

Database Access through the Web

Databases and Interfaces COMP1041

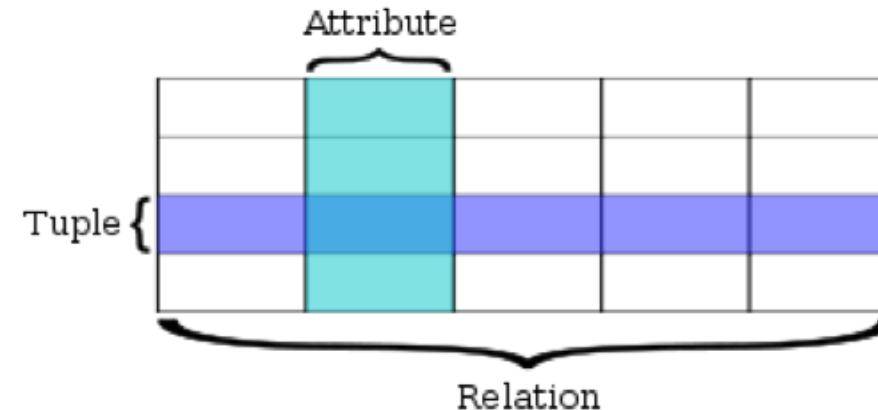
Dr Prapa Rattadilok

Outline

- Databases and relational databases
- Structured Query Language (SQL)
- Database access with PHP and MySQL
- SELECT, INSERT INTO, DELETE FROM, UPDATE

Database and Relational Database

- A database is a collection of data organised to allow relatively easy access for retrievals, additions, modifications, and deletions.
- A relational database is a collection of tables of data, where:
 - Each table can have any number of rows (tuples) and columns (attributes) of data.
 - Values that can uniquely identify the rows of the table are called primary keys.



Source: https://en.wikipedia.org/wiki/Relational_database

Example #1: people Table

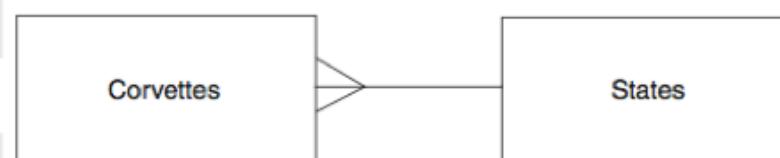
- Stores information about people i.e. id, firstname, lastname, dob, telephone.

id	firstname	lastname	dob	telephone
1	cox	apple	2020-03-01	1111111
2	egg	banana	2020-02-02	2222222
3	satsuma	orange	2020-02-19	3333333

Example #2: Corvettes and States

- To conserve memory, primary keys can be used as values in another table.

Vette_id	Body_style	Miles	Year	State
1	coupe	18.0	1997	4
2	hatchback	58.0	1996	7
3	convertible	13.5	2001	1
4	hatchback	19.0	1995	2
5	hatchback	25.0	1991	5
6	hardtop	15.0	2000	2
7	coupe	55.0	1979	10
8	convertible	17.0	1999	5
9	hardtop	17.0	2000	5
10	hatchback	50.0	1995	7



State_id	State
1	Alabama
2	Alaska
3	Arizona
4	Arkansas
5	California
6	Colorado
7	Connecticut
8	Delaware
9	Florida
10	Georgia

Structured Query Language (SQL)

- A standard language for specifying accesses and modifications to relational databases.
- SQL reserved words are not case sensitive i.e. SELECT, select and Select are all the same.
- **BUT ... the names of tables and table columns may or may not be case sensitive**, depending on the particular database software vendor.

The SELECT SQL Command

- SELECT column names FROM table names [WHERE condition];
- For example,

```
SELECT id, firstname, lastname FROM people;
```

id	firstname	lastname	dob	telephone
1	cox	apple	2020-03-01	1111111
2	egg	banana	2020-02-02	2222222
3	satsuma	orange	2020-02-19	3333333

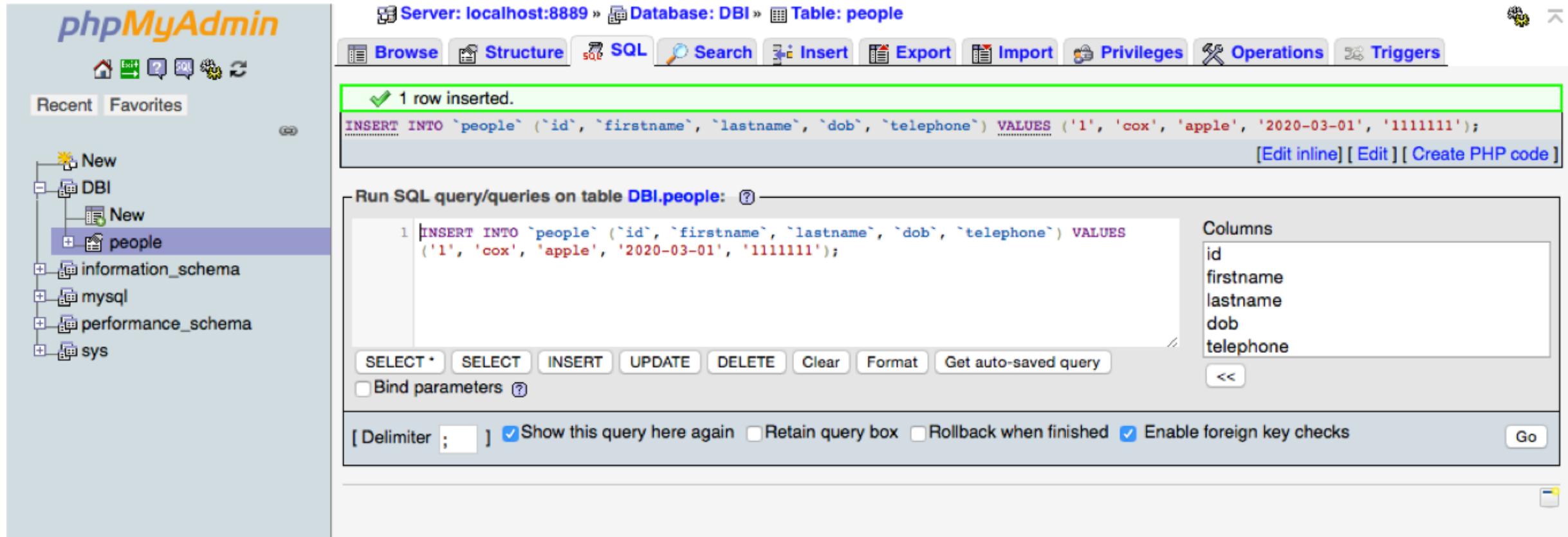
Example: SELECT *

The INSERT SQL Command

- `INSERT INTO table name (column_name_1, column_name_2, ...)
VALUES (value_1, value_2, ...)`
- For example,

```
INSERT INTO people (id, firstname, lastname, ...)  
VALUES (1, cox, apple, ...)
```

Example: INSERT



The screenshot shows the phpMyAdmin interface for a database named 'DBI'. The 'people' table is selected. The SQL tab is active, displaying the query: `INSERT INTO `people` (`id`, `firstname`, `lastname`, `dob`, `telephone`) VALUES ('1', 'cox', 'apple', '2020-03-01', '1111111');`. A success message '1 row inserted.' is shown above the query. The 'Columns' panel on the right lists the table's columns: id, firstname, lastname, dob, and telephone. The query editor at the bottom shows the same query, with buttons for SELECT, INSERT, UPDATE, DELETE, and other database operations.

Client-server Architecture

- Web access to a database is provided by a client-server architecture.
- The client machines provide a way for users to input requests to a database that is resident on a computer that runs a database server.
- Results of requests to the server are returned to the client.



Database Access with PHP and MySQL

- PHP access to a database is often done with two HTML documents:
 - One to collect a user request for a database access and
 - Another to host the PHP code to process the request and generate the returned HTML document.

```
<!DOCTYPE html>
<html>
  <head>
    <title>PHP Test</title>
  </head>
  <body>
    <?php include($_SERVER["DOCUMENT_ROOT"]."/myphp.php"); ?>
  </body>
</html>
```

index.php

```
myphp.php
```

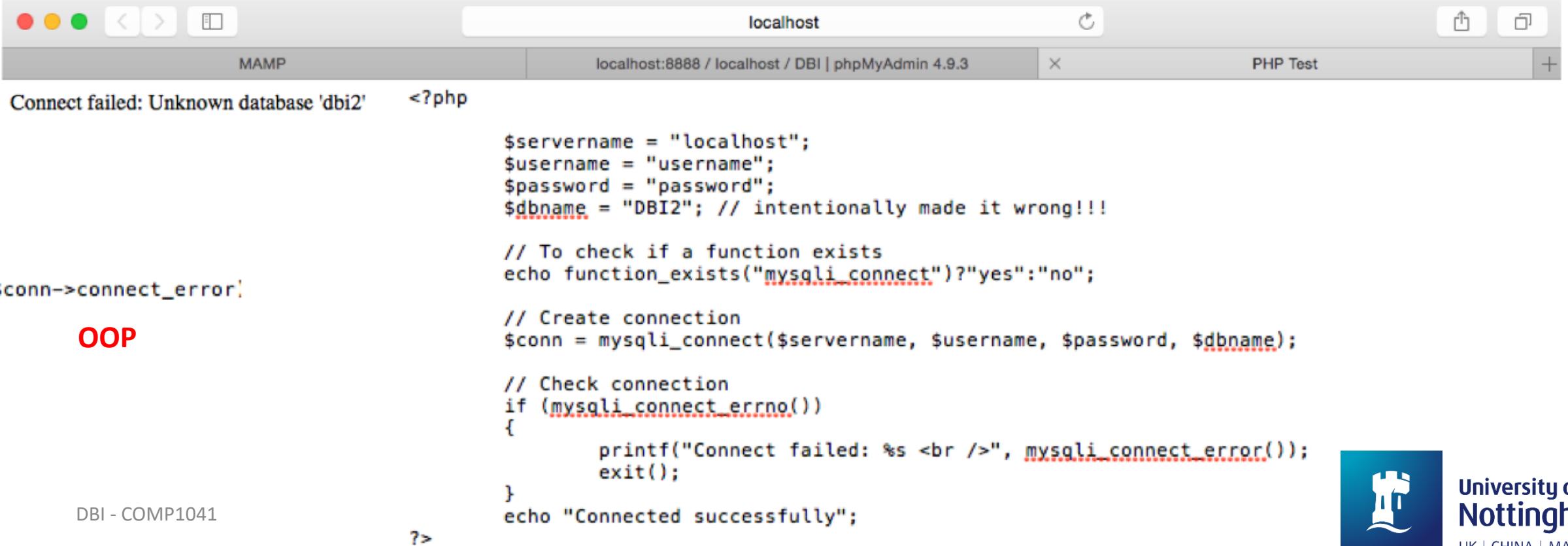
```
$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "DBI";

// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);

// Check connection
if ($conn->connect_error)
{
    die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully";
?>
```

Procedural PHP

- PHP was initially developed as procedural language but later extended to object oriented programming.



localhost

MAMP

localhost:8888 / localhost / DBI | phpMyAdmin 4.9.3

PHP Test

+

Connect failed: Unknown database 'dbi2'

```
<?php
    $servername = "localhost";
    $username = "username";
    $password = "password";
    $dbname = "DBI2"; // intentionally made it wrong!!!

    // To check if a function exists
    echo function_exists("mysqli_connect")?"yes":"no";

$conn->connect_error

    // Create connection
    $conn = mysqli_connect($servername, $username, $password, $dbname);

    // Check connection
    if (mysqli_connect_errno())
    {
        printf("Connect failed: %s <br />", mysqli_connect_error());
        exit();
    }
    echo "Connected successfully";
?>
```

OOP

DBI - COMP1041



Example: SELECT

- You will learn more about SQL and databases after PHP.

```

<?php

$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "DBI";

// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);
// Check connection
if ($conn->connect_error)
{
    die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully <br />";

$sql = "SELECT id, firstname, lastname FROM people";
$result = $conn->query($sql);

$fields = $result->field_count;
$nrrows = $result->num_rows;
echo "There are " . $fields . " fields, and " . $nrrows . " rows in the
results<br />";

```

```

if ($nrrows > 0)
{
    // output data of each row
    while($row = $result->fetch_assoc())
    // fetch_assoc() returns false if there is no more rows
    {
        $keys = array_keys($row);
        $vals = array_values($row);
        echo "<br />";
        foreach($keys as $temp)
        {
            echo $temp . " ";
        }
        echo "<br />";
        foreach($vals as $temp)
        {
            echo $temp . " ";
        }
        echo "<br />";
        echo "id: " . $row["id"] . " - Name: " . $row["firstname"] . " -
Lastname: " . $row["lastname"] . "<br />";
    }
    else
    {
        echo "0 results";
    }
    $conn->close();
?>

```



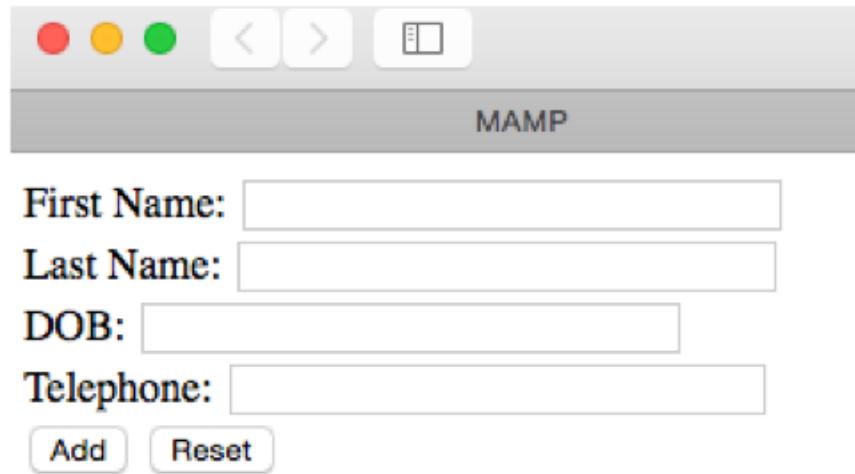
Connected successfully
There are 3 fields, and 3 rows in the results

id firstname lastname
1 cox apple
id: 1 - Name: cox - Lastname: apple

id firstname lastname
2 egg banana
id: 2 - Name: egg - Lastname: banana

id firstname lastname
6 satsumas oranges
id: 6 - Name: satsumas - Lastname: oranges

Example: INSERT INTO



MAMP

First Name:

Last Name:

DOB:

Telephone:

```
<!DOCTYPE html>
<html>
  <head>
    <title>PHP Test</title>
  </head>
  <body>

    <form action = "myphp.php" method = "post">
      First Name: <input type = "text" name = "firstname" size = "30" /><br />
      Last Name: <input type = "text" name = "lastname" size = "30" /><br />
      DOB: <input type = "text" name = "dob" size = "30" /><br />
      Telephone: <input type = "text" name = "tel" size = "30" /><br />
      <input type = "submit" value = "Add" />
      <input type = "reset" value = "Reset" />
    </form>
  </body>
</html>
```

index2.php

```
<?php

$firstname = $_POST["firstname"];
$lastname = $_POST["lastname"];
$dob = $_POST["dob"];
$tel = $_POST["tel"];

$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "DBI";

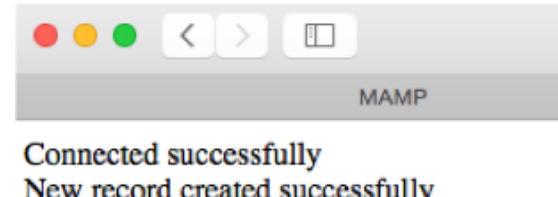
// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);

// Check connection
if ($conn->connect_error)
{
  die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully <br />";

$sql = "INSERT INTO people (firstname, lastname, dob, telephone) VALUES
('$firstname', '$lastname', '$dob', '$tel')";

if($conn->query($sql) === true)
{
  echo "New record created successfully";
}
else
{
  echo "Error: " . $sql . "<br>" . $conn->error;
}

$conn->close();
?>
```



Example: DELETE FROM



First Name: Delete Reset



Connected successfully
Record deleted successfully



Connected successfully
id: 1 - Name: cox - Lastname: apple - DOB: 2020-03-01 - Telephone: 1111111
id: 2 - Name: egg - Lastname: banana - DOB: 2020-02-02 - Telephone: 2222222
id: 6 - Name: satsumas - Lastname: oranges - DOB: 2020-02-01 - Telephone: 3333331
DBI - COMP1041

<?php

```

$firstname = $_POST["firstname"];

$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "DBI";

// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);

// Check connection
if ($conn->connect_error)
{
    die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully <br />";

$sql = "DELETE FROM people WHERE firstname = '$firstname'";

if($conn->query($sql) === true)
{
    echo "Record deleted successfully";
}
else
{
    echo "Error: " . $sql . "<br>" . $conn->error;
}

$conn->close();
header("Location: myphp2.php");
?>
```

Example: Search and Display on form

```

<?php
    $id = $_POST["id"];
    $servername = "localhost";
    $username = "username";
    $password = "password";
    $dbname = "DBI";
    // Create connection
    $conn = new mysqli($servername, $username, $password, $dbname);
    // Check connection
    if ($conn->connect_error)
    {
        die("Connection failed: " . $conn->connect_error);
    }
    echo "Connected successfully <br />";
    $sql = "SELECT * FROM people WHERE id = $id";
    $result = $conn->query($sql);
    $nrow = $result->num_rows;
    if ($nrow > 0)
    {
        // output data of each row
        while($row = $result->fetch_assoc())
        // fetch_assoc() returns false if there is no more rows
        {
            $firstname = $row["firstname"];
            $lastname = $row["lastname"];
            $dob = $row["dob"];
            $telephone = $row["telephone"];
        }
    } else
    {
        echo "0 results";
    }
    $conn->close();
?>

```

ID:

Search Reset

```

<!DOCTYPE html>
<html>
    <head>
        <title>PHP Test</title>
    </head>
    <body>
        <form action = "myphp.php" method = "post">
            ID: <input type = "text" name = "id" size = "30" value="<?php echo
$ id;?>"/><br />
            First Name: <input type = "text" name = "firstname" size = "30"
value="<?php echo $firstname;?>"/><br />
            Last Name: <input type = "text" name = "lastname" size = "30"
value="<?php echo $lastname;?>"/><br />
            DOB: <input type = "text" name = "dob" size = "30" value="<?php
echo $dob;?>"/><br />
            Telephone: <input type = "text" name = "telephone" size = "30"
value="<?php echo $telephone;?>"/><br />
            <input type = "submit" value = "Update" />
            <input type = "reset" value = "Reset" />
        </form>
    </body>
</html>

```

Connected successfully

ID:

First Name:

Last Name:

DOB:

Telephone:

Update Reset

Example: UPDATE



```
<?php

$id = $_POST["id"];
$firstname = $_POST["firstname"];
$lastname = $_POST["lastname"];
$dob = $_POST["dob"];
$telephone = $_POST["telephone"];

echo "$id $firstname $lastname $dob $telephone <br />";

$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "DBI";

// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);

// Check connection
if ($conn->connect_error)
{
    die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully <br />";

$sql = "UPDATE people SET firstname = '$firstname', lastname = '$lastname', dob =
'$dob', telephone = '$telephone' WHERE id = $id";

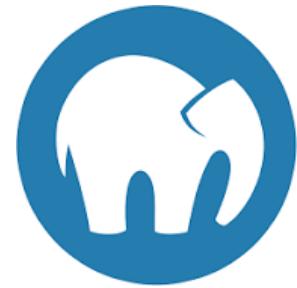
if($conn->query($sql) === true)
{
    echo "Record updated successfully";
}
else
{
    echo "Error: " . $sql . "<br>" . $conn->error;
}

$conn->close();

?>
```

Web Server Solution Stack

- On your local machine
 - XAMPP <https://www.apachefriends.org/index.html>
 - MAMP <https://www.mamp.info/en/>
- On cslinux web server (only works on campus or you can VDI from outside of campus network)
 - <https://cslinux.nottingham.edu.cn/phpmyadmin>



Conclusions

- A database is a collection of data, and a relational database is a collection of tables.
- Web access is based on client-server architecture.
- OOP PHP.
- Using phpMyAdmin.
- Examples of SELECT, INSERT INTO, DELETE FROM, UPDATE.