

# Web Development

## Week 3

### Part 1



# Discussion Questions

Linking Scripts together: [https://www.youtube.com/watch?v=cGh\\_zvESdxA](https://www.youtube.com/watch?v=cGh_zvESdxA)

Answers to common Abertay server problems:

- Verify your device <https://webauth.abertay.ac.uk/>
- Turn off your VPN



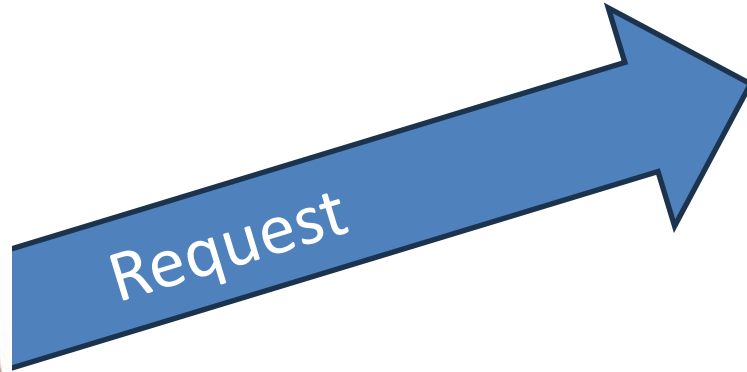
# Website Server Interactions



# Data-Backed Webpages



Web browser



Request

Webserver

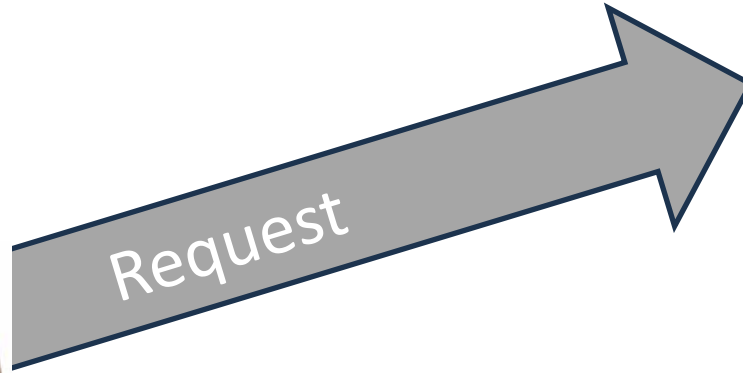


Database server

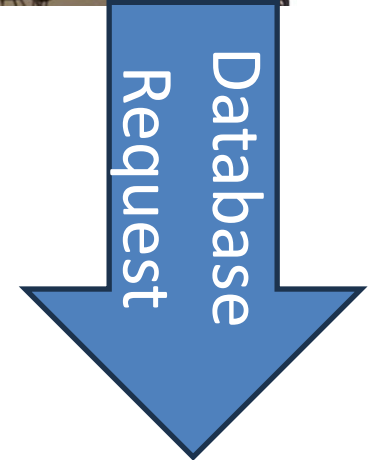
# Data-Backed Webpages



Web browser



Webserver

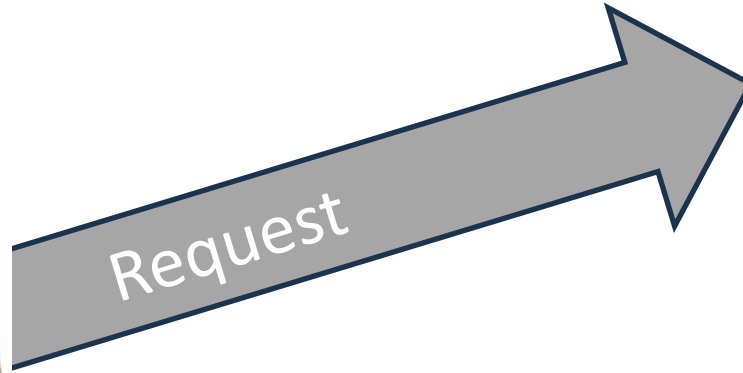


Database server

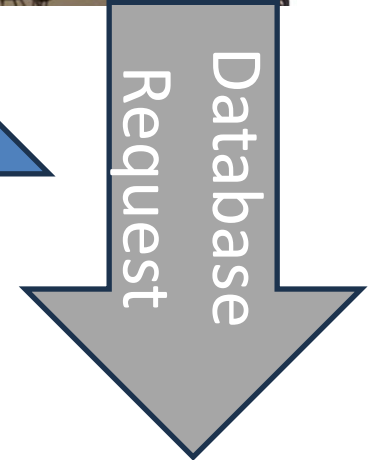
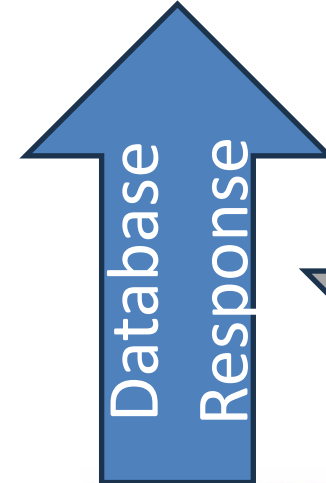
# Data-Backed Webpages



Web browser



Webserver

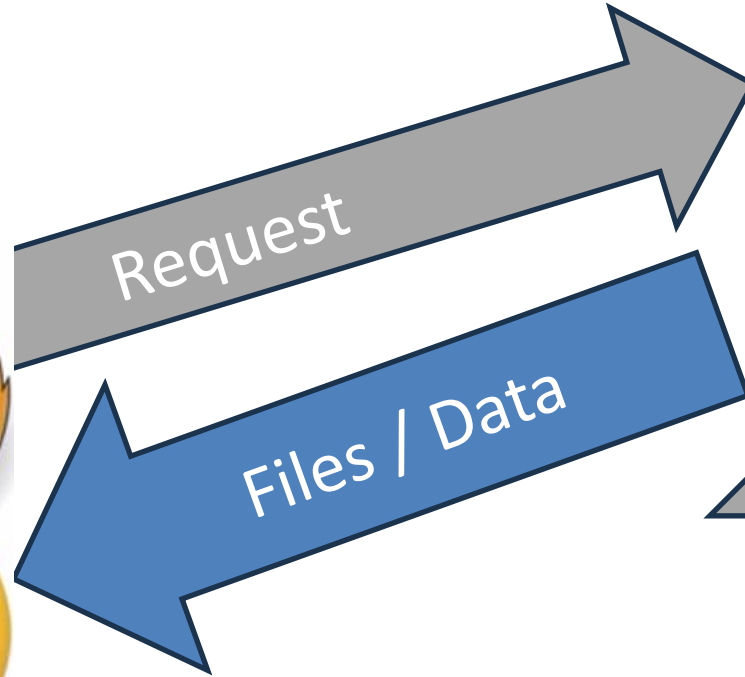


Database server

# Data-Backed Webpages



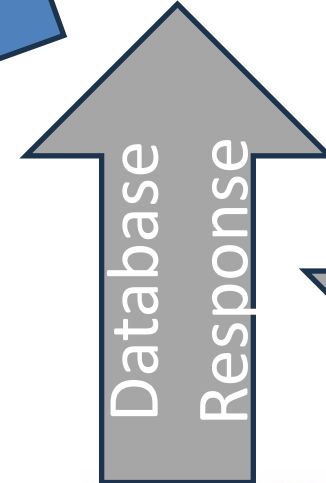
Web browser



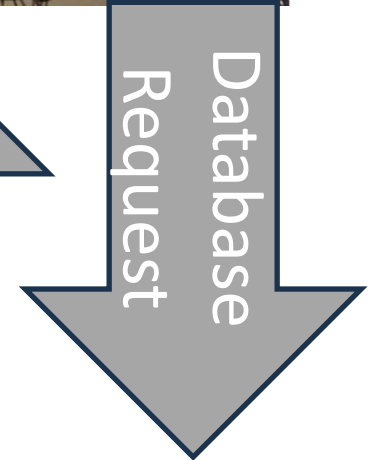
Request

Files / Data

Webserver



Database  
Response



Database  
Request



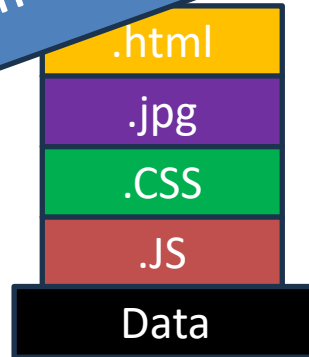
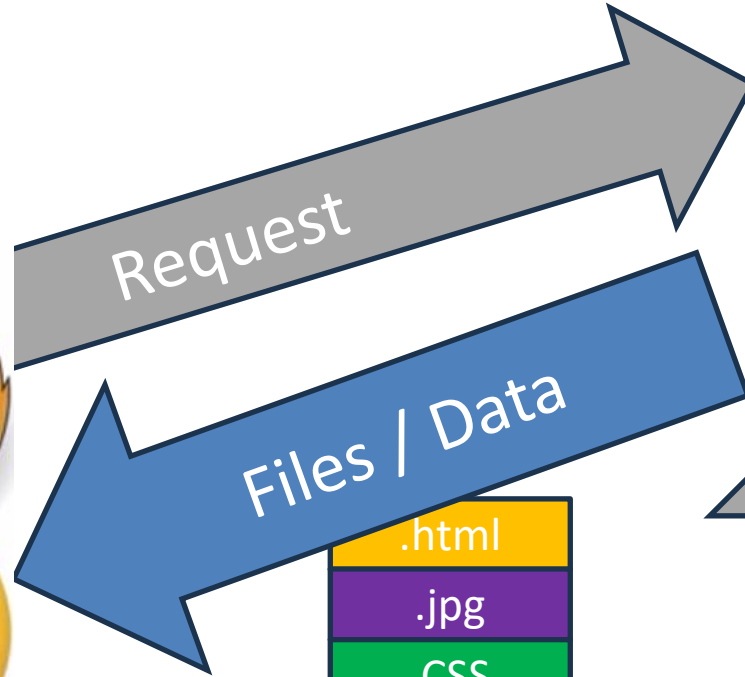
Database server



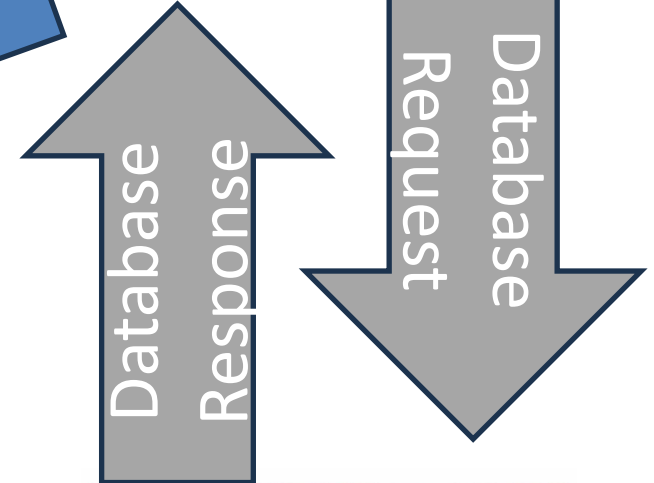
# Data-Backed Webpages



Web browser



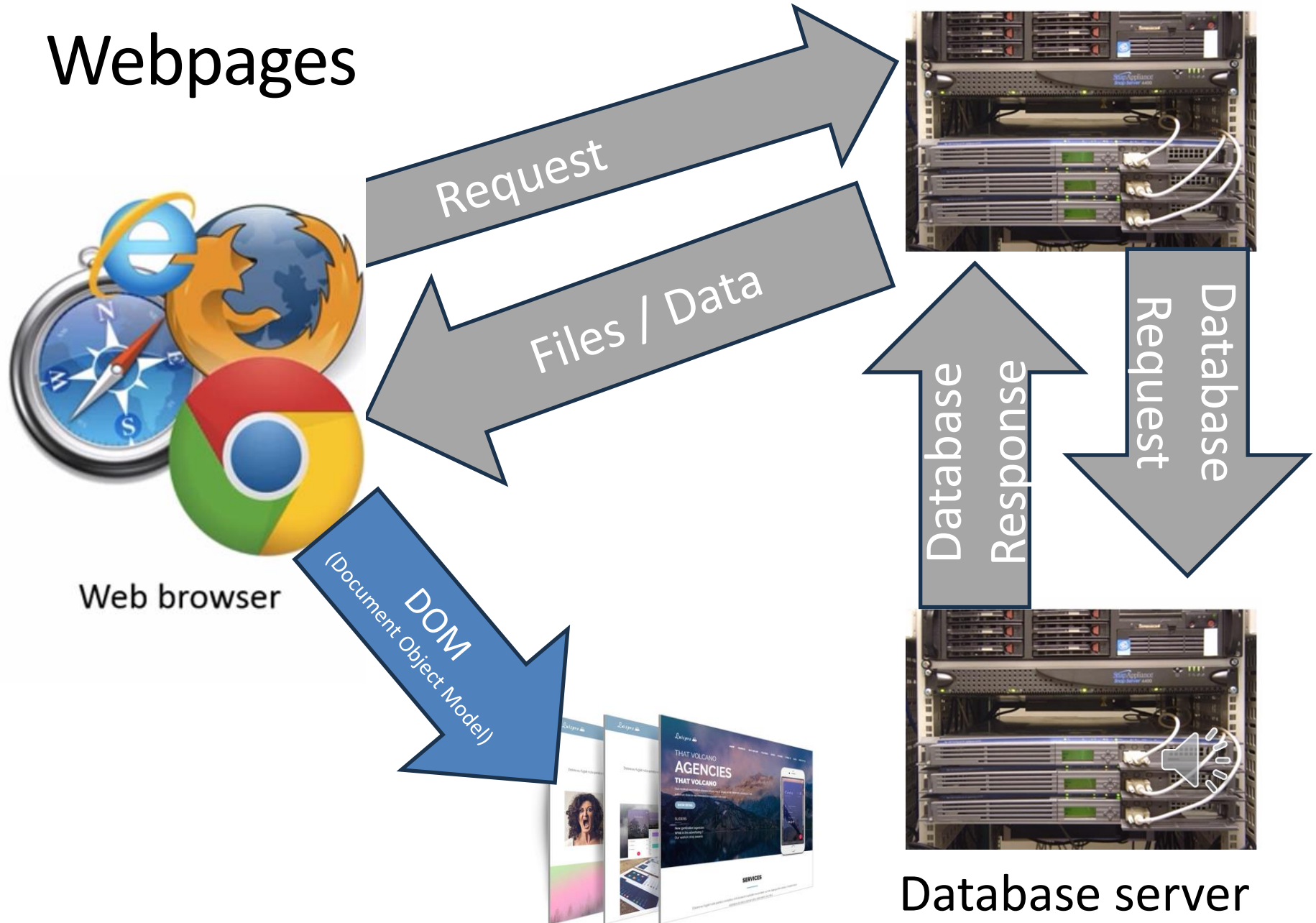
Webserver



Database server



# Data-Backed Webpages



# Recap of PHP



# What is PHP?

## PHP:

- Is an acronym for "PHP: Hypertext Preprocessor"
- Is widely-used,
- Is open-source scripting language
- Is a server-side scripting language meaning php code is executed on the server



# What is a PHP file?

PHP files have extension ".php"

PHP files can contain text, HTML, CSS, JavaScript, and PHP code

What can PHP code do?

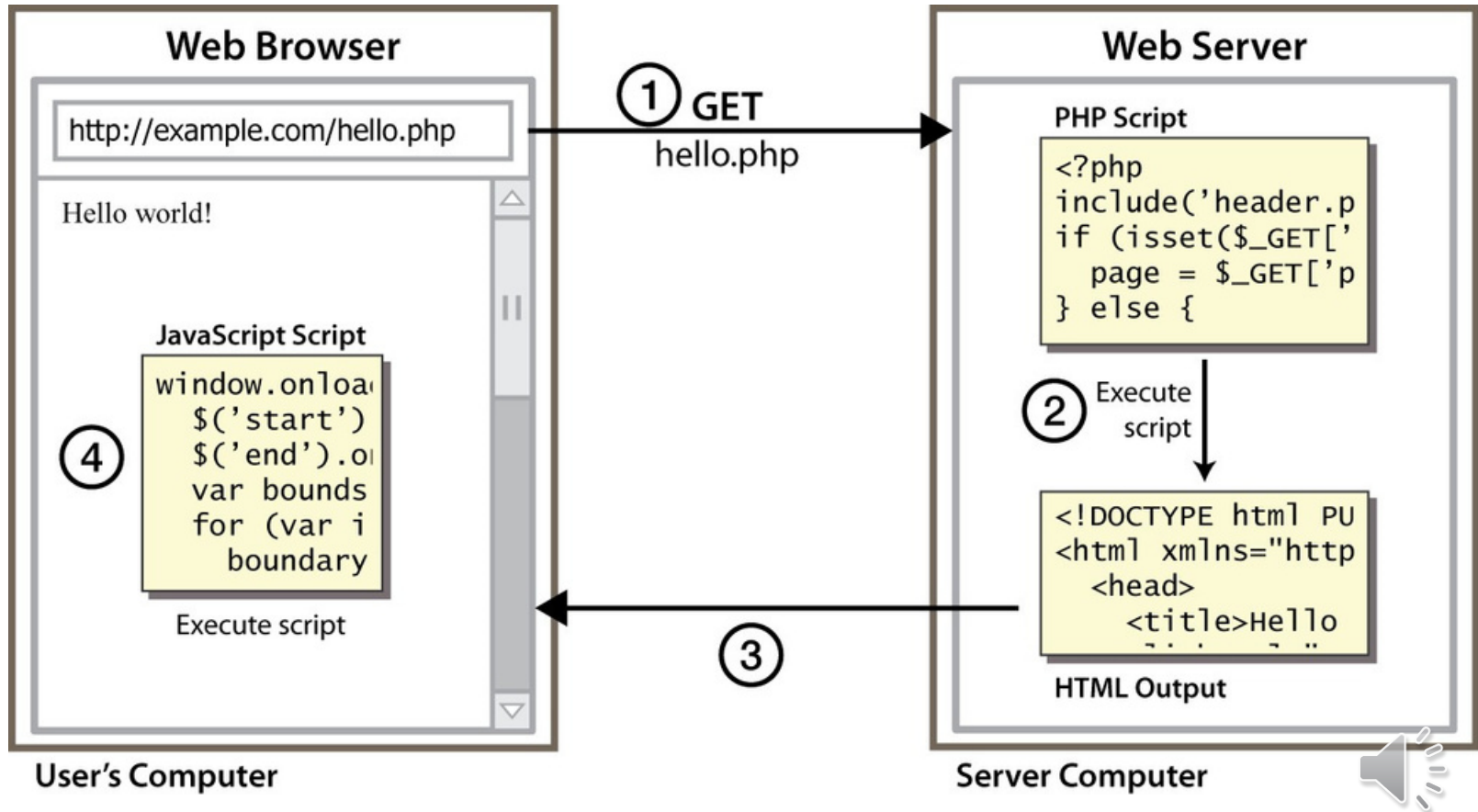
- PHP can generate dynamic page content

- PHP can create, open, read, write, delete, and close files

- PHP can collect form data



# Client & Server



# php –Hello World

```
<?php
```

```
$txt = "World";  
echo "Hello $txt!";
```

```
?>
```

Hello World!

Concatenation is extremely useful



# php –Hello World

```
<!DOCTYPE html>
<html>
<body>

<?php
$txt = "World";
echo "Hello $txt!";
?>

</body>
</html>
```

Hello World!

Variables: [https://www.w3schools.com/php/php\\_variables.asp](https://www.w3schools.com/php/php_variables.asp)

Loops: [https://www.w3schools.com/php/php\\_looping.asp](https://www.w3schools.com/php/php_looping.asp)

Functions: [https://www.w3schools.com/php/php\\_functions.asp](https://www.w3schools.com/php/php_functions.asp)





# MySQL & phpMyAdmin





# The Argument



# The Argument



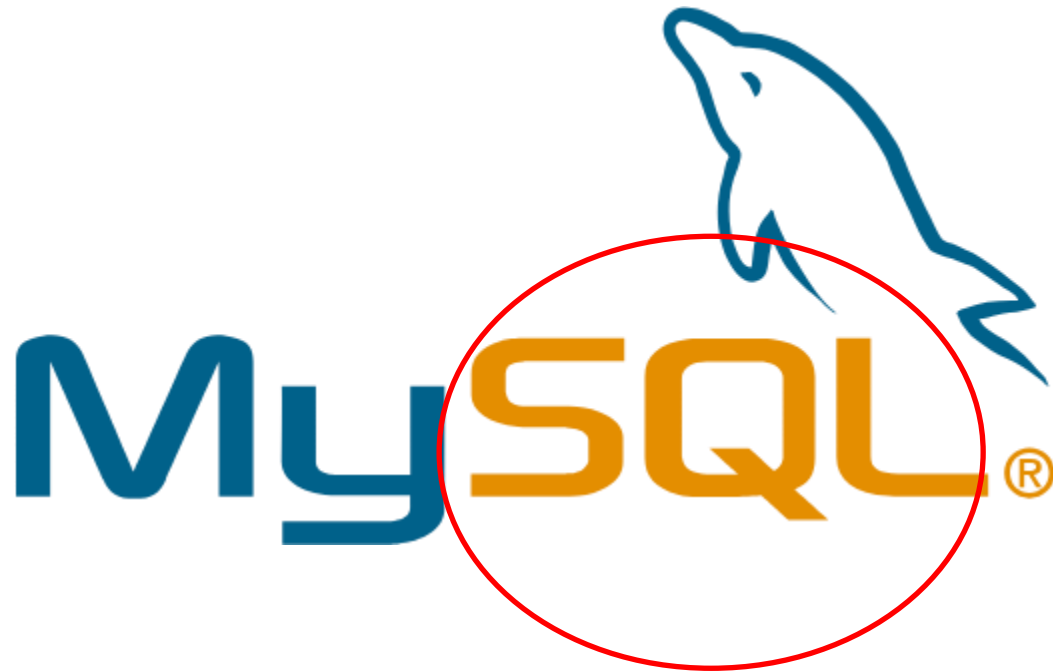
# The Argument



My = The name of co-founder Michael Widenius's daughter My



# The Argument



SQL = An acronym for Structured Query Language



# Case closed



## Documentation

The official way to pronounce "MySQL" is "My Ess Que Ell" (not "my sequel"), but we do not mind if you pronounce it as "my sequel" or in some other localized way.






# PhpMyAdmin

<https://phpmyadmin.abertay.ac.uk/phpmyadmin>

Sign in with your Lochnagar Account Details




Welcome to phpMyAdmin

Language


English (United Kingdom) ▼

Log in ?

Username:

sqlx521369 

Password:



Log in



# PhpMyAdmin

The screenshot displays the phpMyAdmin web interface for a local MySQL server. The top navigation bar includes tabs for Databases, SQL, Status, Export, Import, Settings, Variables, Charsets, Engines, and Plug-ins. The left sidebar shows the 'Recent' and 'Favourites' sections, with 'information\_schema' and 'sqlx521369' listed. The main content area is divided into several panels:

- General settings:** Includes a 'Change password' link, a 'Server connection collation' dropdown set to 'utf8mb4\_unicode\_ci', and a 'More settings' link.
- Appearance settings:** Includes a 'Language' dropdown set to 'English (United Kingdom)' and a 'Theme' dropdown set to 'pmahomme', with a 'View all' button.
- Database server:** Lists server details: Server: Localhost via UNIX socket, Server type: MariaDB, Server connection: SSL is not being used, Server version: 10.5.22-MariaDB - MariaDB Server, Protocol version: 10, User: sqlx521369@localhost, and Server charset: cp1252 West European (latin1).
- Web server:** Lists web server details: Apache/2.4.37 (Oracle Linux) OpenSSL/1.1.1k, Database client version: libmysql - mysqlnd 7.4.33, PHP extension: mysqli, curl, and mbstring, and PHP version: 7.4.33.
- phpMyAdmin:** Includes version information (5.2.1-1.el8.remi (up to date)), links to Documentation, Official Homepage, and Contribute.

A speaker icon is visible in the bottom right corner of the phpMyAdmin panel.

# PhpMyAdmin

The screenshot displays the phpMyAdmin web interface for a local server. The top navigation bar includes tabs for Databases, SQL, Status, Export, Import, Settings, Variables, Charsets, Engines, and Plug-ins. The left sidebar shows the 'Recent' and 'Favourites' sections, with 'information\_schema' and 'sqlx521369' listed. The main content area is divided into several panels:

- General settings:** Includes a 'Change password' link, 'Server connection collation' set to 'utf8mb4\_unicode\_ci', and a 'More settings' link.
- Appearance settings:** Includes 'Language' set to 'English (United Kingdom)' and 'Theme' set to 'pmahomme'.
- Database server:** Lists server details: Localhost via UNIX socket, MariaDB server type, SSL not being used, version 10.5.22-MariaDB, protocol version 10, user 'sqlx521369@localhost', and server charset 'cp1252 West European (latin1)'.
- Web server:** Lists web server details: Apache/2.4.37 (Oracle Linux) OpenSSL/1.1.1k, database client version 'libmysql - mysqlnd 7.4.33', PHP extension 'mysqli' with 'curl' and 'mbstring' enabled, and PHP version '7.4.33'.
- Footer:** A 'phpMyAdmin' logo is circled in red, with links for 'Version information: 5.2.1-1.el8.remi (up to date)', 'Documentation', 'Official Homepage', and 'Contribute'.

# PhpMyAdmin

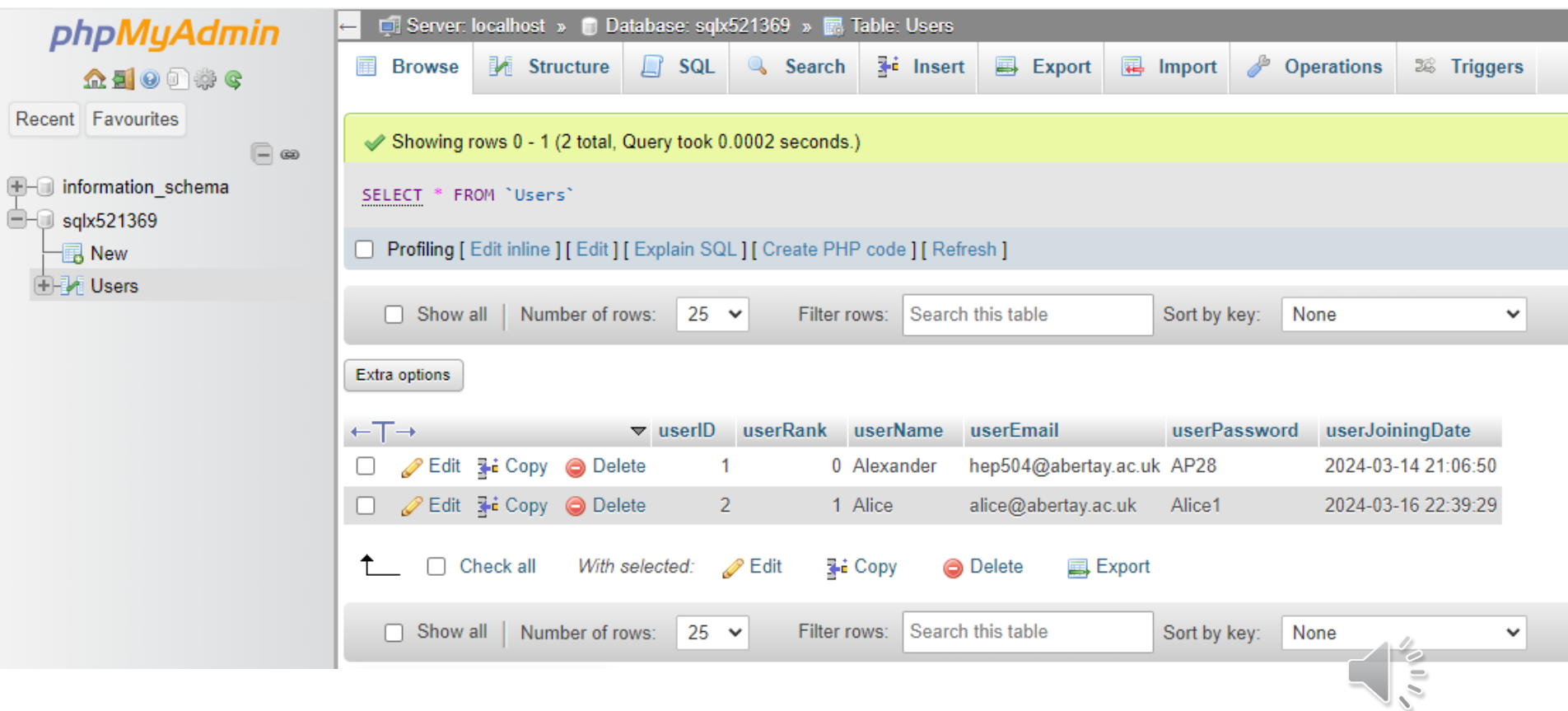
The screenshot displays the phpMyAdmin web interface for a local MySQL server. The top navigation bar includes tabs for Databases, SQL, Status, Export, Import, Settings, Variables, Charsets, Engines, and Plug-ins. The left sidebar shows a list of databases, with 'information schema' and 'sqlx521369' highlighted by a red circle. The main content area is divided into several panels:

- General settings:** Includes a 'Change password' link, a 'Server connection collation' dropdown set to 'utf8mb4\_unicode\_ci', and a 'More settings' link.
- Appearance settings:** Includes a 'Language' dropdown set to 'English (United Kingdom)' and a 'Theme' dropdown set to 'pmahomme' with a 'View all' button.
- Database server:** Lists server details:
  - Server: Localhost via UNIX socket
  - Server type: MariaDB
  - Server connection: SSL is not being used
  - Server version: 10.5.22-MariaDB - MariaDB Server
  - Protocol version: 10
  - User: sqlx521369@localhost
  - Server charset: cp1252 West European (latin1)
- Web server:** Lists web server details:
  - Apache/2.4.37 (Oracle Linux) OpenSSL/1.1.1k
  - Database client version: libmysql - mysqlnd 7.4.33
  - PHP extension: mysqli, curl, mbstring
  - PHP version: 7.4.33
- phpMyAdmin:** Includes version information (5.2.1-1.el8.remi) and links to documentation, official homepage, and contribute.

# Normal Forms in Databases



# Databases and Tables



The screenshot displays the phpMyAdmin web interface. On the left sidebar, the database structure is shown, including 'information\_schema', 'sqlx521369', and a 'New' button. The 'Users' table is selected under 'sqlx521369'.

The top navigation bar shows the current context: Server: localhost » Database: sqlx521369 » Table: Users. Below this, there are tabs for Browse, Structure, SQL, Search, Insert, Export, Import, Operations, and Triggers.

The main content area shows a green status bar indicating 'Showing rows 0 - 1 (2 total, Query took 0.0002 seconds.)'. Below this, the SQL query editor displays the query: `SELECT * FROM `Users``. There are links for Profiling, Edit inline, Edit, Explain SQL, Create PHP code, and Refresh.

Below the query editor, there are controls for displaying the table: 'Show all', 'Number of rows: 25', 'Filter rows: Search this table', and 'Sort by key: None'. An 'Extra options' button is also present.

The table view shows two rows of data:

|                          |                  | userID | userRank | userName  | userEmail            | userPassword | userJoiningDate     |
|--------------------------|------------------|--------|----------|-----------|----------------------|--------------|---------------------|
| <input type="checkbox"/> | Edit Copy Delete | 1      | 0        | Alexander | hep504@abertay.ac.uk | AP28         | 2024-03-14 21:06:50 |
| <input type="checkbox"/> | Edit Copy Delete | 2      | 1        | Alice     | alice@abertay.ac.uk  | Alice1       | 2024-03-16 22:39:29 |

Below the table, there are controls for selecting and acting on rows: 'Check all', 'With selected: Edit Copy Delete Export'.

At the bottom, there are additional controls for displaying the table: 'Show all', 'Number of rows: 25', 'Filter rows: Search this table', and 'Sort by key: None'.

# Normalization - First Normal Form

## First Normal Form

If a relation contains composite or multi-valued attribute, it violates first normal form or a relation is in first normal form if it does not contain any composite or multi-valued attribute. A relation is in first normal form if every attribute in that relation is singled valued attribute.

Example 1 – Relation STUDENT in table 1 is not in 1NF because of multi-valued attribute STUD\_PHONE. Its decomposition into 1NF has been shown in table 2.

| STUD_NO | STUD_NAME | STUD_PHONE                | STUD_STATE | STUD_COUNTRY |
|---------|-----------|---------------------------|------------|--------------|
| 1       | RAM       | 9716271721,<br>9871717178 | HARYANA    | INDIA        |
| 2       | RAM       | 9898297281                | PUNJAB     | INDIA        |
| 3       | SURESH    |                           | PUNJAB     | INDIA        |

**Table 1**

Conversion to first normal form

| STUD_NO | STUD_NAME | STUD_PHONE | STUD_STATE | STUD_COUNTRY |
|---------|-----------|------------|------------|--------------|
| 1       | RAM       | 9716271721 | HARYANA    | INDIA        |
| 1       | RAM       | 9871717178 | HARYANA    | INDIA        |
| 2       | RAM       | 9898297281 | PUNJAB     | INDIA        |
| 3       | SURESH    |            | PUNJAB     | INDIA        |

**Table 2**



# Normalization - First Normal Form

| ID    | Name | Courses |
|-------|------|---------|
| ----- |      |         |
| 1     | A    | c1, c2  |
| 2     | E    | c3      |
| 3     | M    | C2, c3  |

- In the above table Course is a multi-valued attribute so it is not in 1NF. Below Table is in 1NF as there is no multi-valued attribute

| ID    | Name | Course |
|-------|------|--------|
| ----- |      |        |
| 1     | A    | c1     |
| 1     | A    | c2     |
| 2     | E    | c3     |
| 3     | M    | c2     |
| 3     | M    | c3     |



# Normalization - Second Normal Form

To be in second normal form, a relation must be in first normal form and relation must not contain any partial dependency.

A relation is in 2NF if it has No Partial Dependency, i.e., no non-prime attribute (attributes which are not part of any candidate key) is dependent on any proper subset of any candidate key of the table.

Partial Dependency – If the proper subset of candidate key determines non-prime attribute, it is called partial dependency.



# Normalization - Second Normal Form

Consider the table below.

| STUD_NO | COURSE_NO | COURSE_FEE |
|---------|-----------|------------|
| 1       | C1        | 1000       |
| 2       | C2        | 1500       |
| 1       | C4        | 2000       |
| 4       | C3        | 1000       |
| 4       | C1        | 1000       |
| 2       | C5        | 2000       |



# Normalization - Second Normal Form

**Table 1**

| STUD_NO | COURSE_NO |
|---------|-----------|
| 1       | C1        |
| 2       | C2        |
| 1       | C4        |
| 4       | C3        |
| 4       | C1        |

**Table 2**

| COURSE_NO | COURSE_FEE |
|-----------|------------|
| C1        | 1000       |
| C2        | 1500       |
| C3        | 1000       |
| C4        | 2000       |
| C5        | 2000       |

NOTE: 2NF tries to reduce the redundant data getting stored in memory. For instance, if there are 100 students taking C1 course, we don't need to store its Fee as 1000 for all the 100 records, instead, once we can store it in the second table as the course fee for C1 is 1000.

# Normalization - Third Normal Form

A relation will be in 3NF if it is in 2NF and not contain any transitive partial dependency.

3NF is used to reduce the data duplication. It is also used to achieve the data integrity.

If there is no transitive dependency for non-prime attributes, then the relation must be in third normal form.

A relation is in third normal form if it holds at least one of the following conditions for every non-trivial function dependency  $X \rightarrow Y$ .

X is a super key.

Y is a prime attribute, i.e., each element of Y is part of some candidate key.



# Normalization - Third Normal Form

**EMPLOYEE\_DETAIL table:**

| EMP_ID | EMP_NAME  | EMP_ZIP | EMP_STATE | EMP_CITY |
|--------|-----------|---------|-----------|----------|
| 222    | Harry     | 201010  | UP        | Noida    |
| 333    | Stephan   | 02228   | US        | Boston   |
| 444    | Lan       | 60007   | US        | Chicago  |
| 555    | Katharine | 06389   | UK        | Norwich  |
| 666    | John      | 462007  | MP        | Bhopal   |



# Normalization - Third Normal Form

Relational Database Management System:

[https://www.w3schools.com/mysql/mysql\\_rdbms.asp](https://www.w3schools.com/mysql/mysql_rdbms.asp)

First normal form to Fifth Normal Form

<https://medium.com/@shahooda637/mastering-database-design-a-comprehensive-guide-to-sql-normalization-1nf-to-5nf-e23a8c942168>





# What's in Part 2?

