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DEPARTMENT OF COMPUTER ENGINEERING

SUBJECT: Cryptography and Network Security

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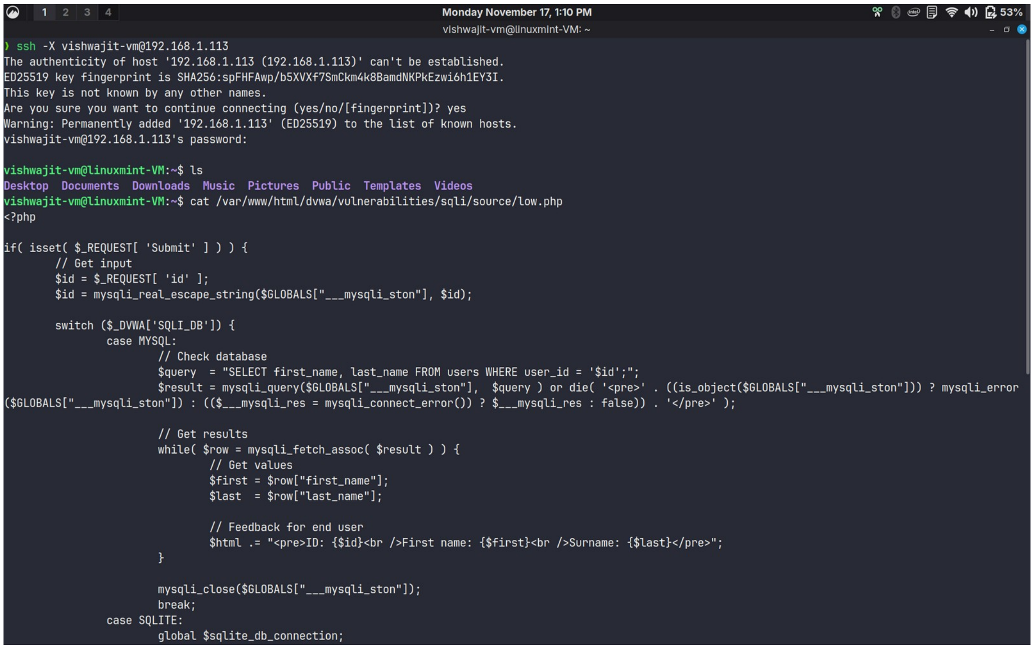
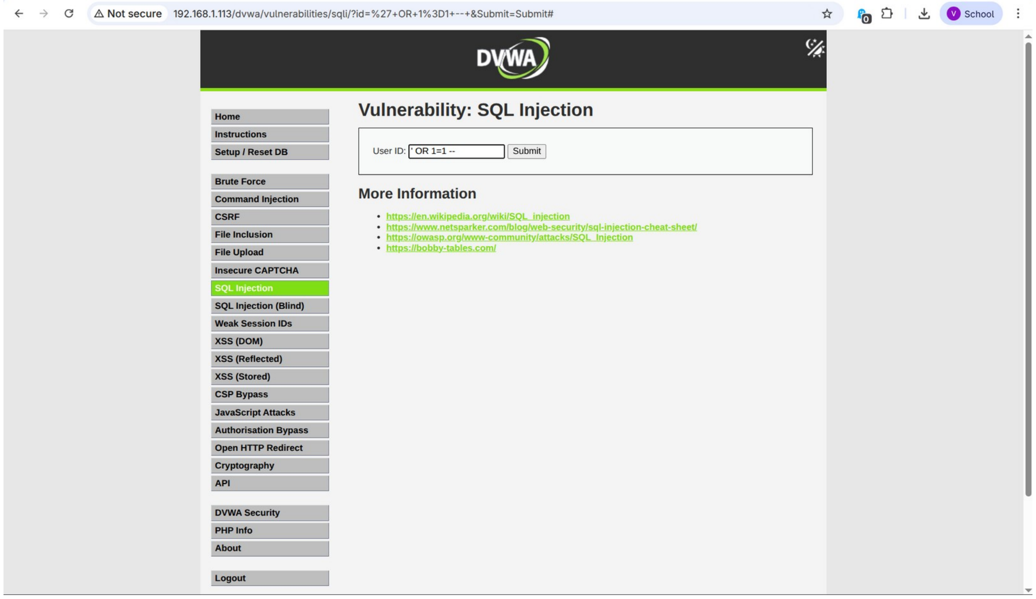
Experiment No.	**7**

AIM:	To mitigate the vulnerabilities in DVWA.
GITHUB LINK:	https://github.com/vishwajitsarnobat/DVWA-Mitigations
SQL INJECTION:	

```
❯ ssh -X vishwajit-vm@192.168.1.113
The authenticity of host '192.168.1.113 (192.168.1.113)' can't be established.
ED25519 key fingerprint is SHA256:spFHFAwp/b5XVXf7SmCkm4k8BamdNKPkEzwi6h1EY3I.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.1.113' (ED25519) to the list of known hosts.
vishwajit-vm@192.168.1.113's password:

vishwajit-vm@linuxmint-VM:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
vishwajit-vm@linuxmint-VM:~$ cat /var/www/html/dvwa/vulnerabilities/sqli/source/low.php
<?php

if( isset( $_REQUEST[ 'Submit' ] ) ) {
        // Get input
        $id = $_REQUEST[ 'id' ];
        $id = mysqli_real_escape_string($GLOBALS["___mysqli_ston"], $id);

        switch ($_DVWA['SQLI_DB']) {
                case MYSQL:
                        // Check database
                        $query  = "SELECT first_name, last_name FROM users WHERE user_id = '$id';";
                        $result = mysqli_query($GLOBALS["___mysqli_ston"],  $query ) or die( '<pre>' . ((is_object($GLOBALS["___mysqli_ston"])) ? mysqli_error
($GLOBALS["___mysqli_ston"]) : (($___mysqli_res = mysqli_connect_error()) ? $___mysqli_res : false)) . '</pre>' );

                        // Get results
                        while( $row = mysqli_fetch_assoc( $result ) ) {
                                // Get values
                                $first = $row["first_name"];
                                $last  = $row["last_name"];

                                // Feedback for end user
                                $html .= "<pre>ID: {$id}<br />First name: {$first}<br />Surname: {$last}</pre>";
                        }

                        mysqli_close($GLOBALS["___mysqli_ston"]);
                        break;
                case SQLITE:
                        global $sqlite_db_connection;
```



Not secure 192.168.1.113/dvwa/vulnerabilities/sqli/?id=%27+OR+1%3D1+--+&Submit=Submit#

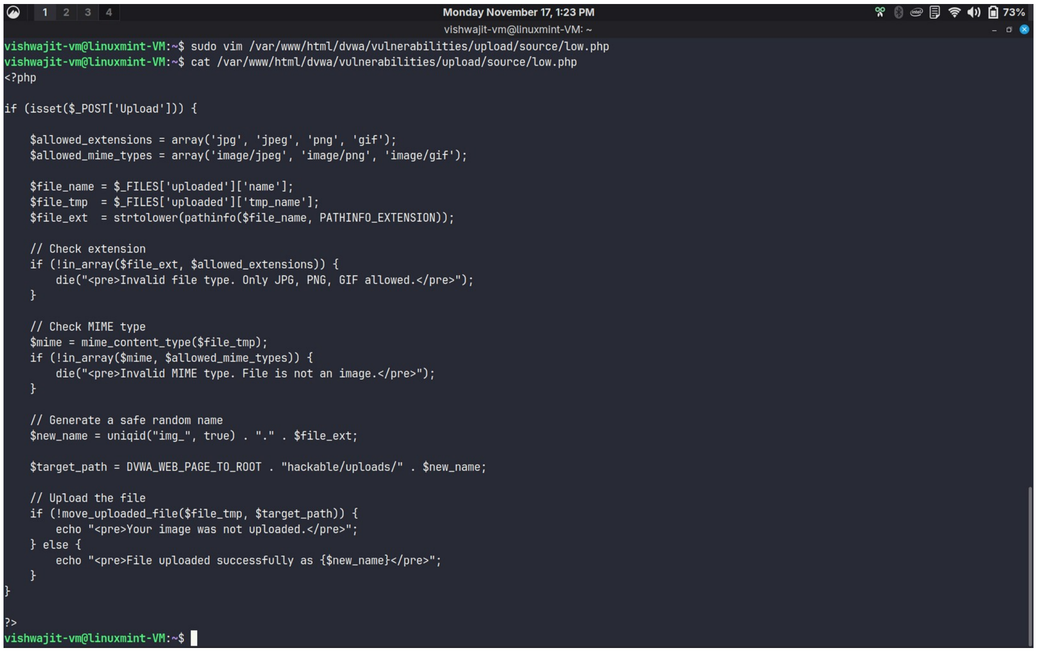
Vulnerability: SQL Injection

User ID: ' OR 1=1 --

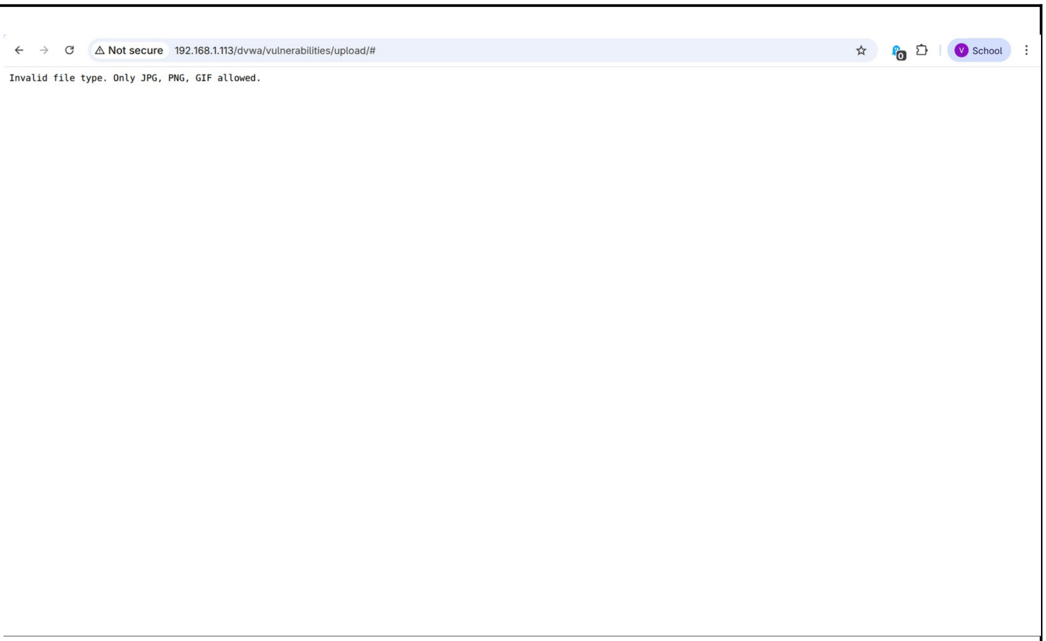
More Information

- 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/

FILE UPLOAD:

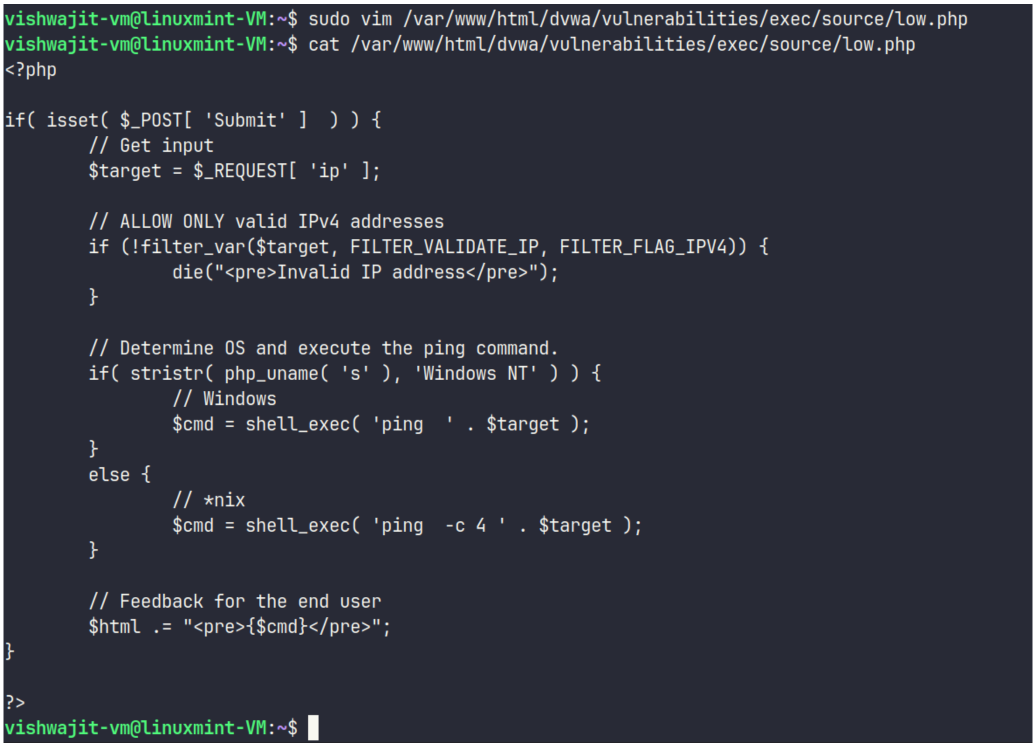


```
vishwajit-vm@linuxmint-VM:~$ sudo vim /var/www/html/dvwa/vulnerabilities/upload/source/low.php
vishwajit-vm@linuxmint-VM:~$ cat /var/www/html/dvwa/vulnerabilities/upload/source/low.php
<?php

if (isset($_POST['Upload'])) {

    $allowed_extensions = array('jpg', 'jpeg', 'png', 'gif');
    $allowed_mime_types = array('image/jpeg', 'image/png', 'image/gif');

    $file_name = $_FILES['uploaded']['name'];
    $file_tmp  = $_FILES['uploaded']['tmp_name'];
    $file_ext  = strtolower(pathinfo($file_name, PATHINFO_EXTENSION));

    // Check extension
    if (!in_array($file_ext, $allowed_extensions)) {
        die("<pre>Invalid file type. Only JPG, PNG, GIF allowed.</pre>");
    }

    // Check MIME type
    $mime = mime_content_type($file_tmp);
    if (!in_array($mime, $allowed_mime_types)) {
        die("<pre>Invalid MIME type. File is not an image.</pre>");
    }

    // Generate a safe random name
    $new_name = uniqid("img_", true) . "." . $file_ext;

    $target_path = DVWA_WEB_PAGE_TO_ROOT . "hackable/uploads/" . $new_name;

    // Upload the file
    if (!move_uploaded_file($file_tmp, $target_path)) {
        echo "<pre>Your image was not uploaded.</pre>";
    } else {
        echo "<pre>File uploaded successfully as {$new_name}</pre>";
    }
}

?>
vishwajit-vm@linuxmint-VM:~$
```

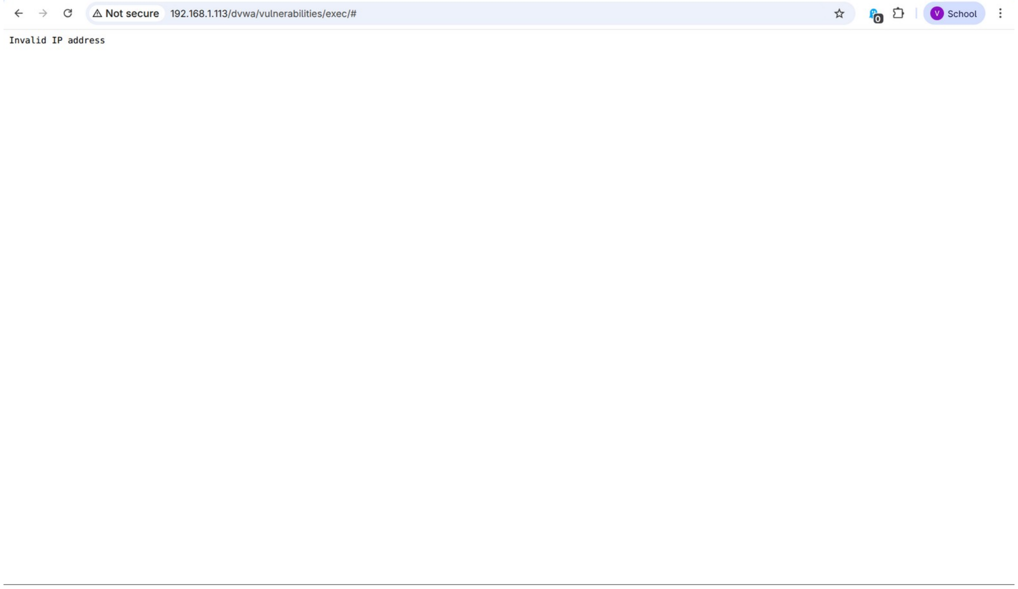


```
Invalid file type. Only JPG, PNG, GIF allowed.
```

COMMAND INJECTION:

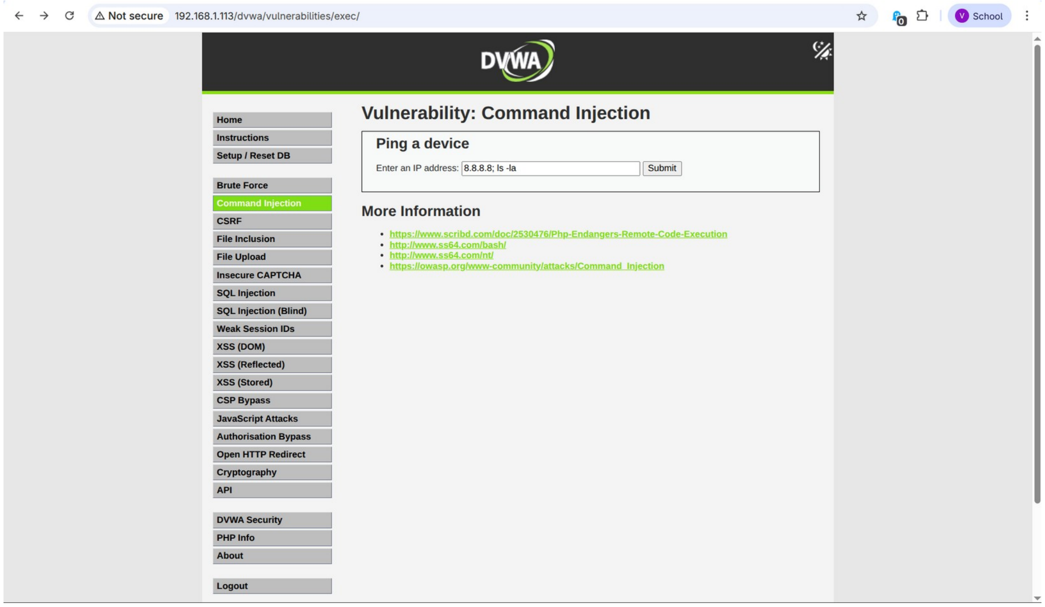


```
vishwajit-vm@linuxmint-VM:~$ sudo vim /var/www/html/dvwa/vulnerabilities/exec/source/low.php
vishwajit-vm@linuxmint-VM:~$ cat /var/www/html/dvwa/vulnerabilities/exec/source/low.php
<?php

if( isset( $_POST[ 'Submit' ]  ) ) {
        // Get input
        $target = $_REQUEST[ 'ip' ];

        // ALLOW ONLY valid IPv4 addresses
        if (!filter_var($target, FILTER_VALIDATE_IP, FILTER_FLAG_IPV4)) {
                die("<pre>Invalid IP address</pre>");
        }

        // Determine OS and execute the ping command.
        if( stristr( php_uname( 's' ), 'Windows NT' ) ) {
                // Windows
                $cmd = shell_exec( 'ping  ' . $target );
        }
        else {
                // *nix
                $cmd = shell_exec( 'ping  -c 4 ' . $target );
        }

        // Feedback for the end user
        $html .= "<pre>{$cmd}</pre>";
}

?>
vishwajit-vm@linuxmint-VM:~$ 
```



Not secure 192.168.1.113/dvwa/vulnerabilities/exec/#

```
Invalid IP address
```



Not secure 192.168.1.113/dvwa/vulnerabilities/exec/

Vulnerability: Command Injection

Ping a device

Enter an IP address: 8.8.8.8; ls -la Submit

More Information

- https://www.scribd.com/doc/2530476/Php-Endangers-Remote-Code-Execution
- http://www.ss64.com/bash/
- http://www.ss64.com/nt/
- https://owasp.org/www-community/attacks/Command_Injection