IJEI FUMNANYA CHUKWUMA DIVINE
CYBERSECURITY ASSIGNMENT 6
TESTING A VULNERABLE WEB APPLICATION

Objective:

Perform basic penetration testing on a deliberately insecure web application.

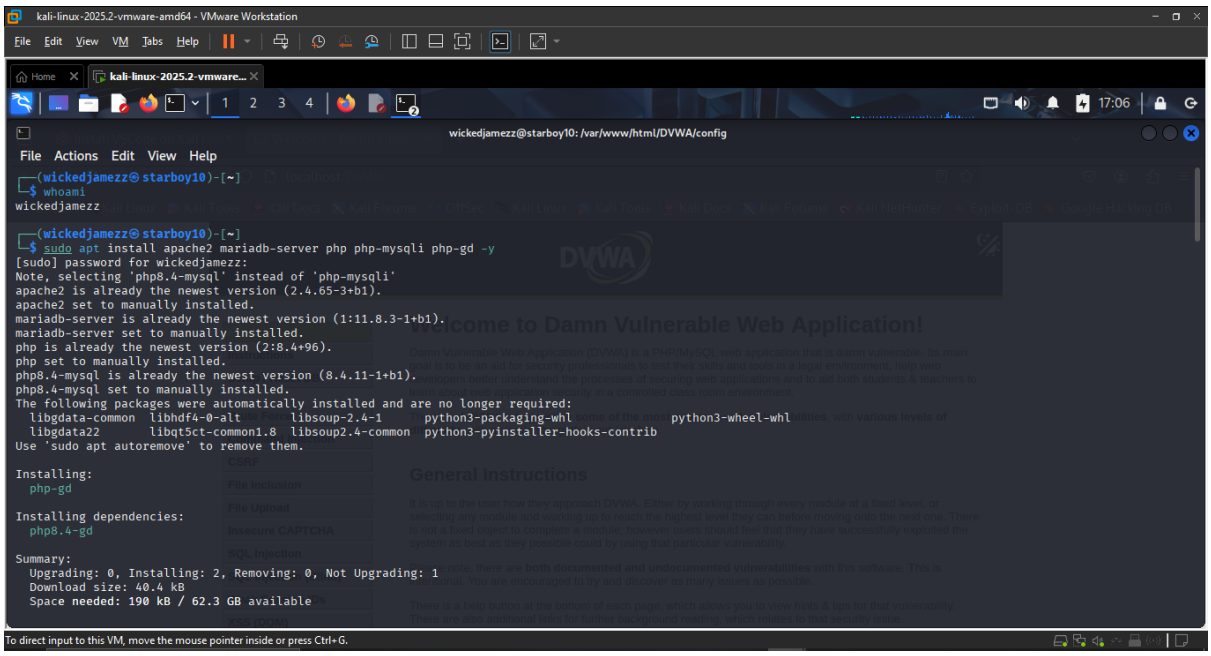
Tools:

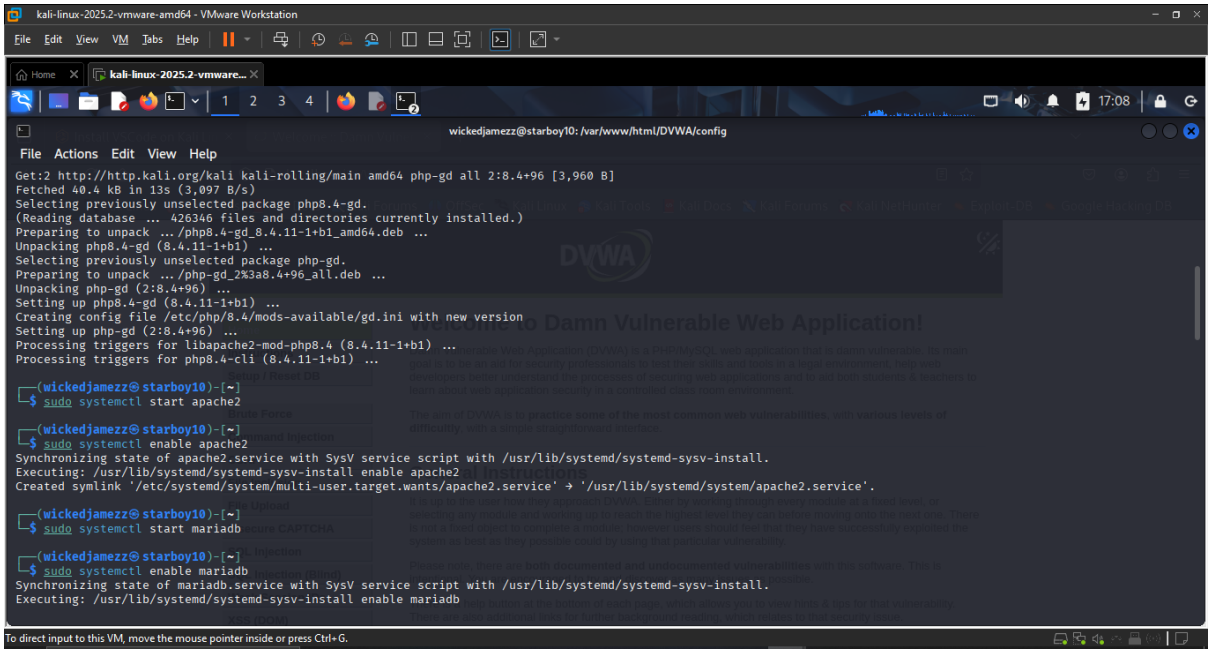
Since we are undergoing our training using Kali Linux, I would be using LAMP (Linux, Apache, MySQL, PHP) instead of XAMPP which are the tools for use on windows OS.

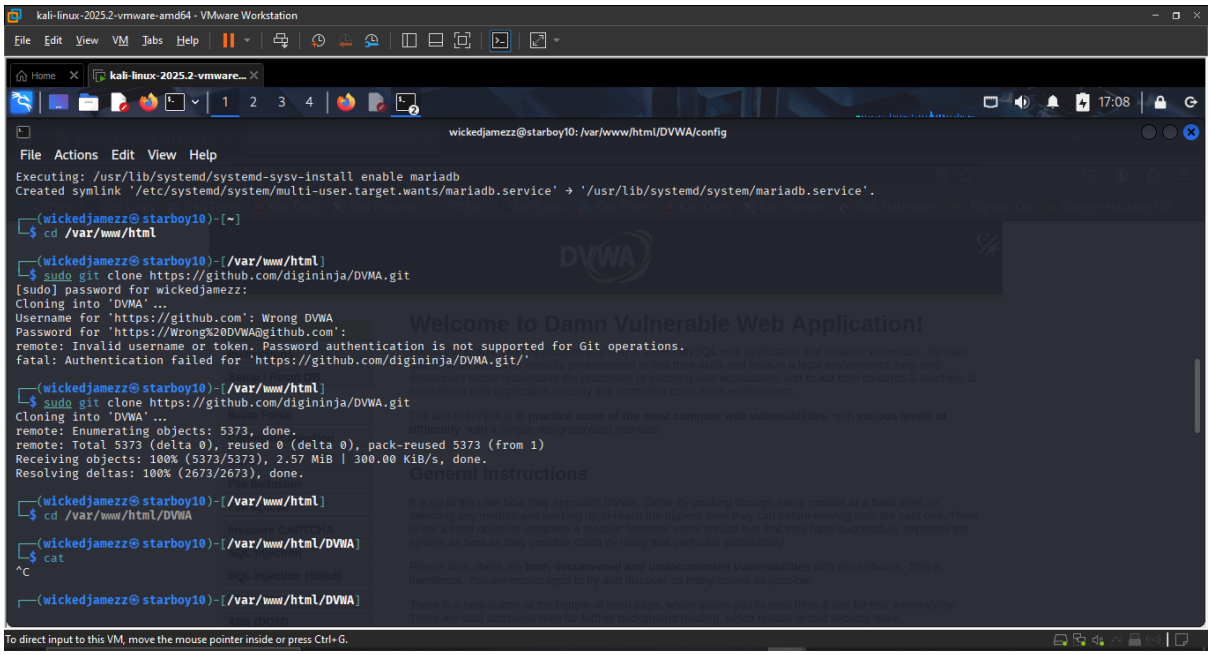
I have been able to download, install and setup my DVWA (Damn Vulnerable Web App) which would be the "Lab" where we would be doing our test exploitation of the 3 web app vulnerabilities given in the assignment questions which are:

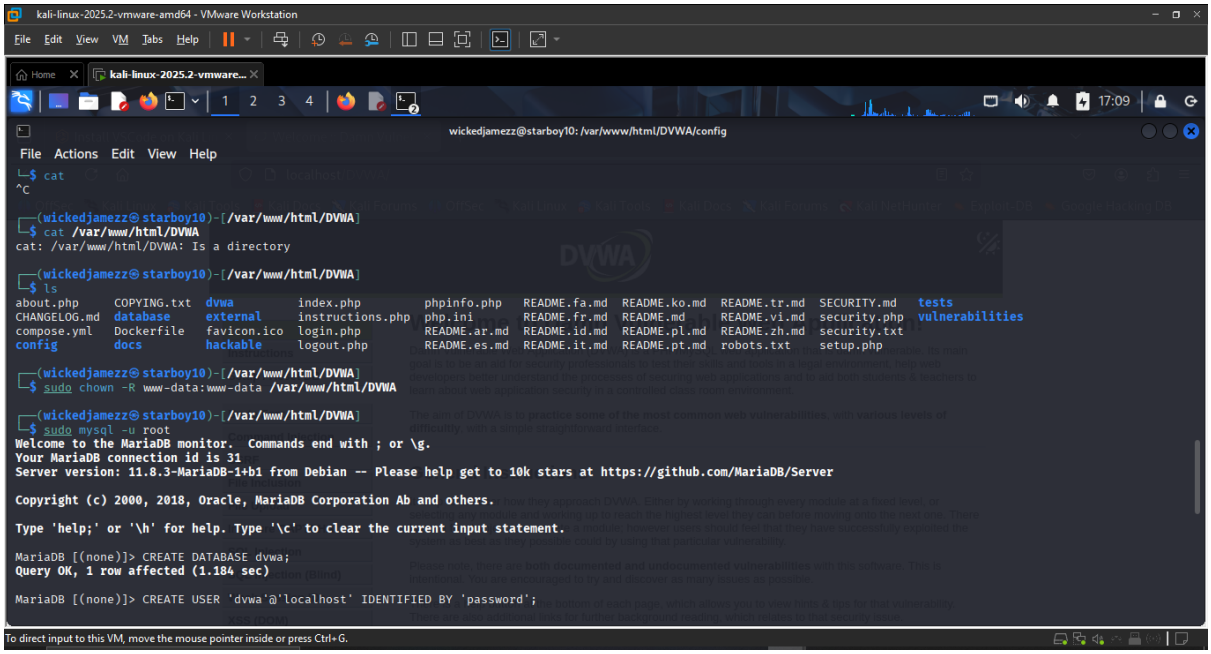
1. SQLi (SQL injection)
2. XSS (Cross Site Scripting) – I decided to do two versions of this vulnerability.
3. CSRF (Cross site request forgery)

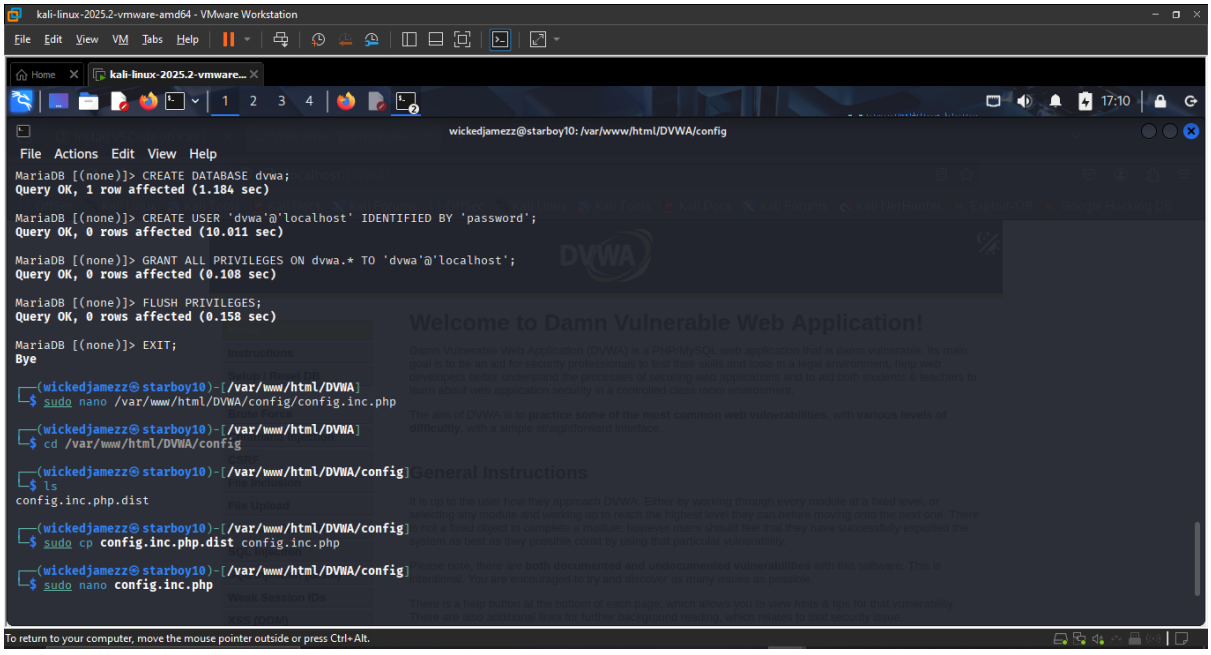
These are screenshots taken during the installation of the DVWA to my Kali UI:

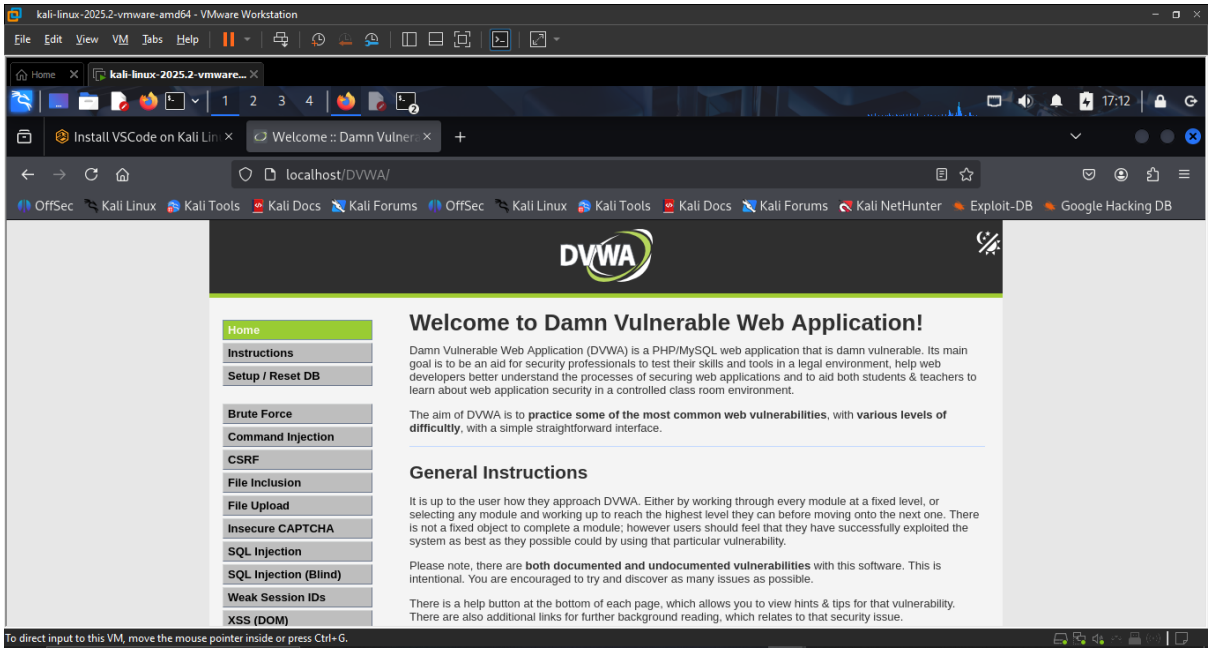



kali-linux-2025.2-vmware-amd64 - VMware Workstation
File Edit View VM Tabs Help
Home
kali-linux-2025.2-vmware...
17:08
wickedjamezz@starboy10: /var/www/html/DVWA/config
File Actions Edit View Help
Get:2 http://http.kali.org/kali kali-rolling/main amd64 php-gd all 2:8.4+96 [3,960 B]
Fetched 40.4 kB in 13s (3,097 B/s)
Selecting previously unselected package php8.4-gd.
(Reading database ... 426346 files and directories currently installed.)
Preparing to unpack .../php8.4-gd_8.4.11-1+b1_amd64.deb ...
Unpacking php8.4-gd (8.4.11-1+b1) ...
Selecting previously unselected package php-gd.
Preparing to unpack .../php-gd_2%3a8.4+96_all.deb ...
Unpacking php-gd (2:8.4+96) ...
Setting up php8.4-gd (8.4.11-1+b1) ...
Creating config file /etc/php/8.4/mods-available/gd.ini with new version
Setting up php-gd (2:8.4+96) ...
Processing triggers for libapache2-mod-php8.4 (8.4.11-1+b1) ...
Processing triggers for php8.4-cli (8.4.11-1+b1) ...
(wickedjamezz㉿starboy10)-[~]
$ sudo systemctl start apache2
(wickedjamezz㉿starboy10)-[~]
$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
Created symlink '/etc/systemd/system/multi-user.target.wants/apache2.service' → '/usr/lib/systemd/system/apache2.service'.
(wickedjamezz㉿starboy10)-[~]
$ sudo systemctl start mariadb
(wickedjamezz㉿starboy10)-[~]
$ sudo systemctl enable mariadb
Synchronizing state of mariadb.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable mariadb
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.


kali-linux-2025.2-vmware-amd64 - VMware Workstation
File Edit View VM Tabs Help
Home
kali-linux-2025.2-vmware...
17:08
wickedjamezz@starboy10: /var/www/html/DVWA/config
File Actions Edit View Help
Executing: /usr/lib/systemd/systemd-sysv-install enable mariadb
Created symlink '/etc/systemd/system/multi-user.target.wants/mariadb.service' → '/usr/lib/systemd/system/mariadb.service'.
(wickedjamezz㉿starboy10)-[~]
$ cd /var/www/html
(wickedjamezz㉿starboy10)-[/var/www/html]
$ sudo git clone https://github.com/digininja/DVMA.git
[sudo] password for wickedjamezz:
Cloning into 'DVMA'...
Username for 'https://github.com': Wrong DVWA
Password for 'https://Wrong%20DVWA@github.com':
remote: Invalid username or token. Password authentication is not supported for Git operations.
fatal: Authentication failed for 'https://github.com/digininja/DVMA.git/'
(wickedjamezz㉿starboy10)-[/var/www/html]
$ sudo git clone https://github.com/digininja/DVWA.git
Cloning into 'DVWA'...
remote: Enumerating objects: 5373, done.
remote: Total 5373 (delta 0), reused 0 (delta 0), pack-reused 5373 (from 1)
Receiving objects: 100% (5373/5373), 2.57 MiB | 300.00 KiB/s, done.
Resolving deltas: 100% (2673/2673), done.
(wickedjamezz㉿starboy10)-[/var/www/html]
$ cd /var/www/html/DVWA
(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
$ cat
^C
(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.


kali-linux-2025.2-vmware-amd64 - VMware Workstation
File Edit View VM Tabs Help
Home
kali-linux-2025.2-vmware...
17:09
wickedjamezz@starboy10: /var/www/html/DVWA/config
File Actions Edit View Help
└─$ cat
^C
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ cat /var/www/html/DVWA
cat: /var/www/html/DVWA: Is a directory
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ ls
about.php COPYING.txt dvwa index.php phpinfo.php README.fa.md README.ko.md README.tr.md SECURITY.md tests
CHANGELOG.md database external instructions.php php.ini README.fr.md README.md README.vi.md security.php vulnerabilities
compose.yml Dockerfile favicon.ico login.php README.ar.md README.id.md README.pl.md README.zh.md security.txt
config docs hackable logout.php README.es.md README.it.md README.pt.md robots.txt setup.php
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ sudo chown -R www-data:www-data /var/www/html/DVWA
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ sudo mysql -u root
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 31
Server version: 11.8.3-MariaDB-1+b1 from Debian -- Please help get to 10k stars at https://github.com/MariaDB/Server
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]> CREATE DATABASE dvwa;
Query OK, 1 row affected (1.184 sec)
MariaDB [(none)]> CREATE USER 'dvwa'@'localhost' IDENTIFIED BY 'password';
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.


kali-linux-2025.2-vmware-amd64 - VMware Workstation
File Edit View VM Tabs Help
Home
kali-linux-2025.2-vmware...
17:10
wickedjamezz@starboy10: /var/www/html/DVWA/config
File Actions Edit View Help
MariaDB [(none)]> CREATE DATABASE dvwa;
Query OK, 1 row affected (1.184 sec)
MariaDB [(none)]> CREATE USER 'dvwa'@'localhost' IDENTIFIED BY 'password';
Query OK, 0 rows affected (10.011 sec)
MariaDB [(none)]> GRANT ALL PRIVILEGES ON dvwa.* TO 'dvwa'@'localhost';
Query OK, 0 rows affected (0.108 sec)
MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.158 sec)
MariaDB [(none)]> EXIT;
Bye
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ sudo nano /var/www/html/DVWA/config/config.inc.php
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA]
└─$ cd /var/www/html/DVWA/config
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA/config]
└─$ ls
config.inc.php.dist
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA/config]
└─$ sudo cp config.inc.php.dist config.inc.php
┌──(wickedjamezz㉿starboy10)-[/var/www/html/DVWA/config]
└─$ sudo nano config.inc.php
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.


kali-linux-2025.2-vmware-amd64 - VMware Workstation
File Edit View VM Tabs Help
Home
kali-linux-2025.2-vmware...
1 2 3 4
17:12
Install VSCode on Kali Lin
Welcome :: Damn Vulner
localhost/DVWA/
OffSec Kali Linux Kali Tools Kali Docs Kali Forums OffSec Kali Linux Kali Tools Kali Docs Kali Forums Kali NetHunter Exploit-DB Google Hacking DB
DVWA
Home
Instructions
Setup / Reset DB
Brute Force
Command Injection
CSRF
File Inclusion
File Upload
Insecure CAPTCHA
SQL Injection
SQL Injection (Blind)
Weak Session IDs
XSS (DOM)
Welcome to Damn Vulnerable Web Application!
Damn Vulnerable Web Application (DVWA) is a PHP/MySQL web application that is damn vulnerable. Its main goal is to be an aid for security professionals to test their skills and tools in a legal environment, help web developers better understand the processes of securing web applications and to aid both students & teachers to learn about web application security in a controlled class room environment.
The aim of DVWA is to practice some of the most common web vulnerabilities, with various levels of difficultly, with a simple straightforward interface.
General Instructions
It is up to the user how they approach DVWA. Either by working through every module at a fixed level, or selecting any module and working up to reach the highest level they can before moving onto the next one. There is not a fixed object to complete a module; however users should feel that they have successfully exploited the system as best as they possible could by using that particular vulnerability.
Please note, there are both documented and undocumented vulnerabilities with this software. This is intentional. You are encouraged to try and discover as many issues as possible.
There is a help button at the bottom of each page, which allows you to view hints & tips for that vulnerability. There are also additional links for further background reading, which relates to that security issue.
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

- **SQLi ➔**

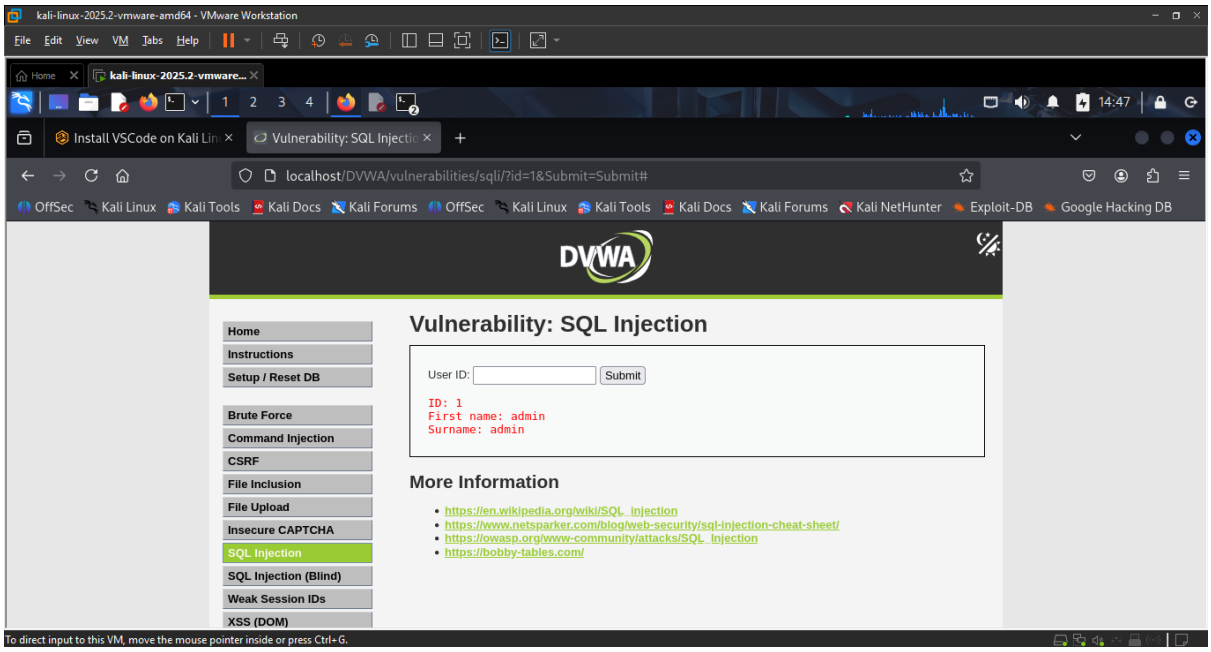
This is one of the vulnerability types of web applications. It can also be called authentication bypass. Because a vulnerable web app does not sanitize input before sending it into an SQL query e.g

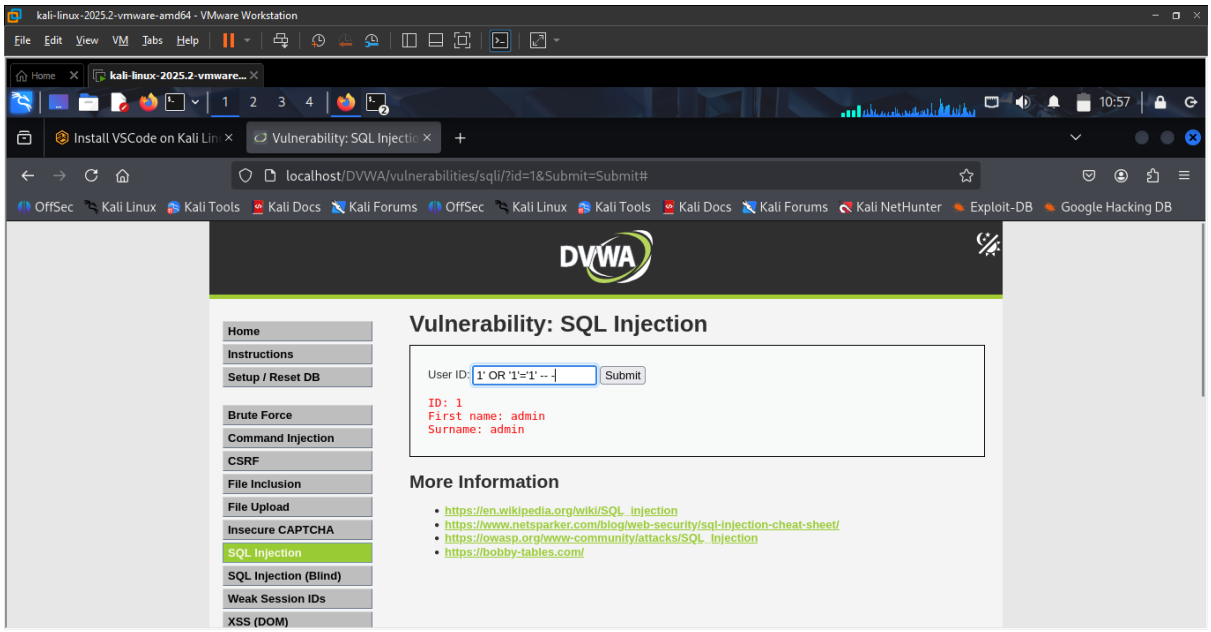
"SELECT * FROM users WHERE username = 'input' AND password = 'input';".

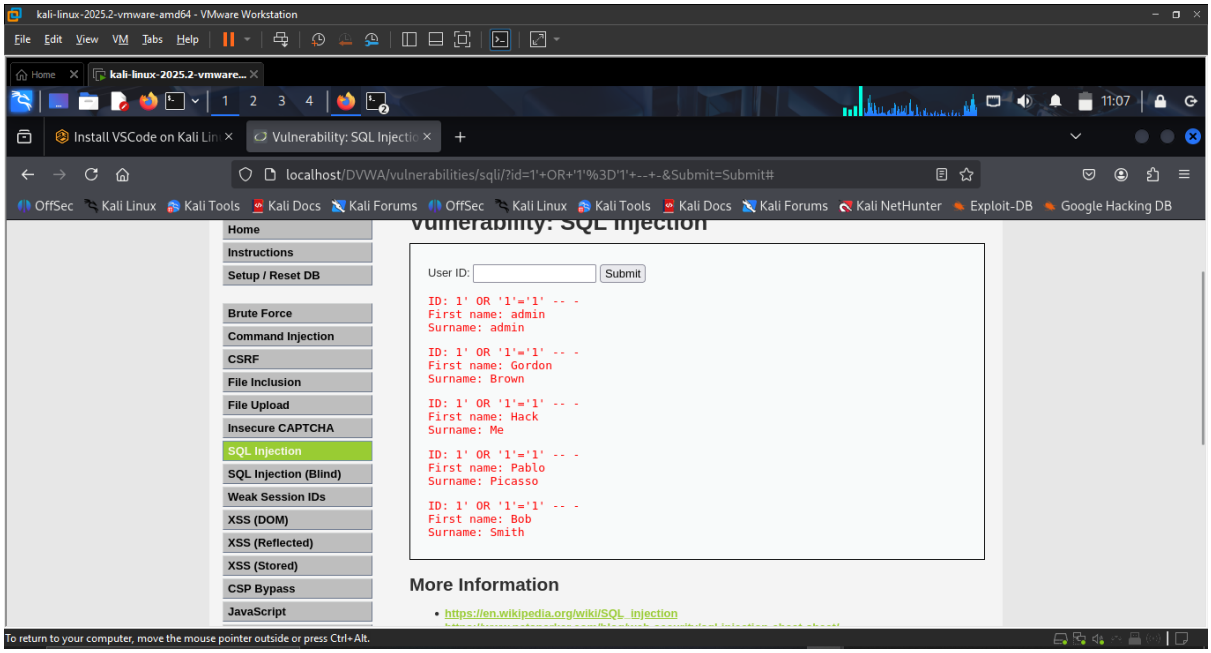
When you enter "1" in the input form that says "UserID" it gives the first user with username and password "admin and admin" respectively and if you enter "2" you would see the second user and so on. One way to manually check for an SQLi is by entering a single quote **(')** or a double quote **(")** to see if we get an SQL syntax error. To test the vulnerability, we can input an SQL statement that always results in true **(' OR '1'='1' -- - or 'OR 1=1-- - or ' OR 1=1#)**

Payload(s) used:

- **(' OR '1'='1' -- - or 'OR 1=1-- - or ' OR 1=1#)**







Mitigation recommended:

- Use prepared statements/parameterised queries (PDO, mysqli).
- Apply Input validation and sanitization.
- Use least-privileged DB (database) accounts.

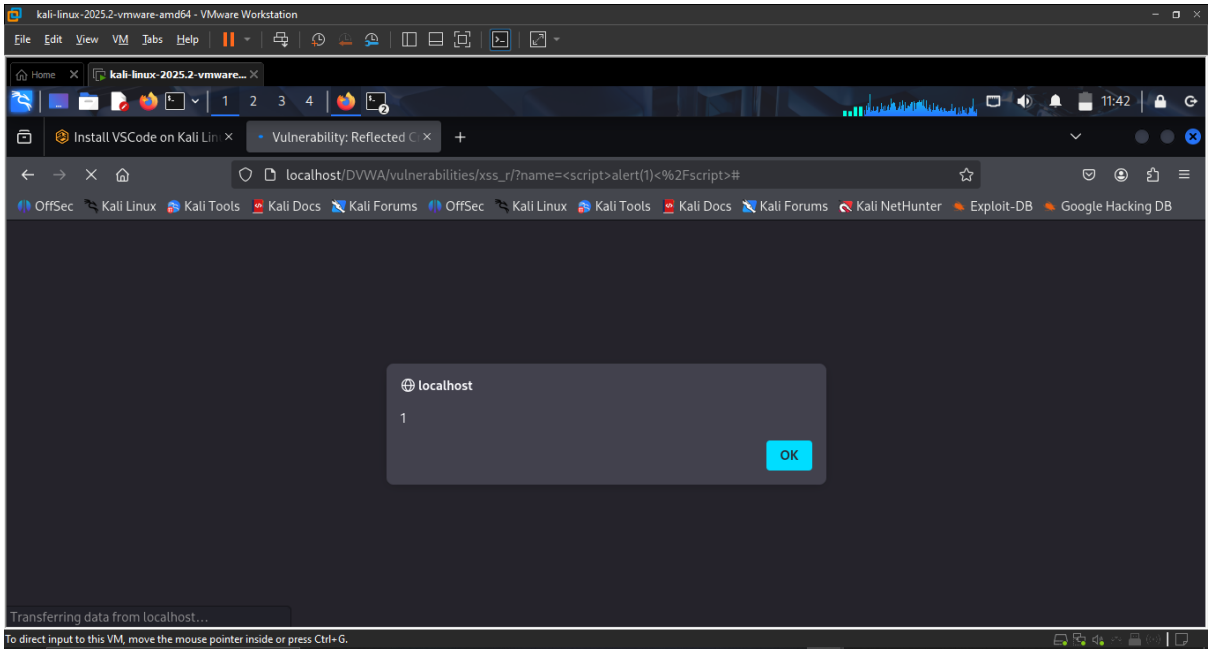
- **XSS Reflected ➔**

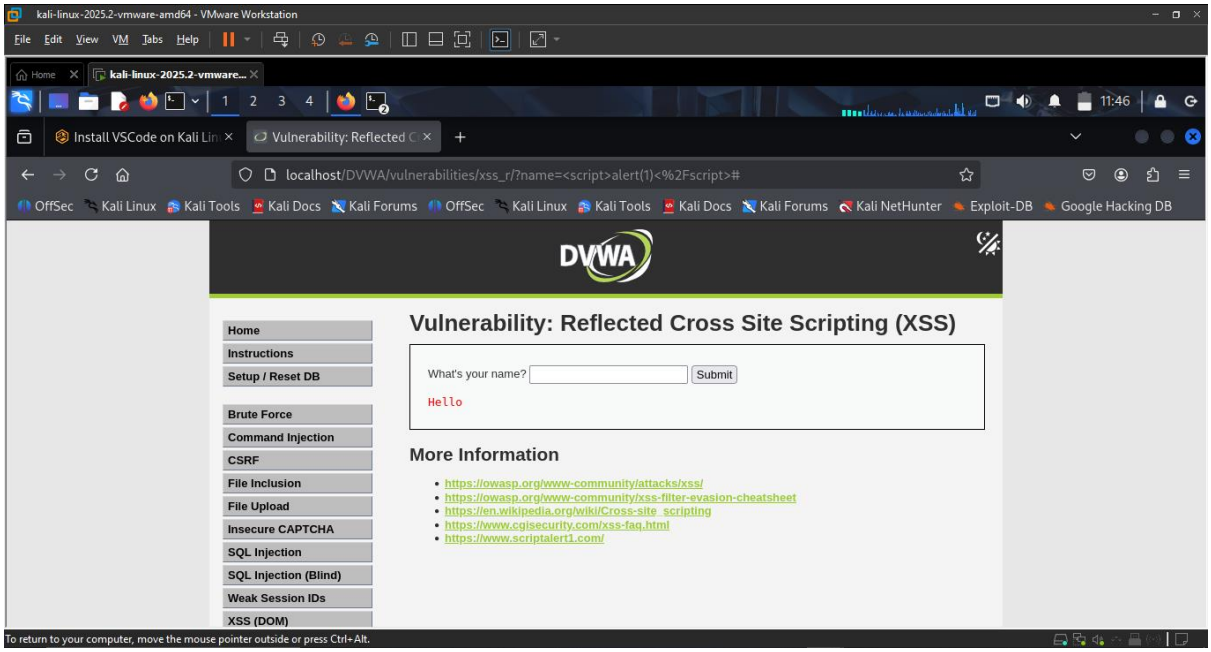
Reflected XSS is when a malicious script can be written typically in the URL of a website when a victim clicks the link with malicious script embedded in it the script will be run once for the user. It is not saved permanently to the webpage. Whatever we type into the field on the input form would be what would be displayed on the URL as well as the page. So if we type in a simple javascript code that displays a pop up we could prove the page is vulnerable to XSS (cross site scripting).

Payload used:

- <script>alert(1)</script>

In this payload, we have our JavaScript code that is noted by the two script tags at the end and beginning and in between we have our alert that is going to say “1”.





Mitigation recommended for XSS reflected:

- Escape user input before rendering to HTML.
- Use content security policy (CSP).
- Sanitize input (e.g., strip tag attributes (/) “<script>”).

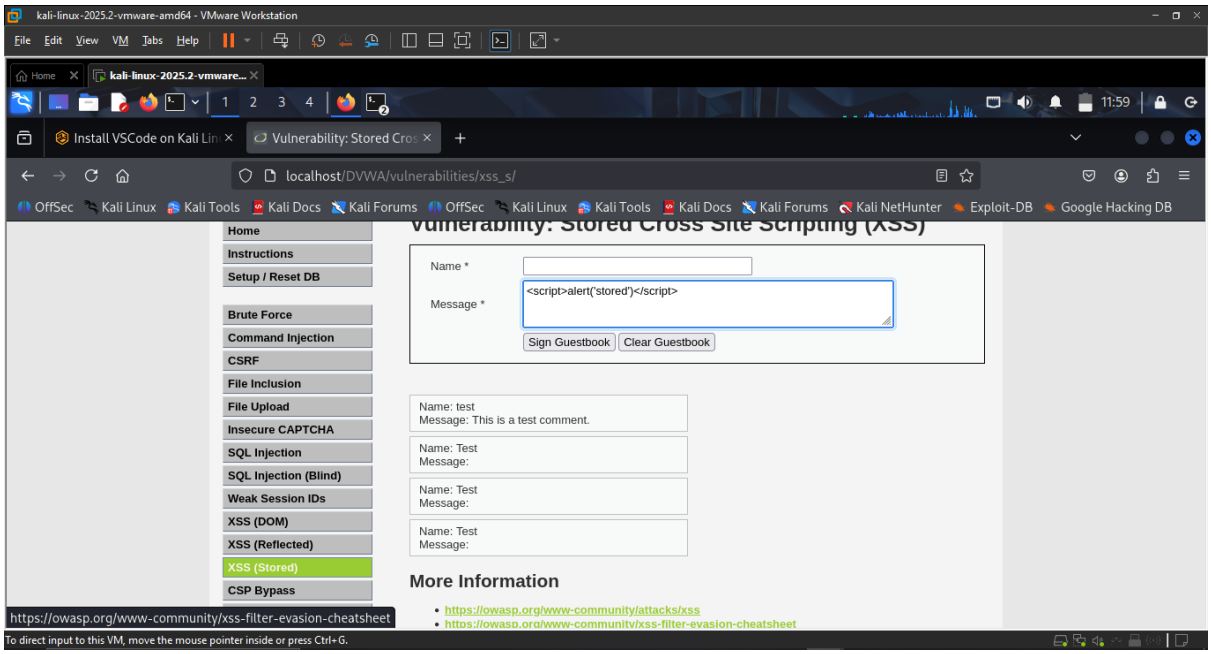
- **XSS Stored ➔**

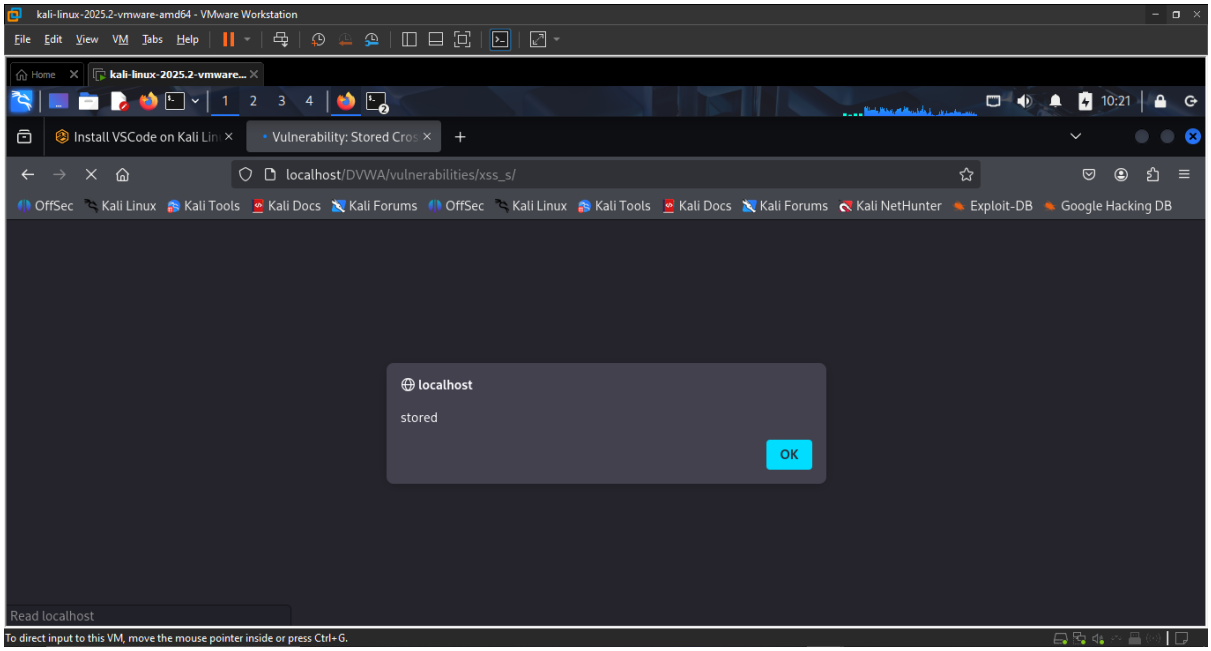
When a cross site scripting payload is processing on a webpage, likely because it is being saved to a database and fetched by the website it is called a stored cross site scripting vulnerability. This is the most dangerous cross site scripting vulnerability because the payload has the ability to affect every single user that visits the vulnerable site. Now, I will run basic script with an alert saying “stored”.

Payload:

- <script>alert(“stored”)</script>

In this payload, we have our JavaScript code that is noted by the two script tags at the end and beginning and in between we have our alert that is going to say “stored”. This has been saved to a database somewhere on the backend and it will be displayed every time the web page is visited by any users.





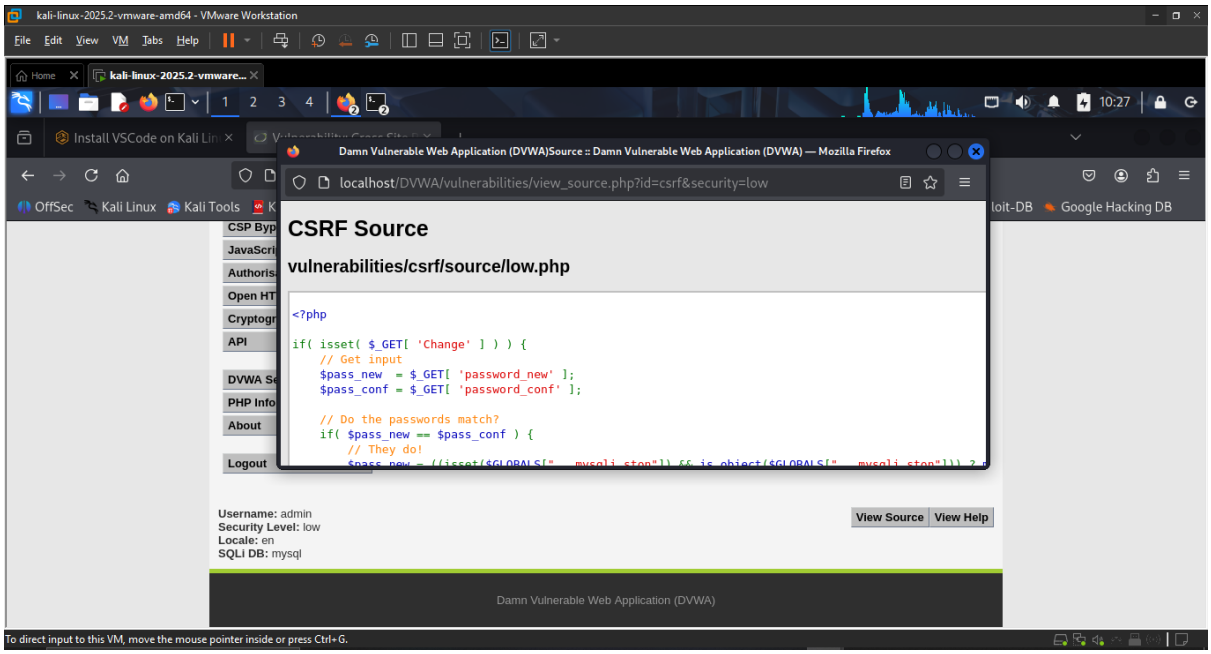
Mitigation recommended:

- Encode output, sanitize input, plus:
- Filter dangerous HTML on both input and output paths.
- Consider a HTML sanitizer library.

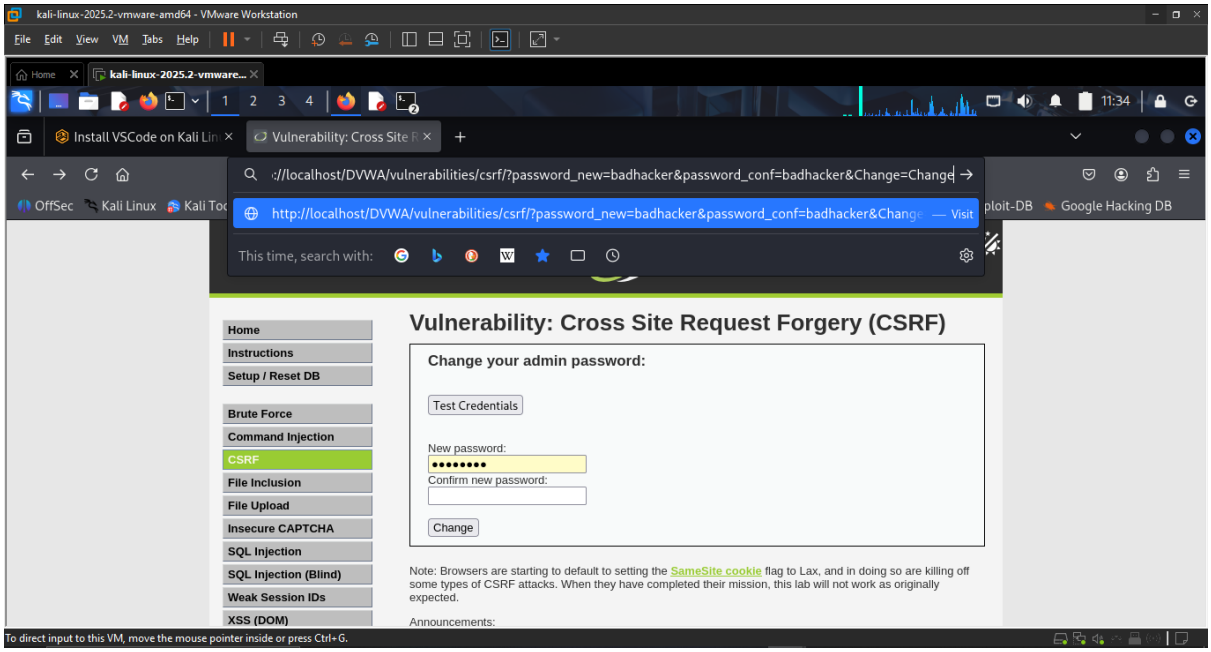
- **CSRF (Cross Site Request Forgery) ➔**

A CSRF attack allows us to perform actions on behalf of another user usually by having them click a link. While logged in to DVWA in on tab, we visit a malicious page in another tab. That page silently submits a form to DVWA to change the password. The browser includes the DVWA cookies, so the server thinks YOU did it.

Initially, we click the “View source” at the bottom of the CSRF page on DVWA and we do that to confirm what the form’s method is (either GET or POST) and what the forms action is and then we also check if we can see input fields like “password_new” and “password_conf”.



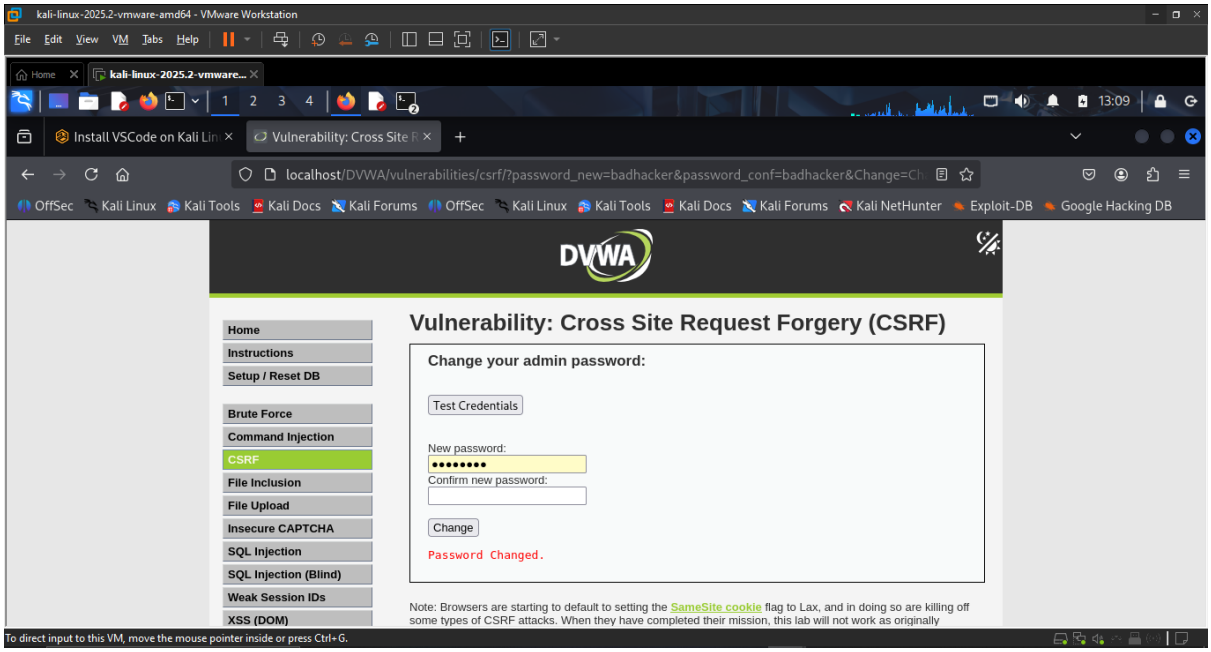
This is the PHP (backend source code) for the web application and from that, we can see that the web app uses the ‘GET’ method or parameters without CSRF tokens which means that we can trigger a password change just by visiting a malicious link.

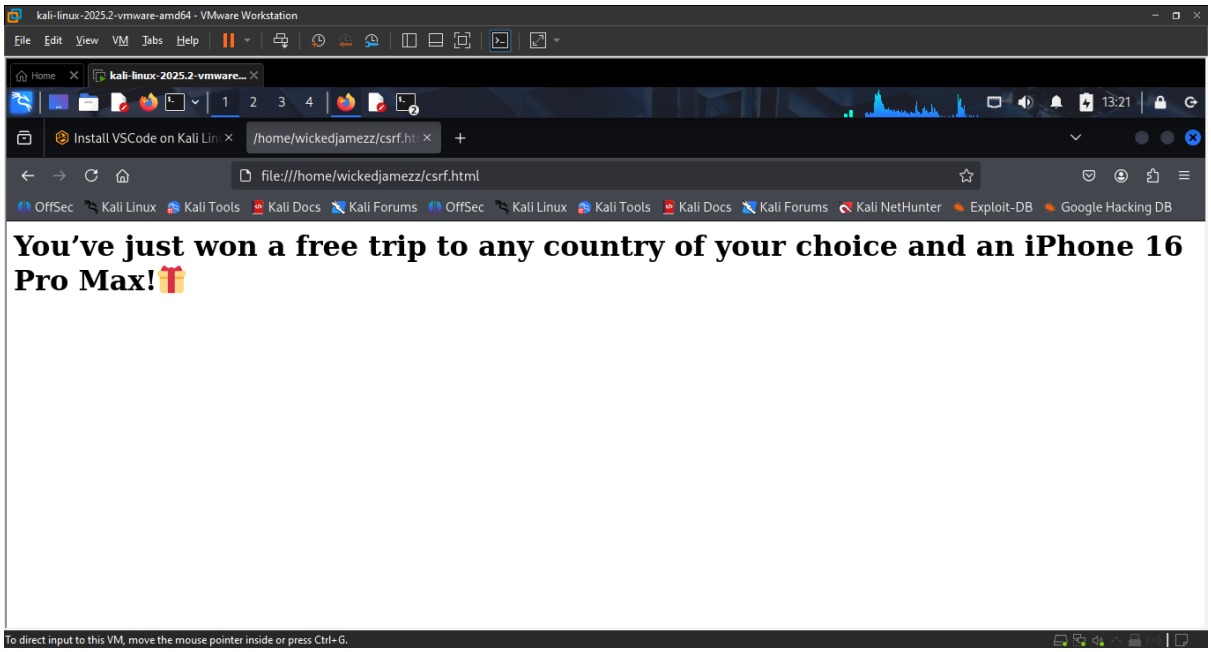


This is malicious link entered:

Payload(s):

- http://localhost/DVWA/vulnerabilities/csrf/?password_new=badhacker&password_conf=badhacker&Change=Change ➔ This is the link for the password change.
- <html>
  <body>
  <h1>You've just won a free trip to any country of your choice and an iPhone 16 Pro Max!
  🎁</h1>
  <img
  src="http://localhost/DVWA/vulnerabilities/csrf/?password_new=badhacker&password_conf=badhacker&Change=Change" style="display:none">
  </body>
  </html> ➔ This is the HTML file we created that can be run in the victim's website and browser.





Mitigations recommended:

- Use CSRF tokens in forms.
- Require POST requests for sensitive actions.
- Check the 'referrer' or 'Origin' header.