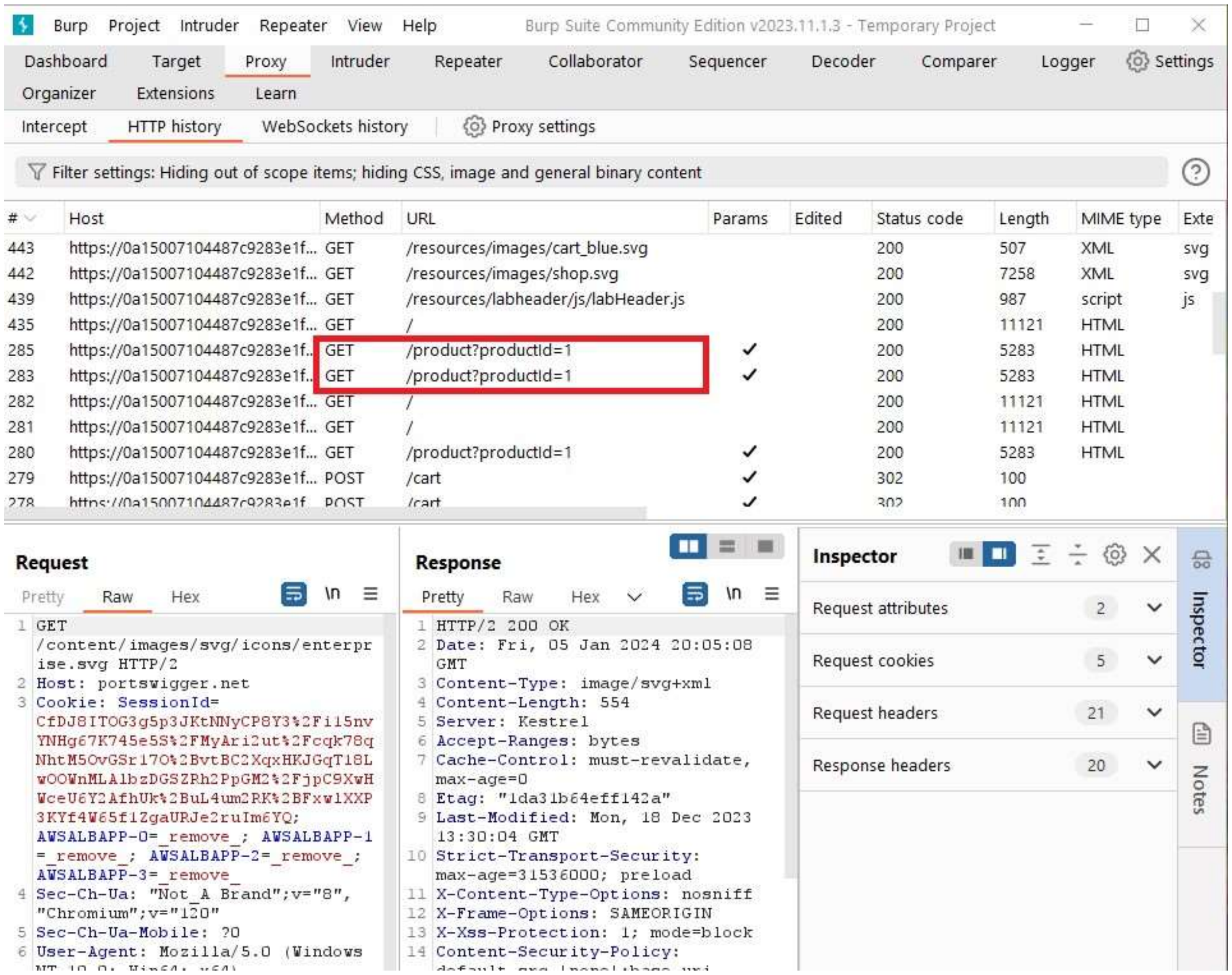
Show all | Hide all | Revert changes | Convert to Bambda | Cancel | Apply

```
5 Sec-Ch-Ua-Mobile: ?0
6 User-Agent: Mozilla/5.0 (Windows
  NT 10.0; Win64; x64)
  AppleWebKit/537.36 (KHTML, like
  Gecko) Chrome/120.0.6099.71
  Safari/537.36
7 Sec-Ch-Ua-Platform: "Windows"
8 Accept:
  image/avif,image/webp,image/apng,
```

```
13 X-Xss-Protection: 1; mode=block
14 Content-Security-Policy:
   default-src 'none';base-uri
   'none';child-src 'self'
   https://www.youtube.com/embed/;co
   nnect-src 'self'
   https://ps.containers.piwik.pro
   https://ps.piwik.pro
   https://www.google.com/recaptcha/
```

Notice that it now only shows entries from the website that were targeted, all other entries have been taken out of the result list. Doing this improves time and efficiency due to only showing the entries that you are interested in (Appendix. C) .

A key component in Burp is the Burp Repeater which lets you reissue requests repeatedly, which will help evaluating results in which the target website’s output is in response to different inputs without having to intercept the request each time which will make it easier to probe for vulnerabilities or confirm once's that were identified by Burp Scanner. To do this first, identify a request. Last tutorial, noticed each time accessing a product page there were GET /product request with a productID query parameter:



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

#	Host	Method	URL	Params	Edited	Status code	Length	MIME type	Exte
443	https://0a15007104487c9283e1f...	GET	/resources/images/cart_blue.svg			200	507	XML	svg
442	https://0a15007104487c9283e1f...	GET	/resources/images/shop.svg			200	7258	XML	svg
439	https://0a15007104487c9283e1f...	GET	/resources/labheader/js/labHeader.js			200	987	script	js
435	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
285	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
283	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
282	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
281	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
280	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
279	https://0a15007104487c9283e1f...	POST	/cart	✓		302	100		
278	https://0a15007104487c9283e1f	POST	/cart	✓		302	100		

Request

```
GET
/content/images/svg/icons/enterpr
ise.svg HTTP/2
Host: portswigger.net
Cookie: SessionId=
CfDJ8ITOG3g5p3JKtNNyCP8Y3%2Fi15nv
YNHg67K745e5S%2FMyAri2ut%2Fcqk78q
NhtM5OvGSr170%2BvtBC2XqxHKJGqT18L
wOOWnMLA1bzDGSZRh2PpGM2%2FjpC9XwH
WceU6Y2AfhUk%2BuL4um2RK%2BFxw1XXP
3KYf4W65f1ZgaURJe2ruIm6YQ;
AWSALBAPP-0=_remove_; AWSALBAPP-1
=_remove_; AWSALBAPP-2=_remove_;
AWSALBAPP-3=_remove_
Sec-Ch-Ua: "Not_A Brand";v="8",
"Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
User-Agent: Mozilla/5.0 (Windows
```

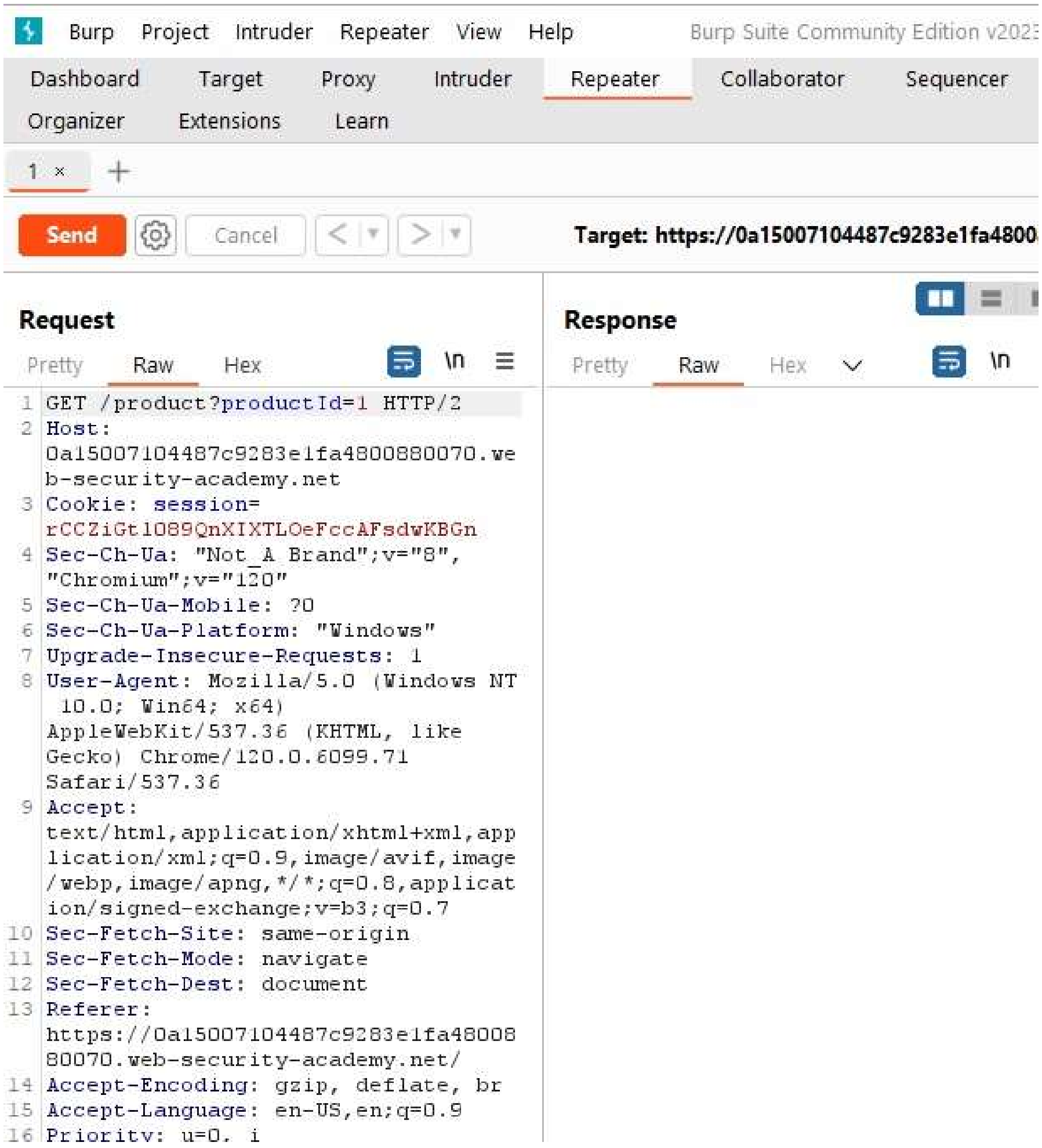
Response

```
HTTP/2 200 OK
Date: Fri, 05 Jan 2024 20:05:08
GMT
Content-Type: image/svg+xml
Content-Length: 554
Server: Kestrel
Accept-Ranges: bytes
Cache-Control: must-revalidate,
max-age=0
Etag: "1da31b64eff142a"
Last-Modified: Mon, 18 Dec 2023
13:30:04 GMT
Strict-Transport-Security:
max-age=31536000; preload
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
X-Xss-Protection: 1; mode=block
Content-Security-Policy:
```

Inspector

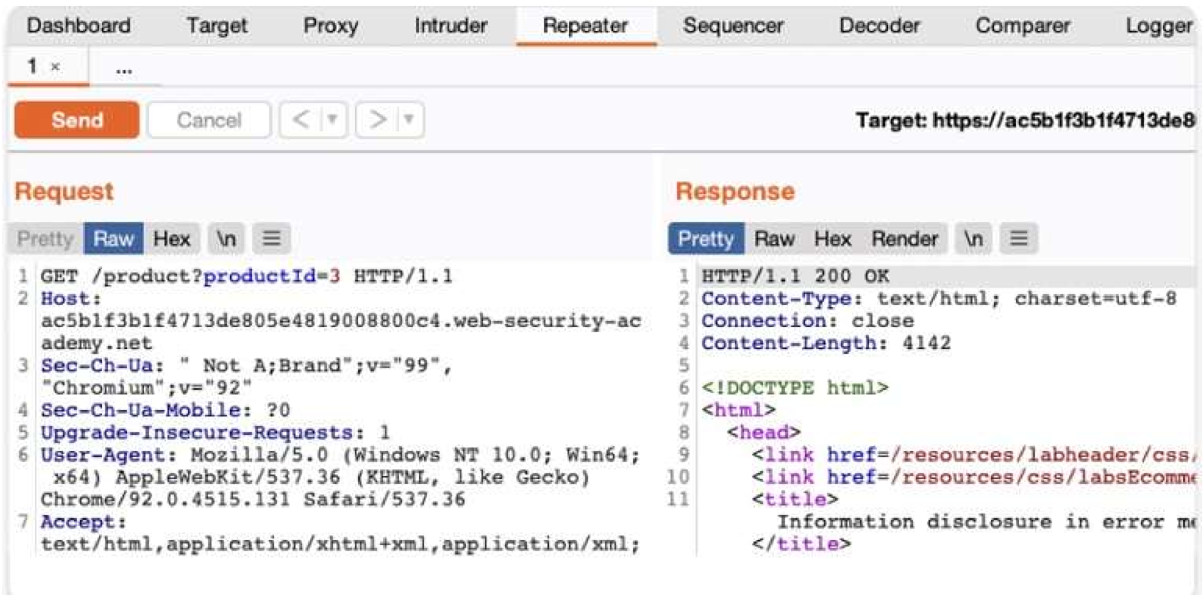
Request attributes	2
Request cookies	5
Request headers	21
Response headers	20

Send the request to Burp Repeater, right click on GET /product?productID=[…] request and select "Send to Repeater" (Appendix. D.). Head to the repeater tab, notice there's is a request entry.



```
GET /product?productId=1 HTTP/2
Host:
0a15007104487c9283e1fa4800880070.we
b-security-academy.net
Cookie: session=
rCCZiGt1089QnXIXTLOeFccAFsdwKBGn
Sec-Ch-Ua: "Not_A Brand";v="8",
"Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
Sec-Ch-Ua-Platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT
 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/120.0.6099.71
Safari/537.36
Accept:
text/html,application/xhtml+xml,app
lication/xml;q=0.9,image/avif,image
/webp,image/apng,*/*;q=0.8,applicat
ion/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: navigate
Sec-Fetch-Dest: document
Referer:
https://0a15007104487c9283e1fa48008
80070.web-security-academy.net/
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Priority: u=0, i
```

Send the request and view the response, click send and view the response from the server:

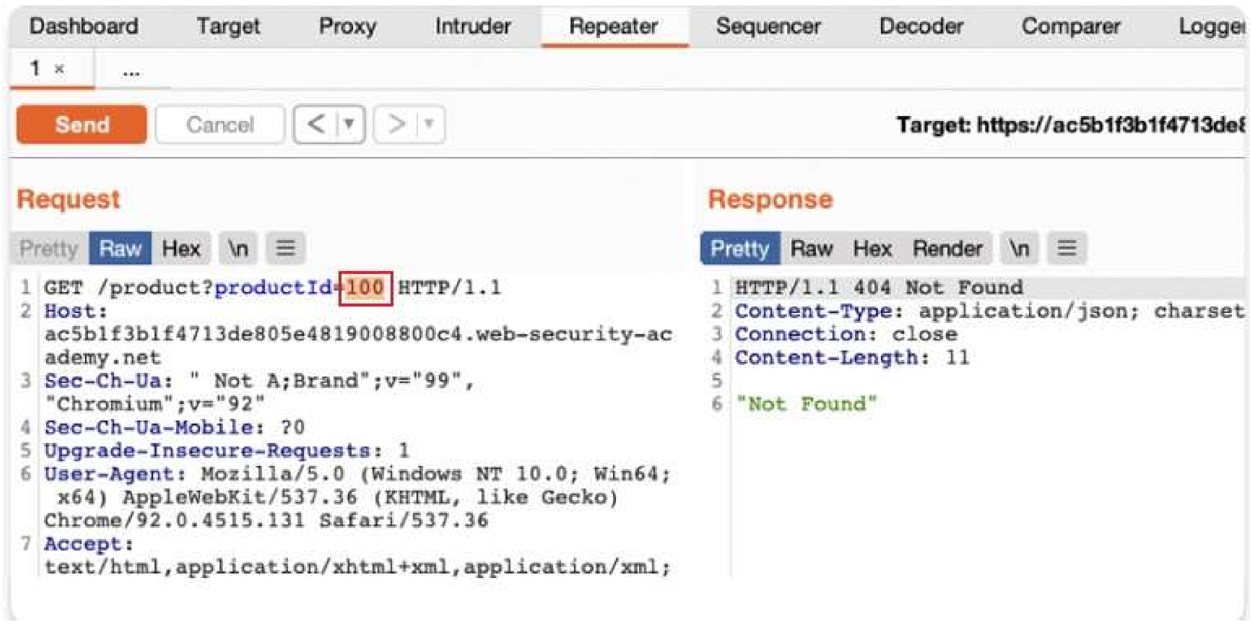


```
GET /product?productId=3 HTTP/1.1
Host:
ac5b1f3b1f4713de805e4819008800c4.web-security-ac
ademy.net
Sec-Ch-Ua: " Not A;Brand";v="99",
"Chromium";v="92"
Sec-Ch-Ua-Mobile: ?0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64;
 x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/92.0.4515.131 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;
```

```
HTTP/1.1 200 OK
Content-Type: text/html; charset=utf-8
Connection: close
Content-Length: 4142

<!DOCTYPE html>
<html>
  <head>
    <link href=/resources/labheader/css/
    <link href=/resources/css/labsEcomme
    <title>
      Information disclosure in error me
    </title>
```

Now let’s Test different input with Burp Repeater by resending the same request with different input, you will be able to identify and confirm different input-based vulnerabilities. Let’s resend the request with different input, change the number in the productID parameter and resend the request :

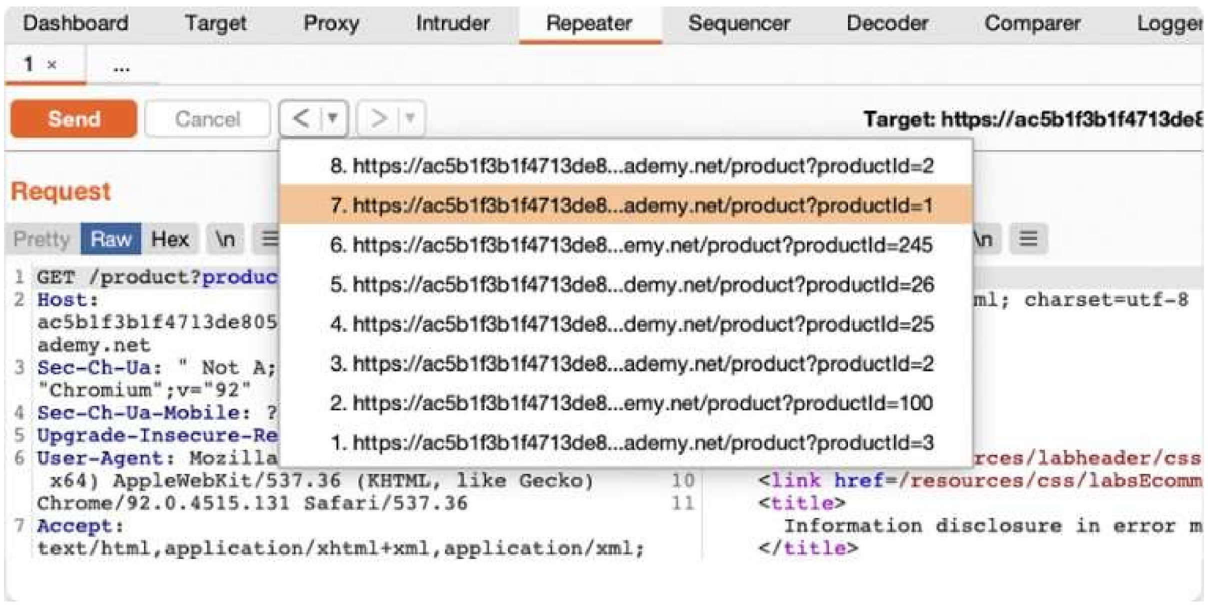


```
GET /product?productId=100 HTTP/1.1
Host:
ac5b1f3b1f4713de805e4819008800c4.web-security-ac
ademy.net
Sec-Ch-Ua: " Not A;Brand";v="99",
"Chromium";v="92"
Sec-Ch-Ua-Mobile: ?0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64;
 x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/92.0.4515.131 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;
```

```
HTTP/1.1 404 Not Found
Content-Type: application/json; charset
Connection: close
Content-Length: 11

"Not Found"
```

View the request history, use the arrows to move to previous request sent along with matching responses. The drop down menu next to each arrows also let you move to a specific request via history:

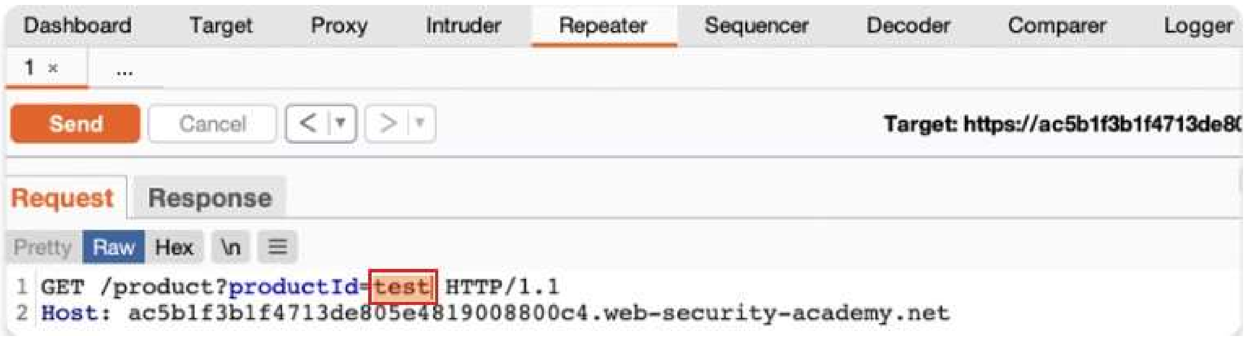


8. https://ac5b1f3b1f4713de8...ademy.net/product?productId=2
7. https://ac5b1f3b1f4713de8...ademy.net/product?productId=1
6. https://ac5b1f3b1f4713de8...emy.net/product?productId=245
5. https://ac5b1f3b1f4713de8...demy.net/product?productId=26
4. https://ac5b1f3b1f4713de8...demy.net/product?productId=25
3. https://ac5b1f3b1f4713de8...ademy.net/product?productId=2
2. https://ac5b1f3b1f4713de8...emy.net/product?productId=100
1. https://ac5b1f3b1f4713de8...ademy.net/product?productId=3

```
GET /product?produc
Host:
ac5b1f3b1f4713de805
ademy.net
Sec-Ch-Ua: " Not A;
"Chromium";v="92"
Sec-Ch-Ua-Mobile: ?
Upgrade-Insecure-Re
User-Agent: Mozilla
 x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/92.0.4515.131 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;
```

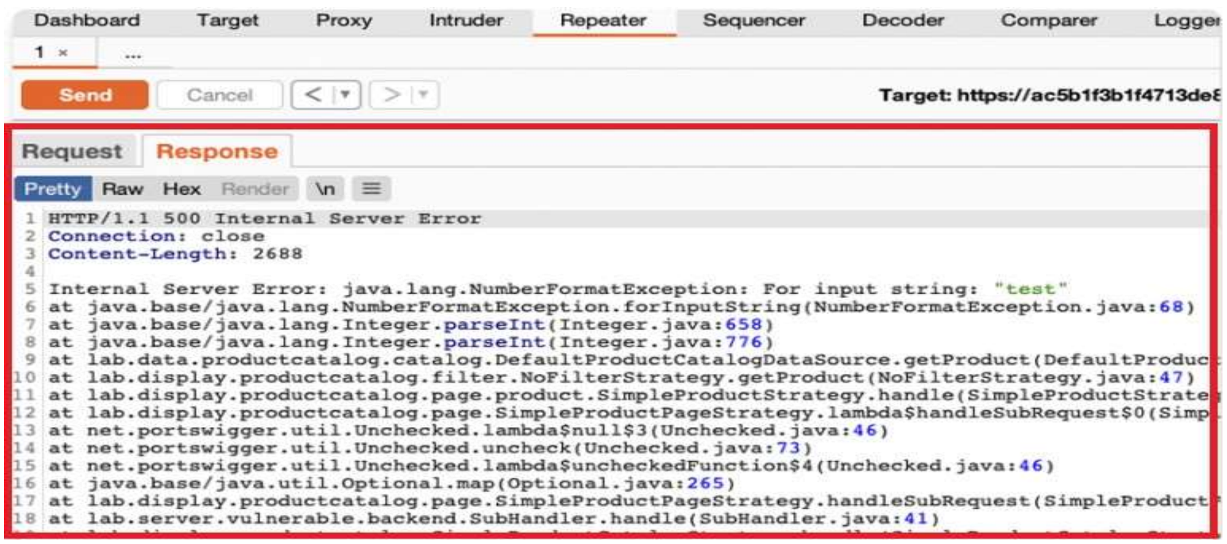
```
ml; charset=utf-8
rces/labheader/css
<link href=/resources/css/labsEcomm
<title>
  Information disclosure in error m
</title>
```

Notice in the responses, you can request different product pages by entering their ID, but you'll receive a Not Found response if the server cannot find that item with the ID number given. Let's try sending unexpected input. Notice how productID expects an int, try adding a string to what happens:



```
GET /product?productId=test HTTP/1.1
Host: ac5b1f3b1f4713de805e4819008800c4.web-security-academy.net
```

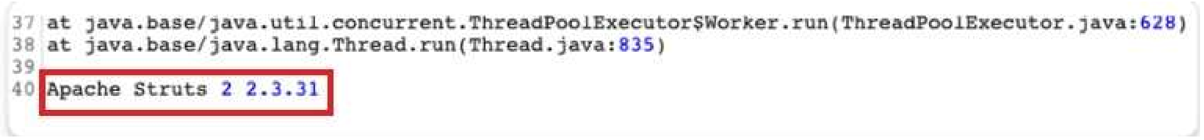
Notice an exception is caused, which an error response is issued:



```
HTTP/1.1 500 Internal Server Error
Connection: close
Content-Length: 2688

Internal Server Error: java.lang.NumberFormatException: For input string: "test"
at java.base/java.lang.NumberFormatException.forInputString(NumberFormatException.java:68)
at java.base/java.lang.Integer.parseInt(Integer.java:658)
at java.base/java.lang.Integer.parseInt(Integer.java:776)
at lab.data.productcatalog.catalog.DefaultProductCatalogDataSource.getProduct(DefaultProduc
at lab.display.productcatalog.filter.NoFilterStrategy.getProduct(NoFilterStrategy.java:47)
at lab.display.productcatalog.page.product.SimpleProductStrategy.handle(SimpleProductStrate
at lab.display.productcatalog.page.SimpleProductPageStrategy.lambda$handleSubRequest$0(Simp
at net.portswigger.util.Unchecked.lambda$null$3(Unchecked.java:46)
at net.portswigger.util.Unchecked.uncheck(Unchecked.java:73)
at net.portswigger.util.Unchecked.lambda$uncheckedFunction$4(Unchecked.java:46)
at java.base/java.util.Optional.map(Optional.java:265)
at lab.display.productcatalog.page.SimpleProductPageStrategy.handleSubRequest(SimpleProduct
at lab.server.vulnerable.backend.SubHandler.handle(SubHandler.java:41)
```

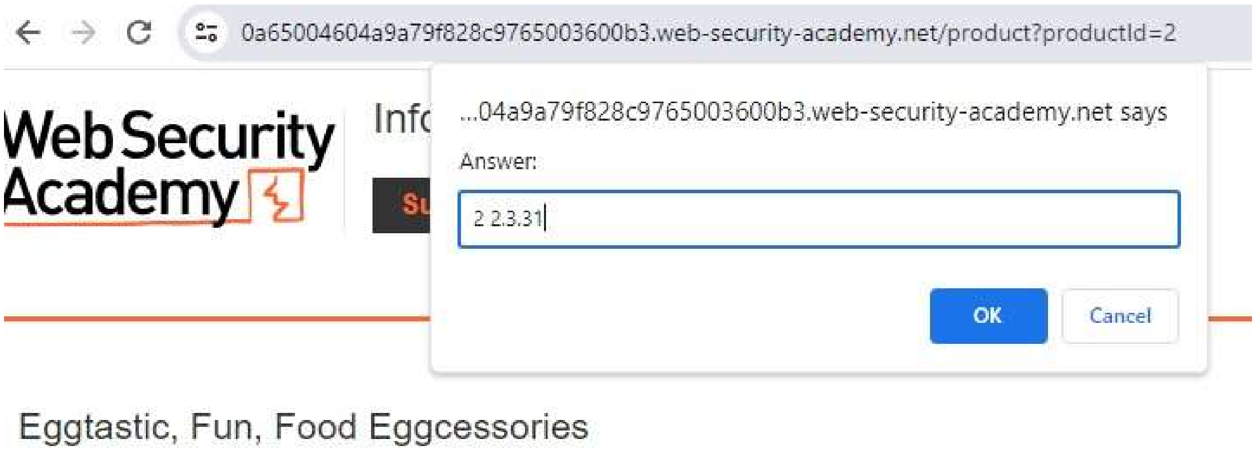
The exception also shows website is using Apache Struts framework (shows its version):



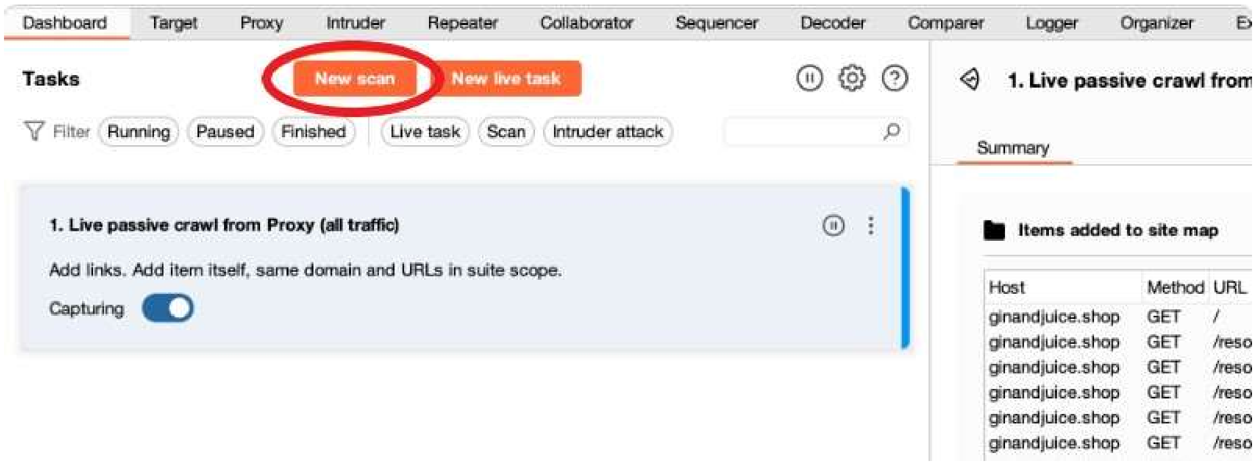
```
at java.base/java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:628)
at java.base/java.lang.Thread.run(Thread.java:835)

Apache Struts 2 2.3.31
```

This info can be exploited by attackers with the version number the attack can look up exploits to run against the website to gain information. Let's head back to the Burp's browser and click on the Submit solution button and enter the Apache Struts version number found in the response:


0a65004604a9a79f828c9765003600b3.web-security-academy.net/product?productId=2
Web Security Academy
...04a9a79f828c9765003600b3.web-security-academy.net says
Answer:
2 2.3.31
OK
Cancel
Eggtastic, Fun, Food Eggcessories

Now we are going to do vulnerbility scanning, you must be running Burp Suite Pro to do this. Start by opening the scan launcher, go to the dashboard tab then to new scan:



1. Live passive crawl from Proxy (all traffic)

Add links. Add item itself, same domain and URLs in suite scope.

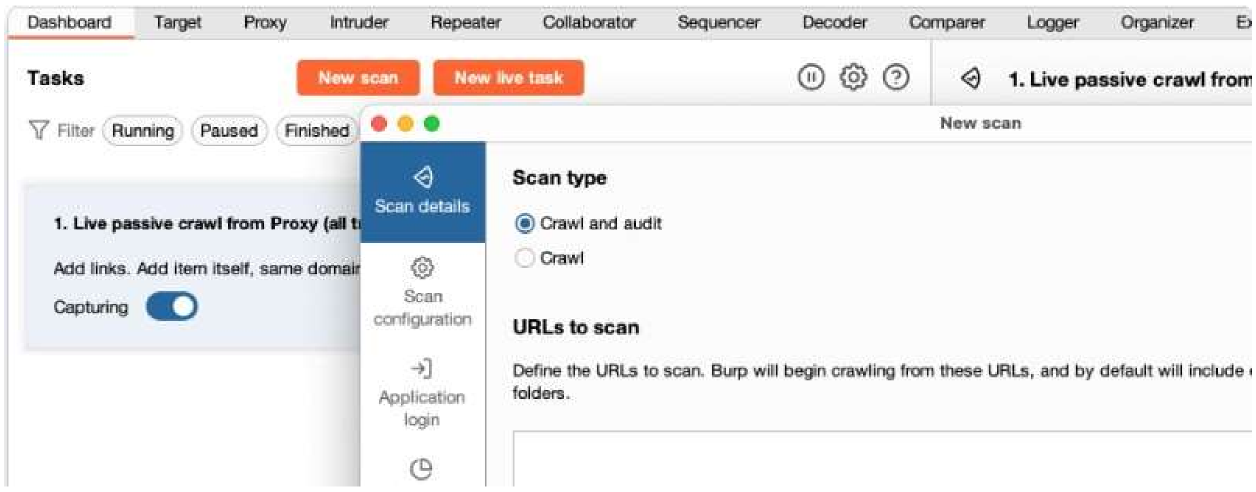
Capturing

1. Live passive crawl from

Items added to site map

Host	Method	URL
ginandjuice.shop	GET	/
ginandjuice.shop	GET	/reso
ginandjuice.shop	GET	/reso
ginandjuice.shop	GET	/reso
ginandjuice.shop	GET	/reso
ginandjuice.shop	GET	/reso

This is followed by the scan launch dialog box opening, this is where the configurations are made for the scans, enter the URL of the target site. In the “URLs to scan” paste in the url ginandjuice.shop



1. Live passive crawl from Proxy (all t

Add links. Add item itself, same domai

Capturing

Scan type

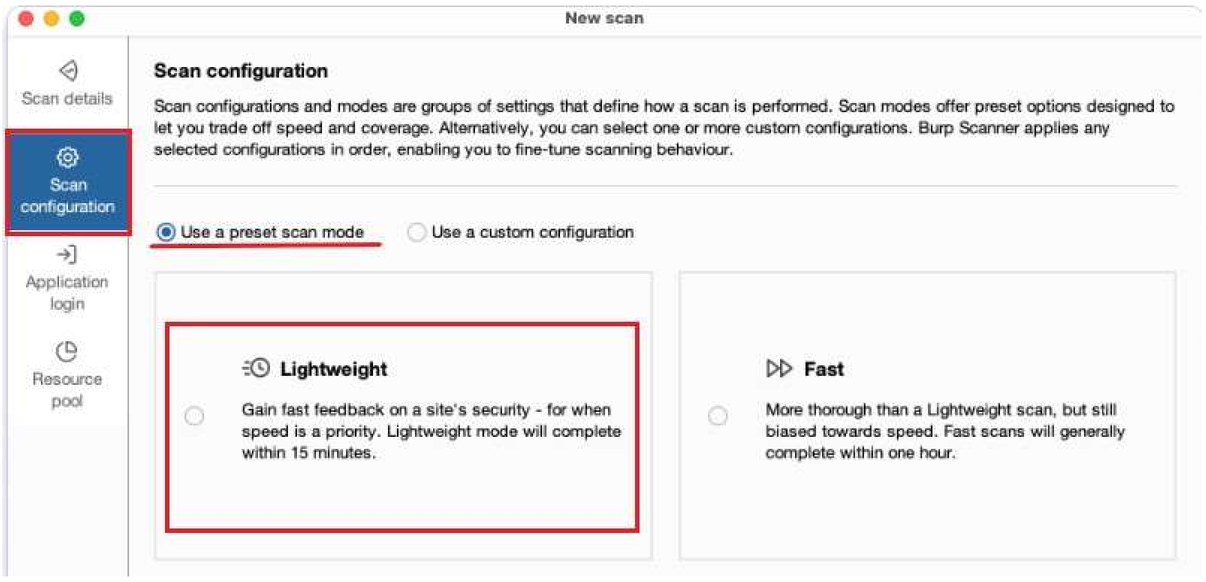
[✓ Crawl and audit]

Crawl

URLs to scan

Define the URLs to scan. Burp will begin crawling from these URLs, and by default will include
folders.

To configure the scan, click Scan Configuration, this is where you can specify what actions you want the Burp Scanner. Make sure that “Use a preset scan mode is selected and click “lightweight”, this scan is for getting a high-level overview of a target as quickly as possible (max time is 15 min):



Scan configuration

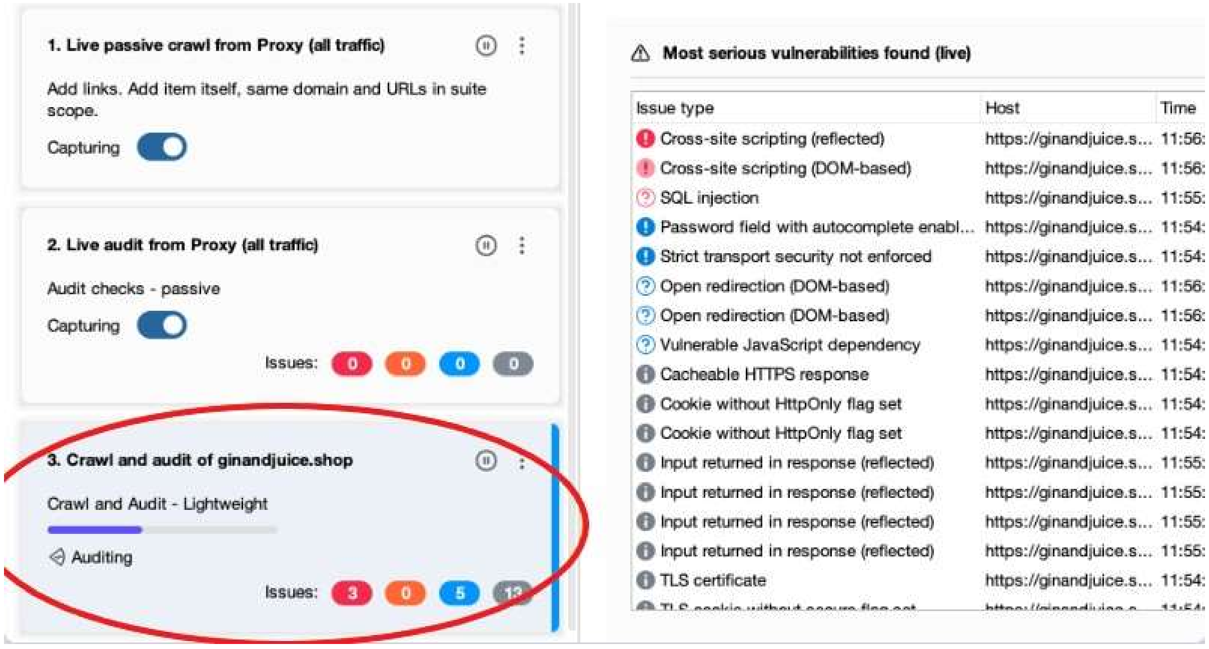
Scan configurations and modes are groups of settings that define how a scan is performed. Scan modes offer preset options designed to let you trade off speed and coverage. Alternatively, you can select one or more custom configurations. Burp Scanner applies any selected configurations in order, enabling you to fine-tune scanning behaviour.

[✓ Use a preset scan mode] Use a custom configuration

Lightweight
Gain fast feedback on a site's security - for when speed is a priority. Lightweight mode will complete within 15 minutes.

Fast
More thorough than a Lightweight scan, but still biased towards speed. Fast scans will generally complete within one hour.

Now launch the scan, click ok, scans will start. The task you added will be added to the Dashboard (if you want to see more info can click on the task):



1. Live passive crawl from Proxy (all traffic)
Add links. Add item itself, same domain and URLs in suite scope.
Capturing

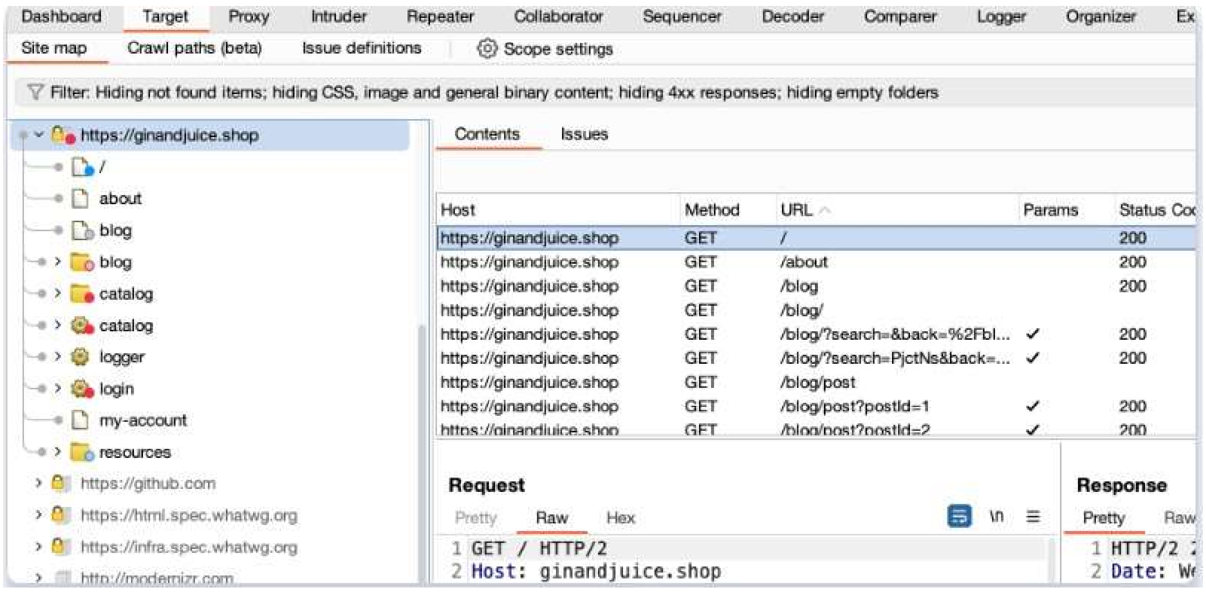
2. Live audit from Proxy (all traffic)
Audit checks - passive
Capturing
Issues: 0 0 0 0

3. Crawl and audit of ginandjuice.shop
Crawl and Audit - Lightweight
Auditing
Issues: 3 0 5 13

Most serious vulnerabilities found (live)

Issue type	Host	Time
Cross-site scripting (reflected)	https://ginandjuice.s...	11:56:
Cross-site scripting (DOM-based)	https://ginandjuice.s...	11:56:
SQL injection	https://ginandjuice.s...	11:55:
Password field with autocomplete enabl...	https://ginandjuice.s...	11:54:
Strict transport security not enforced	https://ginandjuice.s...	11:54:
Open redirection (DOM-based)	https://ginandjuice.s...	11:56:
Open redirection (DOM-based)	https://ginandjuice.s...	11:56:
Vulnerable JavaScript dependency	https://ginandjuice.s...	11:54:
Cacheable HTTPS response	https://ginandjuice.s...	11:54:
Cookie without HttpOnly flag set	https://ginandjuice.s...	11:54:
Cookie without HttpOnly flag set	https://ginandjuice.s...	11:54:
Input returned in response (reflected)	https://ginandjuice.s...	11:55:
Input returned in response (reflected)	https://ginandjuice.s...	11:55:
Input returned in response (reflected)	https://ginandjuice.s...	11:55:
Input returned in response (reflected)	https://ginandjuice.s...	11:55:
TLS certificate	https://ginandjuice.s...	11:54:

While the scans are running the crawl is in action. To see this go to the target then the site map tab. Expand the node for "ginandjuice.shop" there you can see all the contents the crawl has discovered to this point:



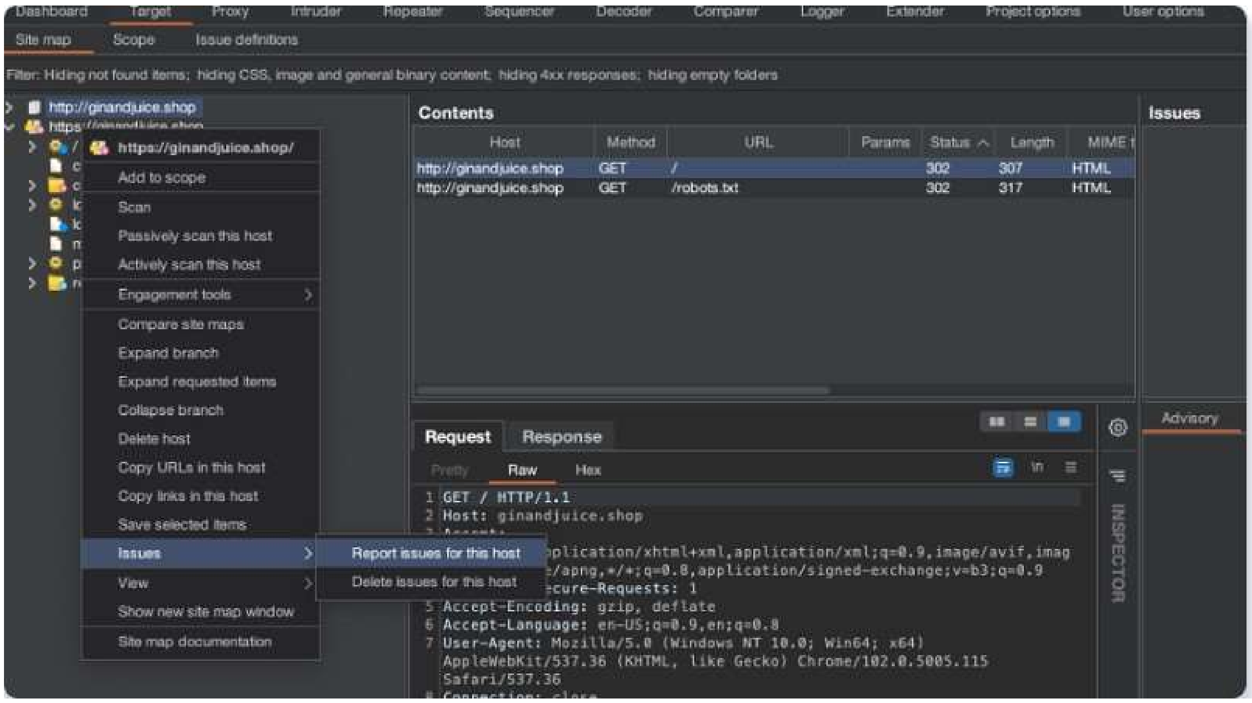
Filter: Hiding not found items; hiding CSS, image and general binary content; hiding 4xx responses; hiding empty folders

Host	Method	URL	Params	Status Co
https://ginandjuice.shop	GET	/		200
https://ginandjuice.shop	GET	/about		200
https://ginandjuice.shop	GET	/blog		200
https://ginandjuice.shop	GET	/blog/		
https://ginandjuice.shop	GET	/blog/?search=&back=%2Fbl...	✓	200
https://ginandjuice.shop	GET	/blog/?search=PjctNs&back=...	✓	200
https://ginandjuice.shop	GET	/blog/post		
https://ginandjuice.shop	GET	/blog/post?postId=1	✓	200
https://ginandjuice.shop	GET	/blog/post?postId=2	✓	200

```
GET / HTTP/2
Host: ginandjuice.shop
```

```
HTTP/2 2
Date: We
```

Moving to the identified issues, you can monitor status of scans (Issues → select scan from Tasks) , once crawl is finished the scanner will start to audit for vulnerabilities. If you select an issue, you can see an "Advisory" tab, which contains key information about the issue type, including a detailed description and some remediation advice. Next to this are several tabs that provide evidence that Burp Scanner found for this issue. This is typically a request and response but will differ depending on the issue type. Now to generate a report. Select relevant issue, go to "target" then on "site map" right-click on the entry for "https://ginandjuice.shop", click issues then report issues for this host:

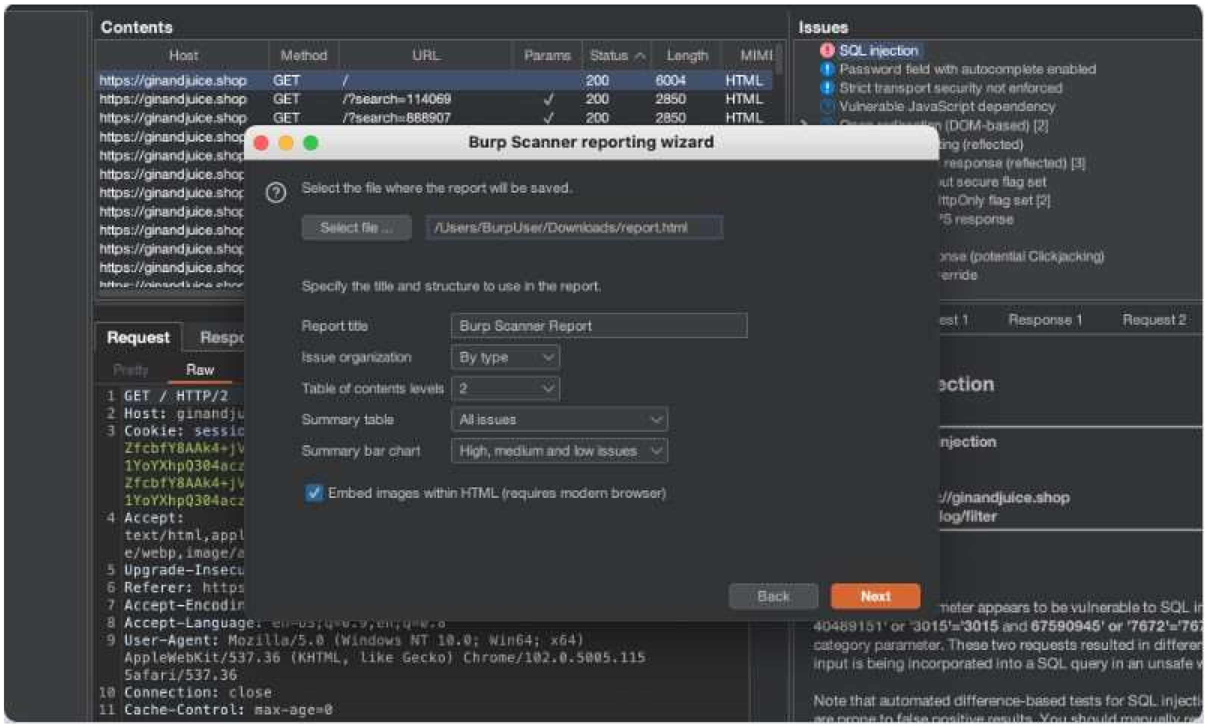


Filter: Hiding not found items; hiding CSS, image and general binary content; hiding 4xx responses; hiding empty folders

Host	Method	URL	Params	Status	Length	MIME t
http://ginandjuice.shop	GET	/		302	307	HTML
http://ginandjuice.shop	GET	/robots.txt		302	317	HTML

```
GET / HTTP/1.1
Host: ginandjuice.shop
Accept:
...plication/xhtml+xml,application/xml;q=0.9,image/avif,imag
.../apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
...cure-Requests: 1
Accept-Encoding: gzip, deflate
Accept-Language: en-US;q=0.9,en;q=0.8
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/102.0.5005.115
Safari/537.36
Connection: close
```

To configure the report options, once it is selected a “Burp Scanner reporting wizard” pops up, click next (defaults until you’re prompted to enter a filename and location for the report):



Burp Scanner reporting wizard

Select the file where the report will be saved.

Select file ... /Users/BurpUser/Downloads/report.html

Specify the title and structure to use in the report.

Report title	Burp Scanner Report
Issue organization	By type
Table of contents levels	2
Summary table	All issues
Summary bar chart	High, medium and low issues

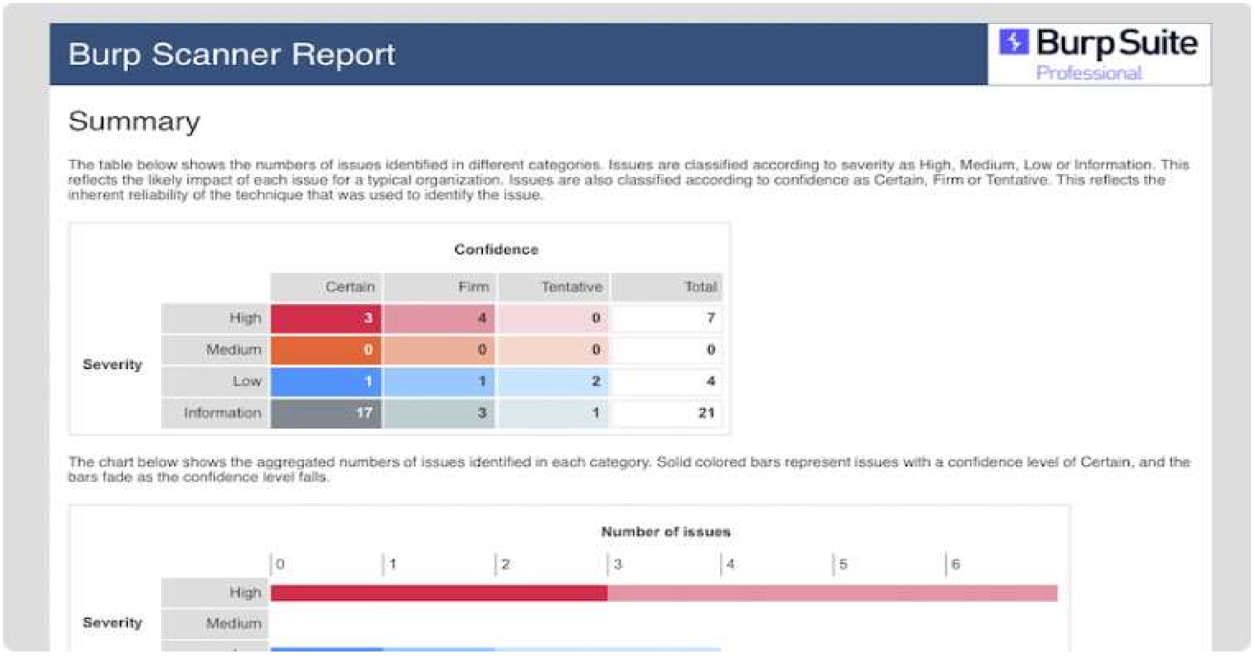
✓ Embed images within HTML (requires modern browser)

Back
Next
Contents
Issues
SQL injection
Password field with autocomplete enabled
Strict transport security not enforced
Vulnerable JavaScript dependency
Request
Raw

Host	Method	URL	Params	Status	Length	MIME
https://ginandjuice.shop	GET	/		200	6004	HTML
https://ginandjuice.shop	GET	/?search=114069	✓	200	2850	HTML
https://ginandjuice.shop	GET	/?search=888907	✓	200	2850	HTML

```
GET / HTTP/2
Accept-Language: en-US;q=0.9,en;q=0.8
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/102.0.5005.115
Safari/537.36
Connection: close
Cache-Control: max-age=0
```

Choose where you want to save the file and then click save and then next. Then view and share report, an example is shown here:



Burp Scanner Report

Summary

The table below shows the numbers of issues identified in different categories. Issues are classified according to severity as High, Medium, Low or Information. This reflects the likely impact of each issue for a typical organization. Issues are also classified according to confidence as Certain, Firm or Tentative. This reflects the inherent reliability of the technique that was used to identify the issue.

		Confidence			
		Certain	Firm	Tentative	Total
Severity	High	3	4	0	7
	Medium	0	0	0	0
	Low	1	1	2	4
	Information	17	3	1	21

The chart below shows the aggregated numbers of issues identified in each category. Solid colored bars represent issues with a confidence level of Certain, and the bars fade as the confidence level falls.

Mitigations

1. **SQL Injection:**
   - Use parameterized queries or prepared statements to ensure input validation.
   - Employ stored procedures to limit direct SQL code execution.
   - Regularly update and patch database management systems.
2. **Cross-Site Scripting (XSS):**
   - Validate and sanitize user inputs, escaping special characters.
   - Implement Content Security Policy (CSP) headers to restrict script sources.
   - Encode output data before rendering it in the browser.
3. **Cross-Site Request Forgery (CSRF):**
   - Use anti-CSRF tokens to validate the origin of requests.
   - Ensure that sensitive actions (e.g., changing passwords) require additional authentication.
   - Implement SameSite cookie attributes to control cookie behavior.
4. **Security Misconfigurations:**
   - Regularly audit and review server configurations.
   - Disable unnecessary services and features.
   - Follow the principle of least privilege for user permissions.
5. **Session Management Issues:**
   - Use secure, random session identifiers.
   - Implement session timeout mechanisms.
   - Regularly rotate session tokens and credentials.
6. **Sensitive Data Exposure:**
   - Encrypt sensitive data, both in transit (using HTTPS) and at rest.
   - Avoid storing sensitive information unless absolutely necessary.
   - Use strong, industry-standard encryption algorithms.

7. **Insecure Direct Object References (IDOR):**
    - Implement proper access controls and authorization mechanisms.
    - Use indirect references, such as tokens or unique identifiers, instead of relying on sequential or easily guessable values.
    - Regularly audit and review access controls.
8. **Unvalidated Redirects and Forwards:**
    - Avoid using user input to construct URLs for redirects.
    - Implement a whitelist of allowed redirect destinations.
    - Provide users with a confirmation step before performing redirects.
9. **File Upload Vulnerabilities:**
    - Implement proper file type verification and validation.
    - Store uploaded files in a secure location with restricted access.
    - Regularly scan uploaded files for malicious content.
10. **Security Headers:**
    - Implement security headers, such as Content Security Policy (CSP), StrictTransport-Security (HSTS), and X-Content-Type-Options.
    - Regularly review and update security header configurations.

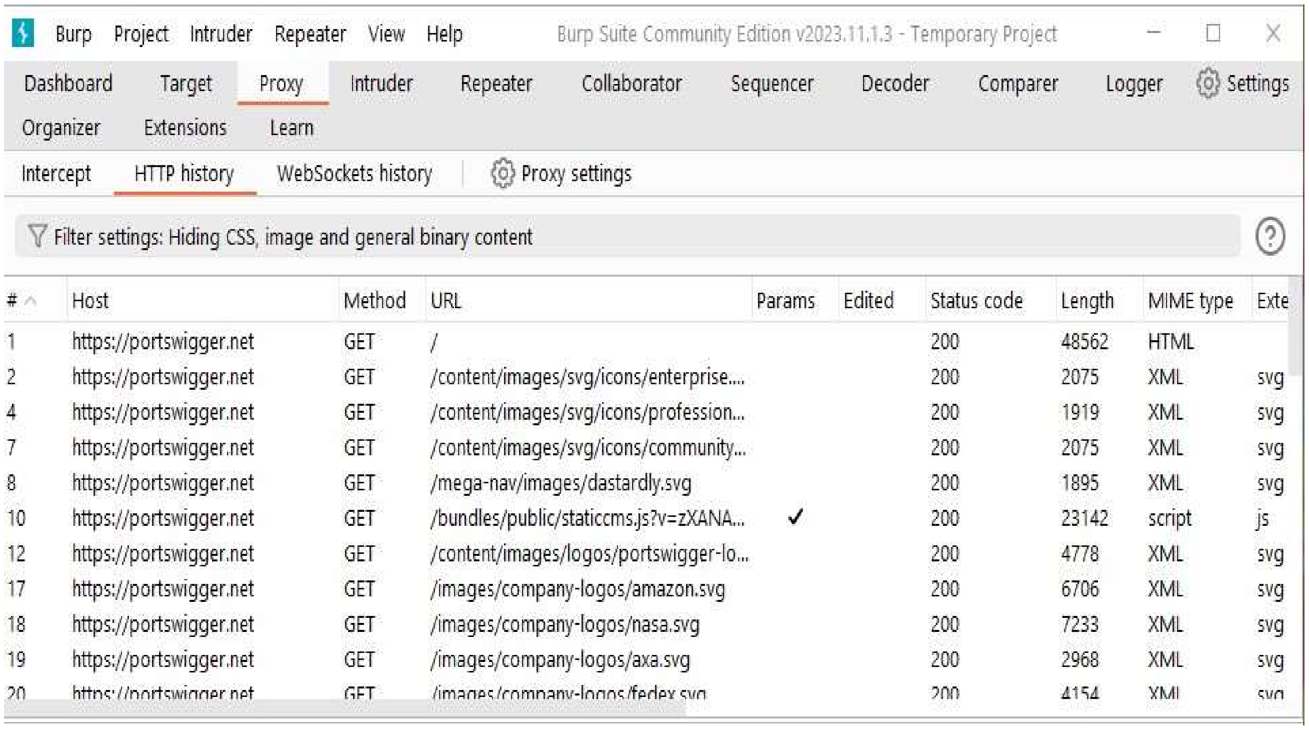
It's important to note that the remediation process may vary based on the specific technologies and frameworks used in the web application. Additionally, organizations should follow best practices, stay informed about security updates, and conduct regular security assessments to maintain a robust defense against evolving threats.

Conclusion

In this project, multiple findings and vulnerabilities we prevalent post test using Burp Suite. Attacks like Cross-Site Scripting, Sensitive Data Exposure, and Unvalidated Redirects and Forwards were all shown here. An attacker could use vulnerabilities found in this lab and exploit them for personal gain which could ultimately degrade the posture of a website and protection of assets for a company. Using the interceptor I was able to gain request sent, then I was able to modify the request to change information on that website, then I was able to use repeater to change the productID type which then gave me an error and I was able to exploit the website. And finally I was able to run a scan on another website using Burp Suite Pro, where I was able to find issues and remediation to them and generate a report on that scan.

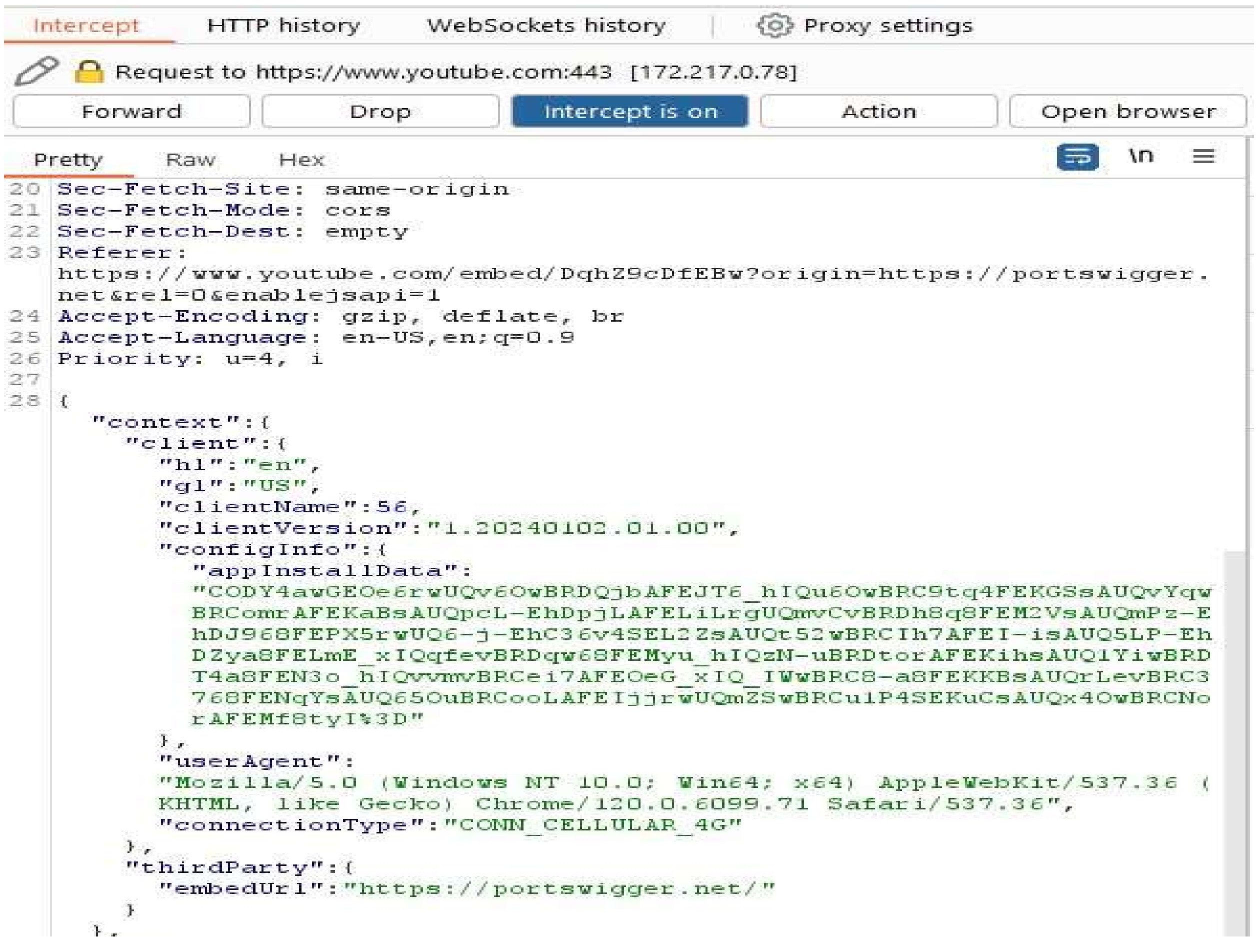
Appendix

A.


Burp Project Intruder Repeater View Help
Burp Suite Community Edition v2023.11.1.3 - Temporary Project
Dashboard Target Proxy Intruder Repeater Collaborator Sequencer Decoder Comparer Logger Settings
Organizer Extensions Learn
Intercept HTTP history WebSockets history Proxy settings
Filter settings: Hiding CSS, image and general binary content

#	Host	Method	URL	Params	Edited	Status code	Length	MIME type	Exte
1	https://portswigger.net	GET	/			200	48562	HTML	
2	https://portswigger.net	GET	/content/images/svg/icons/enterprise....			200	2075	XML	svg
4	https://portswigger.net	GET	/content/images/svg/icons/profession...			200	1919	XML	svg
7	https://portswigger.net	GET	/content/images/svg/icons/community...			200	2075	XML	svg
8	https://portswigger.net	GET	/mega-nav/images/dastardly.svg			200	1895	XML	svg
10	https://portswigger.net	GET	/bundles/public/staticcms.js?v=zXANA...	✓		200	23142	script	js
12	https://portswigger.net	GET	/content/images/logos/portswigger-lo...			200	4778	XML	svg
17	https://portswigger.net	GET	/images/company-logos/amazon.svg			200	6706	XML	svg
18	https://portswigger.net	GET	/images/company-logos/nasa.svg			200	7233	XML	svg
19	https://portswigger.net	GET	/images/company-logos/axa.svg			200	2968	XML	svg
20	https://portswigger.net	GET	/images/company-logos/fedex.svg			200	4154	XML	svg

B.

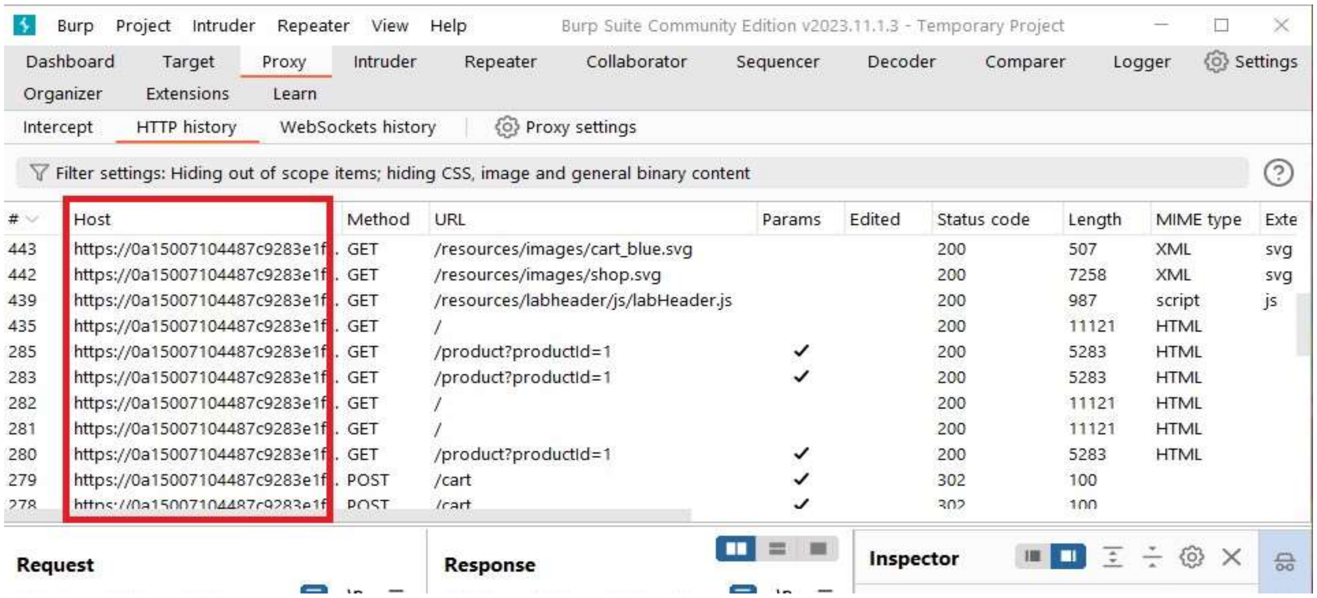


Request to https://www.youtube.com:443 [172.217.0.78]

```
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: cors
Sec-Fetch-Dest: empty
Referer:
https://www.youtube.com/embed/DqhZ9cDfEBw?origin=https://portswigger.
net&rel=0&enablejsapi=1
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Priority: u=4, i

{
  "context":{
    "client":{
      "hl":"en",
      "gl":"US",
      "clientName":56,
      "clientVersion":"1.20240102.01.00",
      "configInfo":{
        "appInstallData":
        "CODY4awGEOe6rwUQv6OwBRDQjbAFEJT6_hIQu6OwBRC9tq4FEKGSsAUQvYqw
        BRComrAFEKaBsAUQpcL-EhDpjLAFELiLrgUQmvCvBRDh8q8FEM2VsAUQmPz-E
        hDJ968FEPX5rwUQ6-j-EhC36v4SEL2ZsAUQt52wBRCIh7AFEI-isAUQ5LP-Eh
        DZya8FELmE_xIQqfevBRDqw68FEMyu_hIQzN-uBRDtorAFEKihsAUQ1YiwBRD
        T4a8FEN3o_hIQvvmvBRCei7AFEOeG_xIQ_IWwBRC8-a8FEKKBsAUQrLevBRC3
        768FENqYsAUQ65OuBRCooLAFEIjjrwUQmZSwBRCu1P4SEKuCsAUQx4OwBRCNo
        rAFEMf8tyI%3D"
      },
      "userAgent":
      "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (
      KHTML, like Gecko) Chrome/120.0.6099.71 Safari/537.36",
      "connectionType":"CONN_CELLULAR_4G"
    },
    "thirdParty":{
      "embedUrl":"https://portswigger.net/"
    }
  },
```

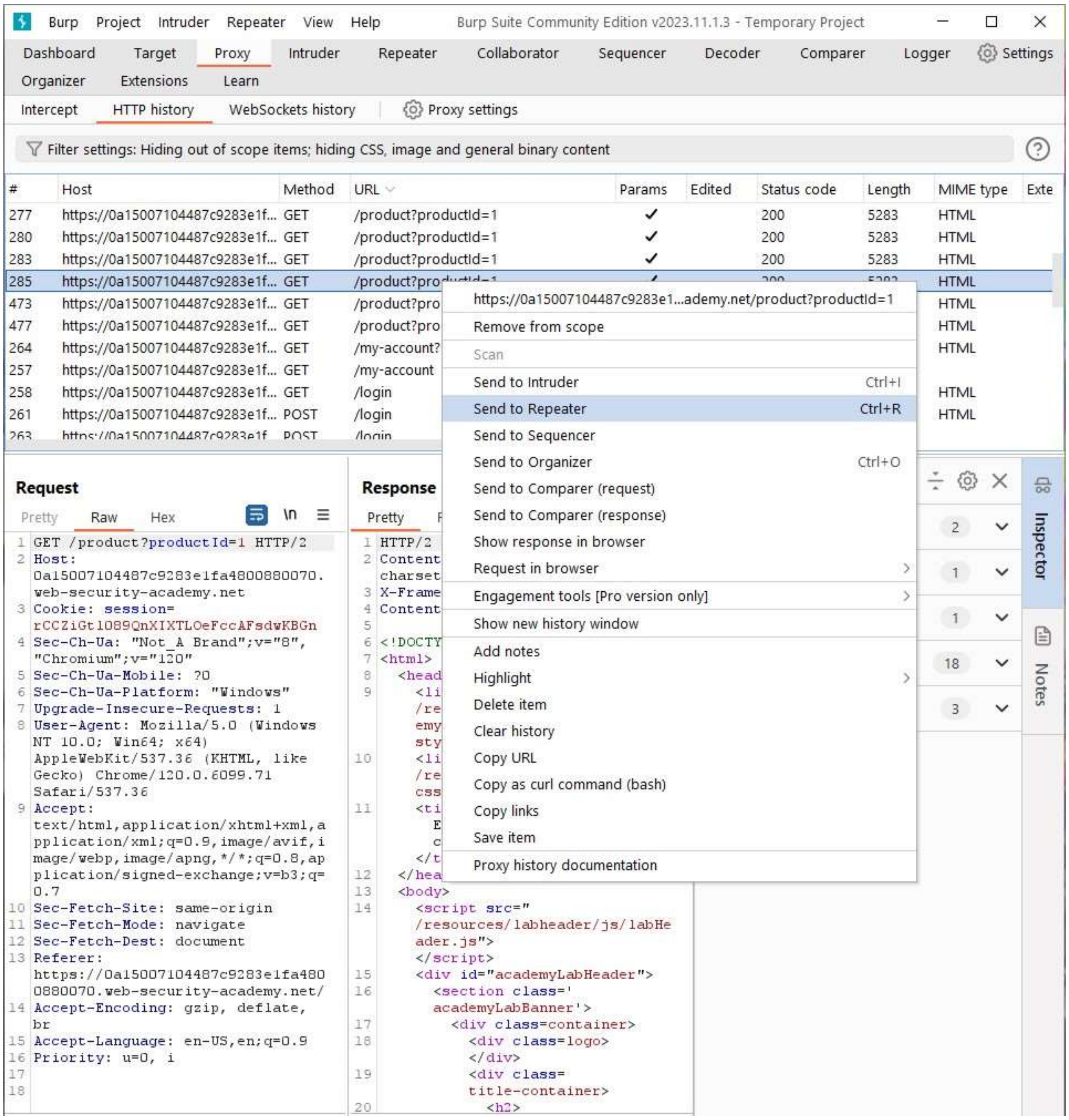
C.



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

#	Host	Method	URL	Params	Edited	Status code	Length	MIME type	Exte
443	https://0a15007104487c9283e1f...	GET	/resources/images/cart_blue.svg			200	507	XML	svg
442	https://0a15007104487c9283e1f...	GET	/resources/images/shop.svg			200	7258	XML	svg
439	https://0a15007104487c9283e1f...	GET	/resources/labheader/js/labHeader.js			200	987	script	js
435	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
285	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
283	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
282	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
281	https://0a15007104487c9283e1f...	GET	/			200	11121	HTML	
280	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
279	https://0a15007104487c9283e1f...	POST	/cart	✓		302	100		
278	https://0a15007104487c9283e1f...	POST	/cart	✓		302	100		

D.



Burp Project Intruder Repeater View Help
Burp Suite Community Edition v2023.11.1.3 - Temporary Project
Dashboard Target Proxy Intruder Repeater Collaborator Sequencer Decoder Comparer Logger Settings
Organizer Extensions Learn
Intercept HTTP history WebSockets history Proxy settings
Filter settings: Hiding out of scope items; hiding CSS, image and general binary content

#	Host	Method	URL	Params	Edited	Status code	Length	MIME type	Exte
277	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
280	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
283	https://0a15007104487c9283e1f...	GET	/product?productId=1	✓		200	5283	HTML	
285	https://0a15007104487c9283e1f...	GET	/product?pro					HTML	
473	https://0a15007104487c9283e1f...	GET	/product?pro					HTML	
477	https://0a15007104487c9283e1f...	GET	/product?pro					HTML	
264	https://0a15007104487c9283e1f...	GET	/my-account?					HTML	
257	https://0a15007104487c9283e1f...	GET	/my-account						
258	https://0a15007104487c9283e1f...	GET	/login					HTML	
261	https://0a15007104487c9283e1f...	POST	/login					HTML	
263	https://0a15007104487c9283e1f	POST	/login						

```
GET /product?productId=1 HTTP/2
Host:
0a15007104487c9283e1fa4800880070.
web-security-academy.net
Cookie: session=
rCCZiGtl089QnXIXTLOeFccAFsdwKBGn
Sec-Ch-Ua: "Not_A Brand";v="8",
"Chromium";v="120"
Sec-Ch-Ua-Mobile: ?0
Sec-Ch-Ua-Platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows
NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like
Gecko) Chrome/120.0.6099.71
Safari/537.36
Accept:
text/html,application/xhtml+xml,a
pplication/xml;q=0.9,image/avif,i
mage/webp,image/apng,*/*;q=0.8,ap
plication/signed-exchange;v=b3;q=
0.7
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: navigate
Sec-Fetch-Dest: document
Referer:
https://0a15007104487c9283e1fa480
0880070.web-security-academy.net/
Accept-Encoding: gzip, deflate,
br
Accept-Language: en-US,en;q=0.9
Priority: u=0, i
```

```
HTTP/2
Content
charset
X-Frame
Content

<!DOCTY
<html>
  <head
    <li
    /re
    emy
    sty
    <li
    /re
    css
    <ti
      E
      c
    </t
  </hea
  <body>
    <script src="
    /resources/labheader/js/labHe
    ader.js">
    </script>
    <div id="academyLabHeader">
      <section class='
      academyLabBanner'>
        <div class=container>
          <div class=logo>
          </div>
          <div class=
          title-container>
            <h2>
```