# Project 2: WAF Rule Development Lab

This guide walks you through setting up **ModSecurity**, a Web Application Firewall (WAF), to block a basic SQL Injection attack.

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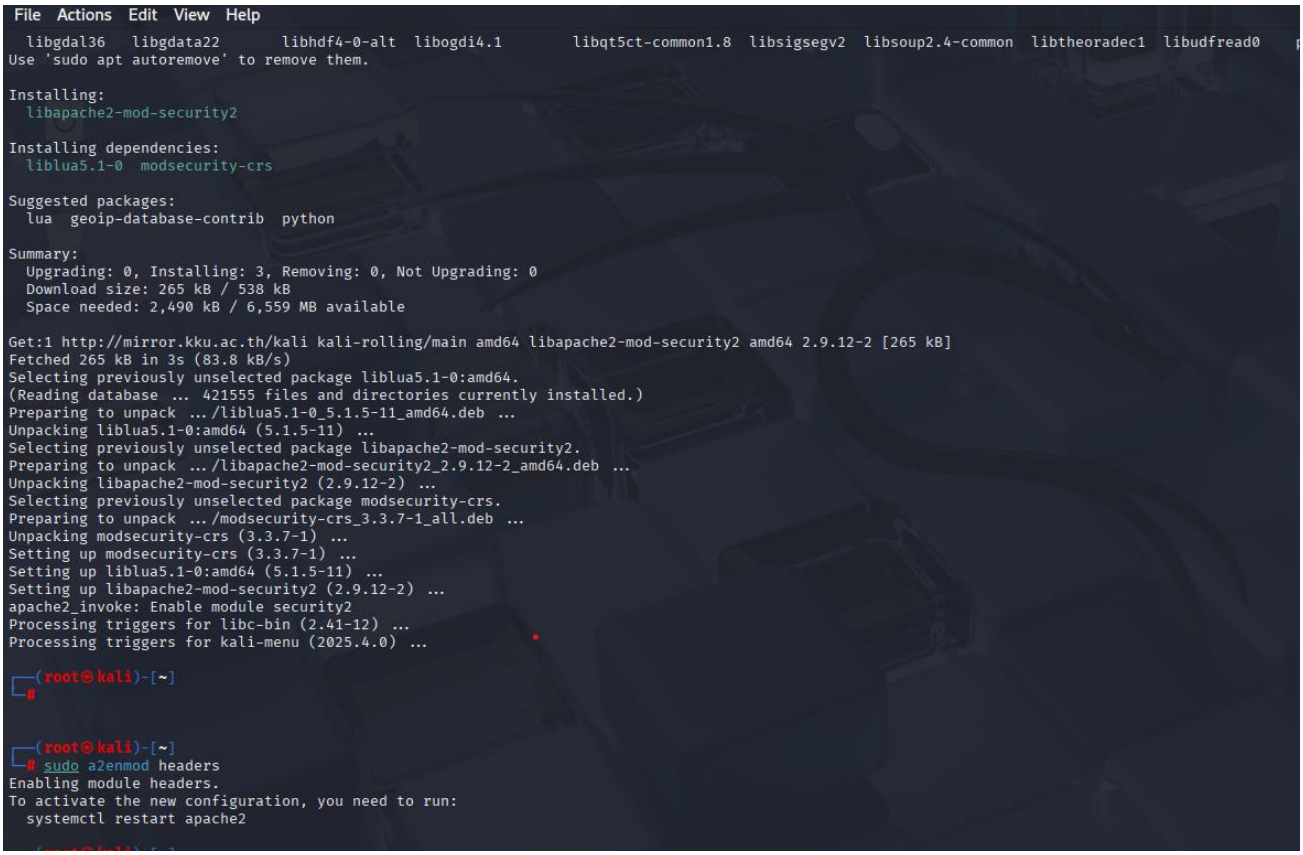
**Step 1: Setup and Installation**

1. **Install Apache & ModSecurity**: On a fresh Ubuntu Server VM, install the Apache web server and the ModSecurity module.

*sudo apt update*

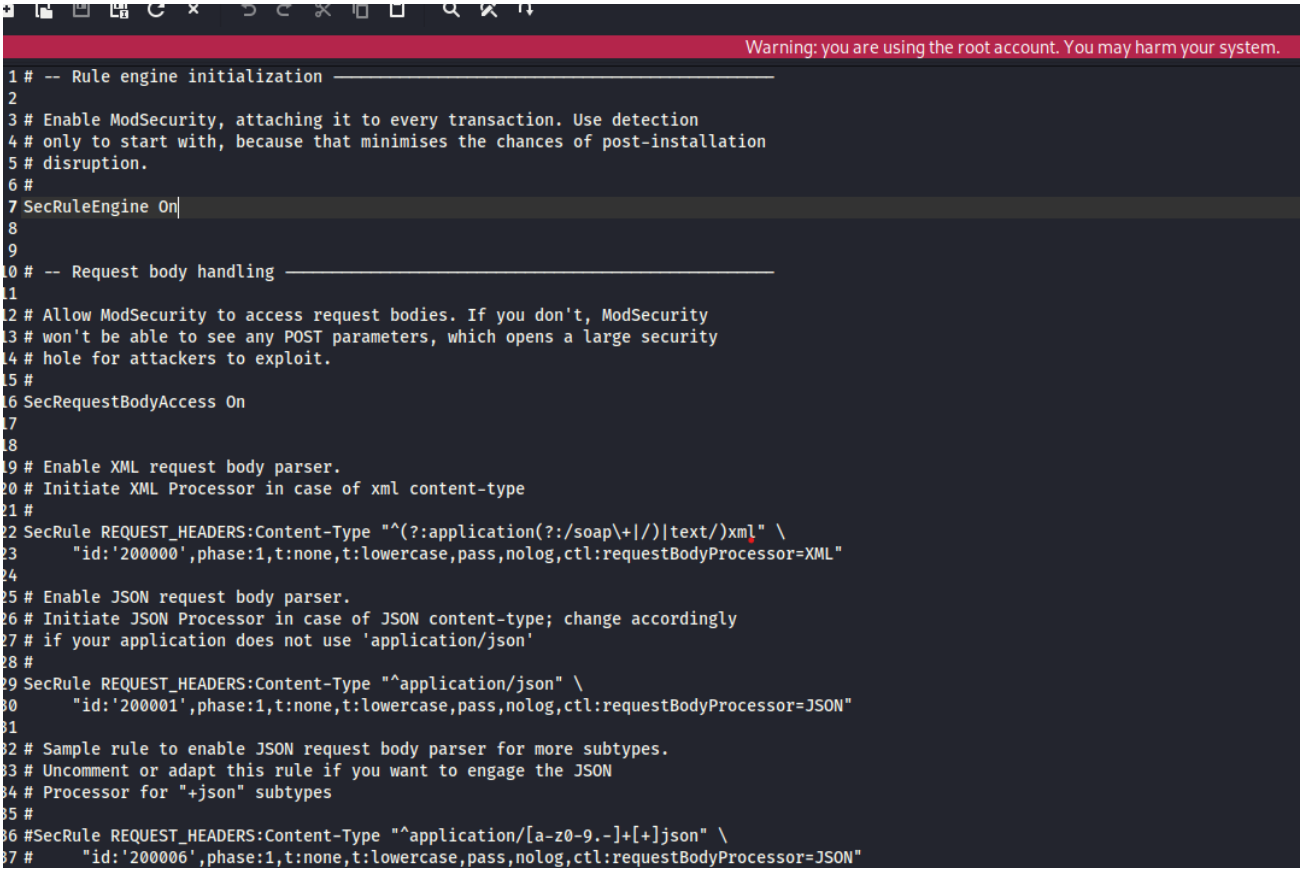
*sudo apt install -y apache2 libapache2-mod-security2*




2. **Enable ModSecurity**: Enable the module and restart Apache.

*sudo a2enmod security2*

*sudo systemctl restart apache2*




3. **Configure ModSecurity**: Turn the engine on by editing the configuration f

```
┌──(root㉿kali)-[~]
└─# sudo a2enmod headers
nabling module headers.
o activate the new configuration, you need to run:
 systemctl restart apache2

┌──(root㉿kali)-[~]
└─# systemctl reatart apache2
nknown command verb 'reatart', did you mean 'restart'?

┌──(root㉿kali)-[~]
└─# systemctl restart apache2

┌──(root㉿kali)-[~]
└─#


┌──(root㉿kali)-[~]
└─# sudo cp /etc/modsecurity/modsecurity.conf-recommenden /etc/modesecurity/modesecurity.conf
o: cannot stat '/etc/modsecurity/modsecurity.conf-recommenden': No such file or directory

┌──(root㉿kali)-[~]
└─# systemctl restart apache2

┌──(root㉿kali)-[~]
└─# sudo rm -rf /usr/shere/modsecurity-crs

┌──(root㉿kali)-[~]
└─# sudo apt install libapache2-mod-security2 -y
```

```
┌──(root㉿kali)-[~]
└─# sudo git clone https://github.com/coreruleset/coreruleset /usr/shere/modsecurity-crs
Cloning into '/usr/shere/modsecurity-crs' ...
remote: Enumerating objects: 36267, done.
remote: Counting objects: 100% (304/304), done.
remote: Compressing objects: 100% (176/176), done.
remote: Total 36267 (delta 263), reused 128 (delta 128), pack-reused 35963 (from 3)
Receiving objects: 100% (36267/36267), 10.92 MiB | 5.19 MiB/s, done.
Resolving deltas: 100% (28760/28760), done.

┌──(root㉿kali)-[~]
└─#


┌──(root㉿kali)-[~]
└─# sudo mv /usr/shere/modsecurity-crs/crs-setup.conf.example /usr/shere/modsecurity-crs/cr
s-setup.conf

┌──(root㉿kali)-[~]
└─# sudo mv /usr/shere/modsecurity-crs/rules/REQUEST-900-EXCLUSION-RULES-BEFORE-CRS.conf.ex
ample /usr/shere/modsecurity-crs/rules/REQUEST-900-EXCLUSION-RULES-BEFORE-CRS.conf

┌──(root㉿kali)-[~]
└─#
```

*sudo nano /etc/modsecurity/modsecurity.conf*

Find the line SecRuleEngine DetectionOnly and change it to SecRuleEngine On.

**Step 2: Deploy a Vulnerable App**

For simplicity, we'll create a single vulnerable PHP page instead of installing a complex application like DVWA.

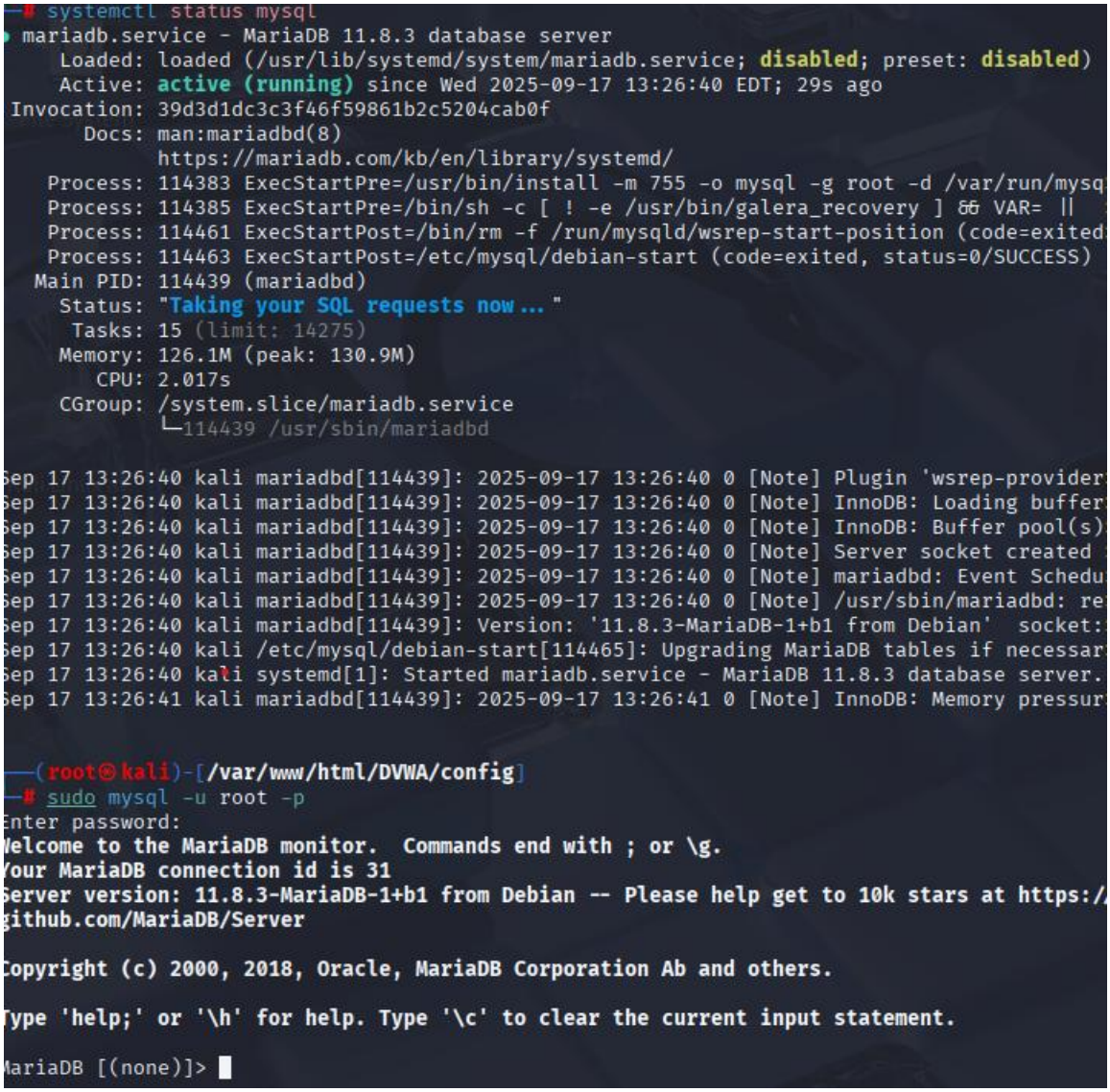
1. **Install PHP**:

*sudo apt install -y php libapache2-mod-php*

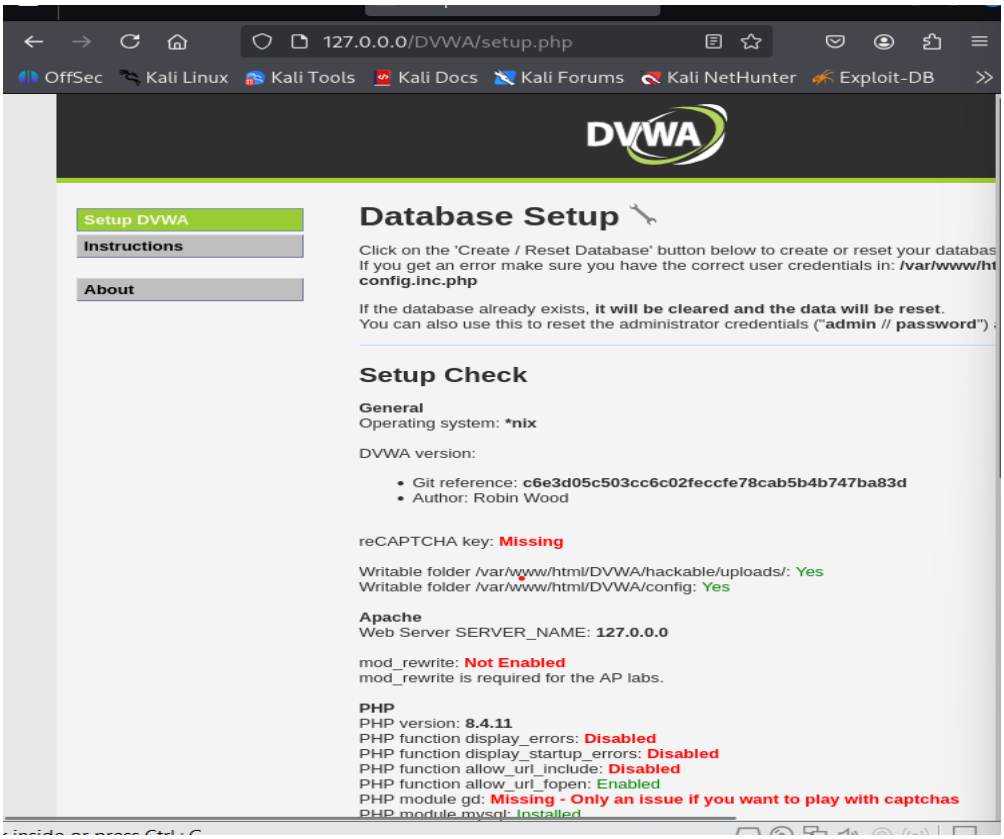
```
┌──(root㉿kali)-[/var/www/html]
└─# sudo git clone https://github.com/ethicalhack3r/DVWA
Cloning into 'DVWA' ...
remote: Enumerating objects: 5373, done.
remote: Total 5373 (delta 0), reused 0 (delta 0), pack-reused 5373 (from 1)
Receiving objects: 100% (5373/5373), 2.57 MiB | 508.00 KiB/s, done.
Resolving deltas: 100% (2673/2673), done.

┌──(root㉿kali)-[/var/www/html]
└─# ls
DVWA  index.html  index.nginx-debian.html

┌──(root㉿kali)-[/var/www/html]
└─#
```

**Step 3: Create and Test a WAF Rule**

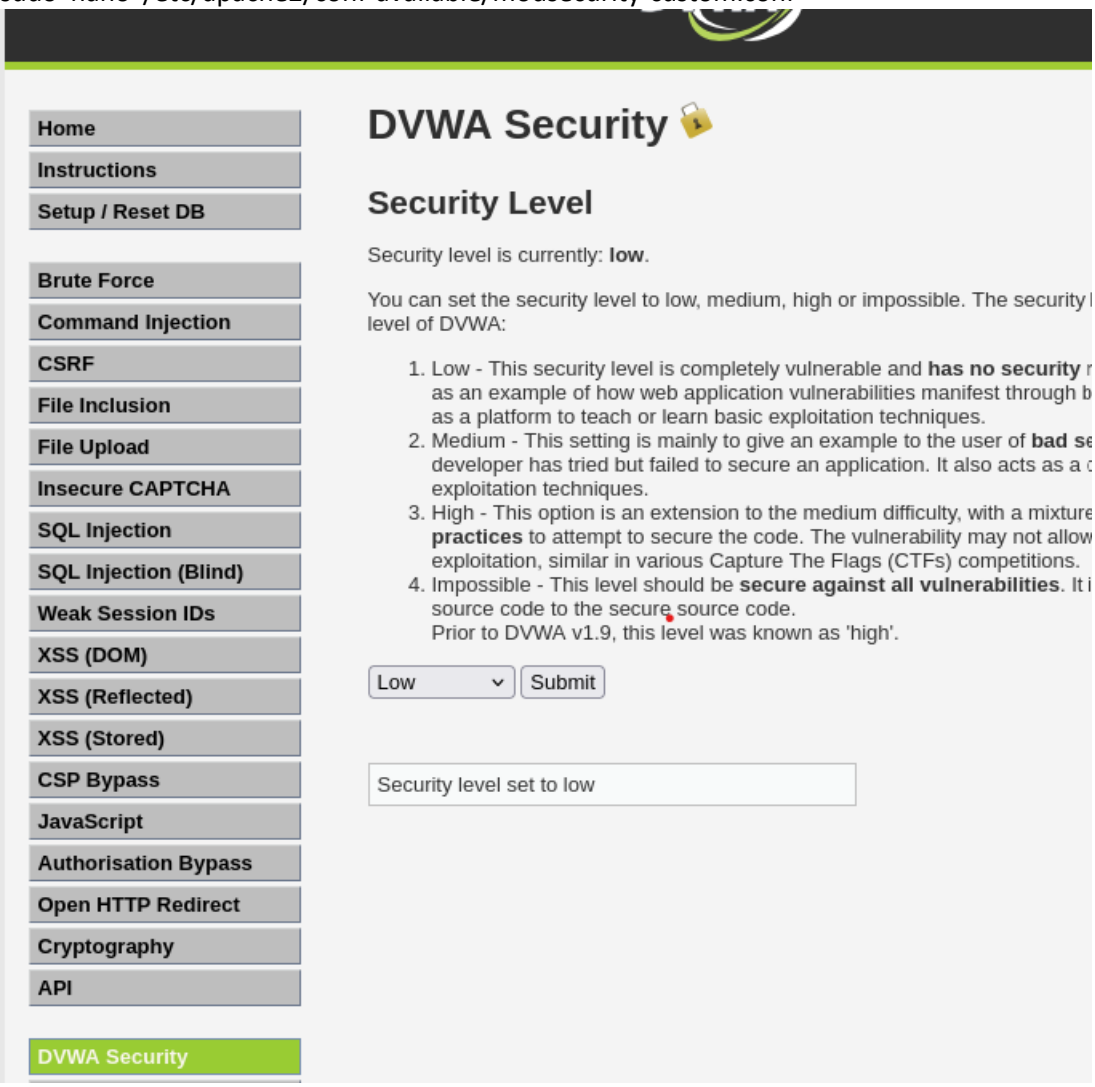
1. **Create a Custom Rules File**:

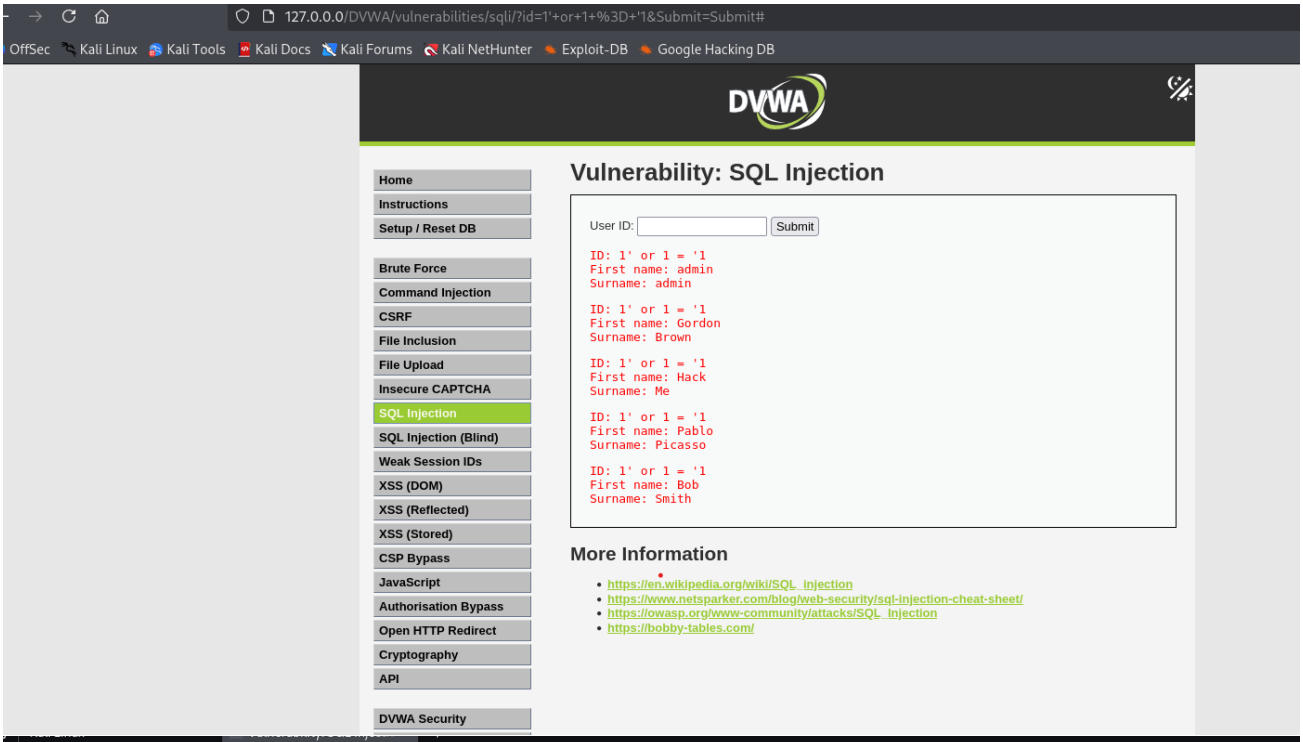

systemctl status mysql
mariadb.service - MariaDB 11.8.3 database server
Loaded: loaded (/usr/lib/systemd/system/mariadb.service; disabled; preset: disabled)
Active: active (running) since Wed 2025-09-17 13:26:40 EDT; 29s ago
Invocation: 39d3d1dc3c3f46f59861b2c5204cab0f
Docs: man:mariadbd(8)
https://mariadb.com/kb/en/library/systemd/
Process: 114383 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysq
Process: 114385 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= ||
Process: 114461 ExecStartPost=/bin/rm -f /run/mysqld/wsrep-start-position (code=exited
Process: 114463 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
Main PID: 114439 (mariadbd)
Status: "Taking your SQL requests now..."
Tasks: 15 (limit: 14275)
Memory: 126.1M (peak: 130.9M)
CPU: 2.017s
CGroup: /system.slice/mariadb.service
└─114439 /usr/sbin/mariadbd
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] Plugin 'wsrep-provider
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] InnoDB: Loading buffer
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] InnoDB: Buffer pool(s)
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] Server socket created
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] mariadbd: Event Schedu
Sep 17 13:26:40 kali mariadbd[114439]: 2025-09-17 13:26:40 0 [Note] /usr/sbin/mariadbd: re
Sep 17 13:26:40 kali mariadbd[114439]: Version: '11.8.3-MariaDB-1+b1 from Debian' socket:
Sep 17 13:26:40 kali /etc/mysql/debian-start[114465]: Upgrading MariaDB tables if necessar
Sep 17 13:26:40 kali systemd[1]: Started mariadb.service - MariaDB 11.8.3 database server.
Sep 17 13:26:41 kali mariadbd[114439]: 2025-09-17 13:26:41 0 [Note] InnoDB: Memory pressur
(root@kali)-[/var/www/html/DVWA/config]
# sudo mysql -u root -p
Enter password:
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)]>

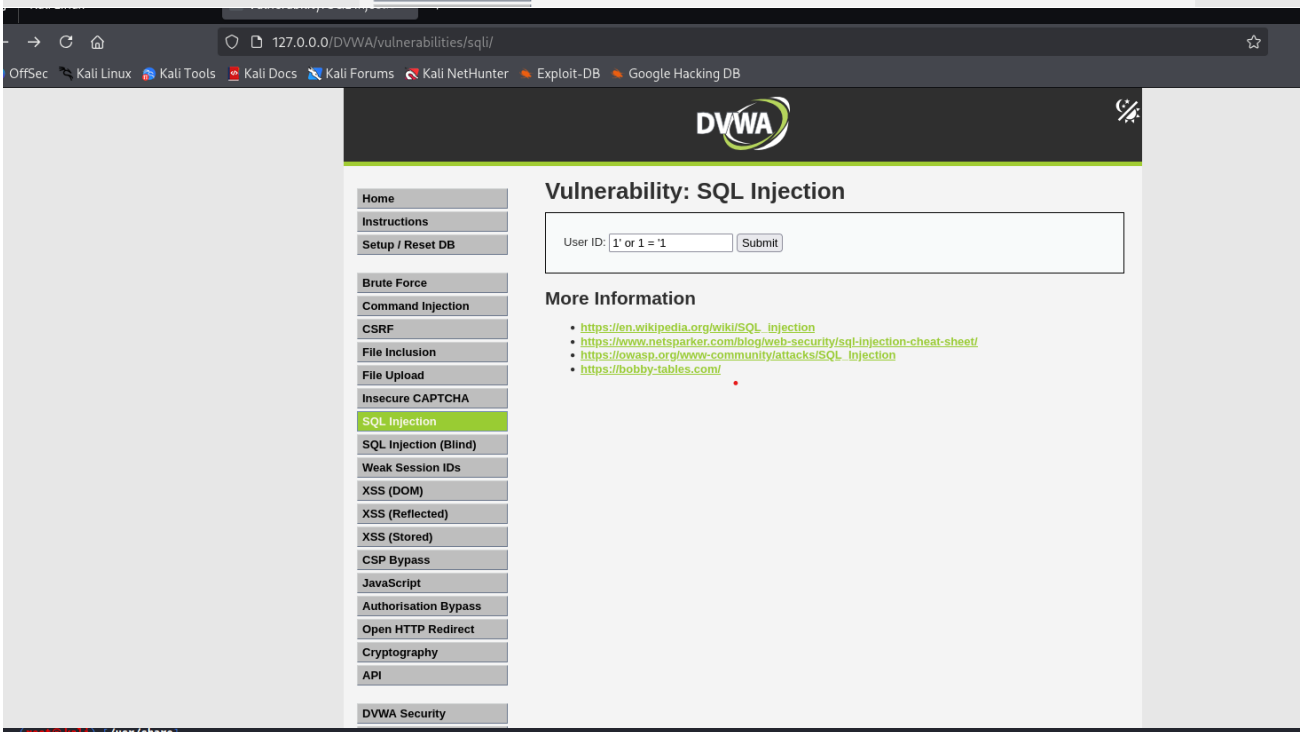
```
cd: no such file or directory: /etc/php/7.4/apache2

┌──(root㉿kali)-[~]
└─# php -v
PHP 8.4.11 (cli) (built: Aug 15 2025 23:34:18) (NTS)
Copyright (c) The PHP Group
Built by Debian
Zend Engine v4.4.11, Copyright (c) Zend Technologies
    with Zend OPcache v8.4.11, Copyright (c), by Zend Technologies

┌──(root㉿kali)-[~]
└─# cd /etc/php/8.4/apache2

┌──(root㉿kali)-[/etc/php/8.4/apache2]
└─# sudo systemctl start apache2

┌──(root㉿kali)-[/etc/php/8.4/apache2]
└─# systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/apache2.service; disabled; preset: disabled)
     Active: active (running) since Wed 2025-09-17 12:45:04 EDT; 1h 3min ago
 Invocation: 13ab5ba8e2df4bb2a6067673f842af35
       Docs: https://httpd.apache.org/docs/2.4/
    Process: 93454 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
   Main PID: 93466 (apache2)
      Tasks: 6 (limit: 2163)
     Memory: 35.9M (peak: 36.2M)
        CPU: 540ms
     CGroup: /system.slice/apache2.service
             ├─93466 /usr/sbin/apache2 -k start
             ├─93469 /usr/sbin/apache2 -k start
             ├─93470 /usr/sbin/apache2 -k start
             ├─93471 /usr/sbin/apache2 -k start
             ├─93472 /usr/sbin/apache2 -k start
             └─93473 /usr/sbin/apache2 -k start

Sep 17 12:45:03 kali systemd[1]: Starting apache2.service - The Apache HTTP Server ...
Sep 17 12:45:04 kali systemd[1]: Started apache2.service - The Apache HTTP Server.

┌──(root㉿kali)-[/etc/php/8.4/apache2]
└─#
```



sudo nano /etc/apache2/conf-available/modsecurity-custom.conf



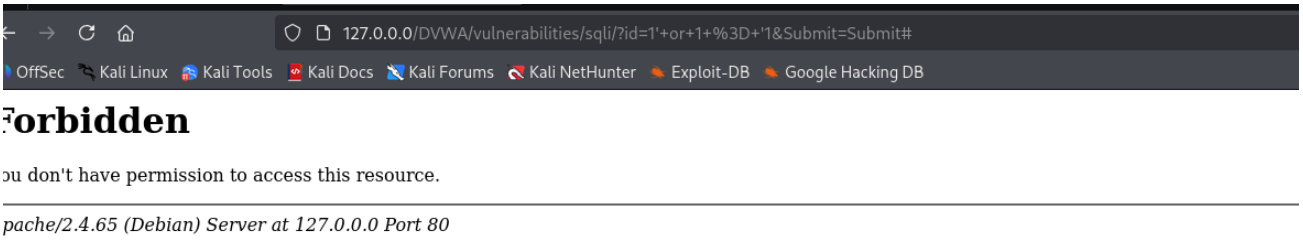



```
┌──(root㉿kali)-[/usr/share]
└─# sudo git clone https://github.com/coreruleset/coreruleset.git modsecurity-crs
Cloning into 'modsecurity-crs'...
remote: Enumerating objects: 36275, done.
remote: Counting objects: 100% (307/307), done.
remote: Compressing objects: 100% (177/177), done.
remote: Total 36275 (delta 265), reused 130 (delta 130), pack-reused 35968 (from 4)
Receiving objects: 100% (36275/36275), 10.89 MiB | 2.75 MiB/s, done.
Resolving deltas: 100% (28762/28762), done.

┌──(root㉿kali)-[/usr/share]
└─# cd /usr/share/modsecurity-crs

┌──(root㉿kali)-[/usr/share/modsecurity-crs]
└─# sudo cp crs-setup.conf.example crs-setup.conf

┌──(root㉿kali)-[/usr/share/modsecurity-crs]
└─# ls -l /usr/share/modsecurity-crs/crs-setup.conf
-rw-r--r-- 1 root root 36362 Sep 19 03:11 /usr/share/modsecurity-crs/crs-setup.conf

┌──(root㉿kali)-[/usr/share/modsecurity-crs]
└─# ls /usr/share/modsecurity-crs/rules/
asp-dotnet-errors.data                          REQUEST-913-SCANNER-DETECTION.conf                  REQUEST-944-APPLICATION-ATTACK-JAVA.conf            restricted-files.data
iis-errors.data                                 REQUEST-920-PROTOCOL-ENFORCEMENT.conf               REQUEST-949-BLOCKING-EVALUATION.conf                restricted-upload.data
java-classes.data                               REQUEST-921-PROTOCOL-ATTACK.conf                    RESPONSE-950-DATA-LEAKAGES.conf                     ruby-errors.data
lfi-os-files.data                               REQUEST-922-MULTIPART-ATTACK.conf                   RESPONSE-951-DATA-LEAKAGES-SQL.conf                 scanners-user-agents.data
php-errors.data                                 REQUEST-930-APPLICATION-ATTACK-LFI.conf             RESPONSE-952-DATA-LEAKAGES-JAVA.conf                sql-errors.data
php-errors-pl2.data                             REQUEST-931-APPLICATION-ATTACK-RFI.conf             RESPONSE-953-DATA-LEAKAGES-PHP.conf                 ssrf.data
php-function-names-933150.data                  REQUEST-932-APPLICATION-ATTACK-RCE.conf             RESPONSE-954-DATA-LEAKAGES-IIS.conf                 unix-shell-builtins.data
php-variables.data                              REQUEST-933-APPLICATION-ATTACK-PHP.conf             RESPONSE-955-WEB-SHELLS.conf                        unix-shell.data
REQUEST-900-EXCLUSION-RULES-BEFORE-CRS.conf.example  REQUEST-934-APPLICATION-ATTACK-GENERIC.conf    RESPONSE-956-DATA-LEAKAGES-RUBY.conf                web-shells-asp.data
REQUEST-901-INITIALIZATION.conf                 REQUEST-941-APPLICATION-ATTACK-XSS.conf             RESPONSE-959-BLOCKING-EVALUATION.conf               web-shells-php.data
REQUEST-905-COMMON-EXCEPTIONS.conf              REQUEST-942-APPLICATION-ATTACK-SQLI.conf            RESPONSE-980-CORRELATION.conf                       windows-powershell-commands.data
REQUEST-911-METHOD-ENFORCEMENT.conf             REQUEST-943-APPLICATION-ATTACK-SESSION-FIXATION.conf  RESPONSE-999-EXCLUSION-RULES-AFTER-CRS.conf.example

┌──(root㉿kali)-[/usr/share/modsecurity-crs]
└─#
```

*sudo systemctl restart apache2*

2. **Test the WAF**:
    - **Benign Request**: Open a web browser and go to http://<VM_IP>/login.php. Enter a normal username like admin and click Login. It should work.
    - **Attack Request**: Now, enter a basic SQLi probe into the username field: test' UNION SELECT 1,2,3--
    - **Verify the Block**: When you click Login, you will receive a **403 Forbidden** error from the server. The WAF has blocked your request. You can see the block message in Apache's error log (sudo tail /var/log/apache2/error.log).

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# Project 3: Threat Intel Processor

This guide explains how to build a Python script that fetches malicious IPs from the **AbuseIPDB** threat feed and checks them against a sample log file.

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**Step 1: Setup and API Key**

1. **Install Python and Libraries**:

*sudo apt update*

*sudo apt install -y python3 python3-pip*

*pip3 install requests*

2. **Get an AbuseIPDB API Key**:
    - Go to https://www.abuseipdb.com/ and create a free account.