Project Tutorial 3

PHP and MySQL

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PHP and databases

Basic strategy

- Connect to a database.
- Construct a SQL query as a string.
- Run the query.
  - If the query returns results (e.g., SELECT), then get the data.
- Close the connection.

Connecting to a database

- Use the mysqli_connect method:

  ```
  $connection = mysqli_connect('localhost','exampleuser','mypassword','Example')
  ```

  - Arguments: server, username, password, database name.
- mysqli = MySQL improved (newer functions).

Usernames and password

- Root can access all databases.
- Good practice tips:
  - Set up new usernames/passwords for each database. (Don’t use root!)
  - Set a root password as well.
  - Store files such as SQL scripts on server but not in the www/htdocs directory (requestable by users).
    - Don’t want hackers to get easy access to your development code.

Connections can fail...

- Can use:

```
$connection =
mysqli_connect('localhost','exampleuser','mypassword','Example')
  or die('Error connecting to MySQL server.' . mysql_error());
```

  - die echo’s the message and exits the current script.

- Can also use:

```
if (!$connection) { ... } // connection failed
```

  - Allows more useful action to be taken.

Making a SQL query

```
$query = "SELECT first_name, family_name FROM Users";
$result = mysqli_query($connection,$query)
 or die('Error making select users query' .
mysql_error());
```

- SQL query is a string (semi-colon is optional for the query string).
- Use mysqli_query with connection and query.
  - Returns a mysqli_result object.

Getting the results

```
$row = mysqli_fetch_array($result)
```

- Fetch the next row from the object returned.
- Returns an array containing the column/value pairs for the row. Access using:

  ```
  $row['first_name']
  $row['family_name']
  ```

Need to iterate to get complete result set

- Create a dynamic table from database results using PHP:

```
echo '<table border="1">';
while ($row = mysqli_fetch_array($result))
{
  echo '<tr><td>' . $row['first_name’].
       '</td><td>' . $row['family_name’].
       '</td></tr>';
}
echo '</table>’;
```

- $row evaluates to false when no more rows exist

Close the connection

```
mysqli_close($connection);
```

- Important to release a connection when no longer needed (finite connection pool).

Constructing an INSERT query from input

```
$connection = mysqli_connect('localhost','exampleuser',
'mypassword','Example')
  or die('Error connecting to MySQL server.' . mysql_error());

$query = "INSERT INTO Users (first_name, family_name)".
   "VALUES ('${user['firstName']}','${user['familyName']}')";

$result = mysqli_query($connection,$query)
  or die('Error making saveToDatabase query’);
mysqli_close($connection);
```

Tip: Beware of browser caching

- Sometimes browsers cache data to reduce the need to request data from the server.
- Frustrating experience of making changes to .php files and not seeing any changed behavior.
- Try force reload (ctrl+F5 or cmd+R) or clearing cache.

Tip: Reuse the database connection code

- The work of opening a database connection, sending a query, and closing a database connection is the same across the site.
- Reuse these functions by placing them in a PHP file and including that file.
  - E.g. `<?php include 'database.php'; ?>`

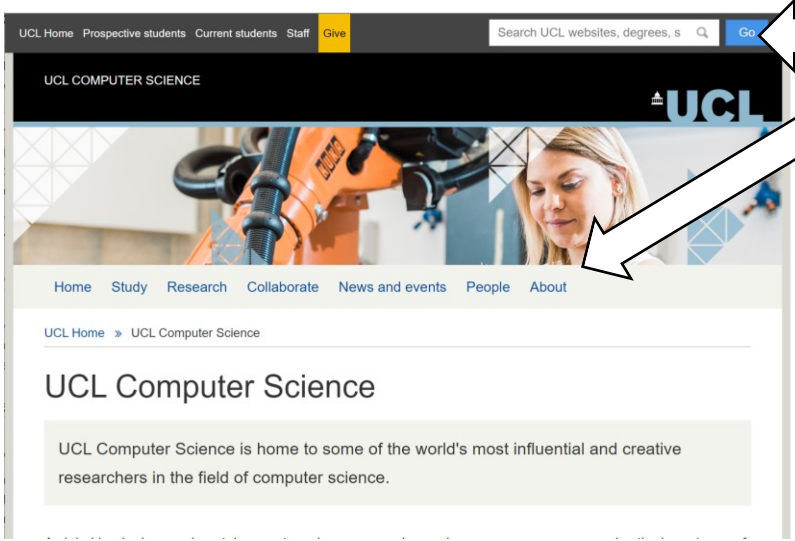
Include vs. require

- PHP provides include and require to insert the content of one php/html file into another.
- `<?php include('header.php'); ?>`
  - If an error occurs a warning is generated but PHP script carries on.
  - Use this if you have robust error recovery.
    - Don’t want to risk displaying invalid or private information.
- `<?php require('header.php'); ?>`
  - If an error occurs PHP script will exit.
  - Use this by default.

_once

- PHP pages are often built with multiple requires or includes.
- There can be a problem with a file being included/ required more than once.
  - This is a problem for PHP code in particular.
- `include_once`, `require_once` will not include/require a file that has already been loaded.
- Use require_once for your code.

PHP includes are helpful for website layout too



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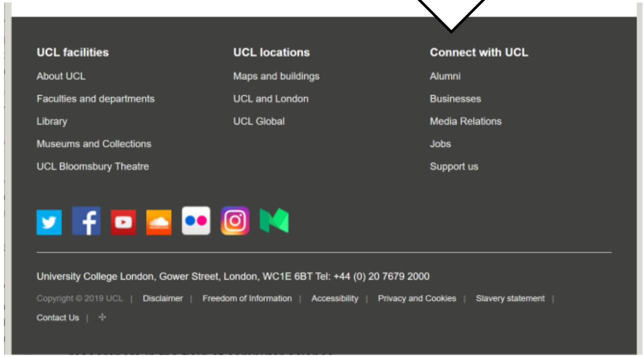
Headers and menus

Common footer



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Header example using variables

- In pageheader.php:

```
<!DOCTYPE html>
<html>
  <head>
    <meta http-equiv="Content-Type"
content="text/html; charset=UTF-8">
    <link rel="stylesheet" href="style.css"
type="text/css" media="screen">
    <?php echo"<title>My Application -
$pageTitle</title>" ?>
  </head>
  <body>
    <header>
      <img class="headerlogo" src="logo.png">
      <p class="headertitle">Site name</p>
    </header>
```

Include same stylesheet in every page for consistent look

Can use variables to display page-specific data.

Using the header in a page

- In a page using the header:

  ```
  <?php
    $pageTitle = "Index";
    require_once('pageheader.php');
  ?>
  ```

- Set the page title.
- The content of the required file is directly included in the text of the document, so variables are in scope.

TODOs this week:

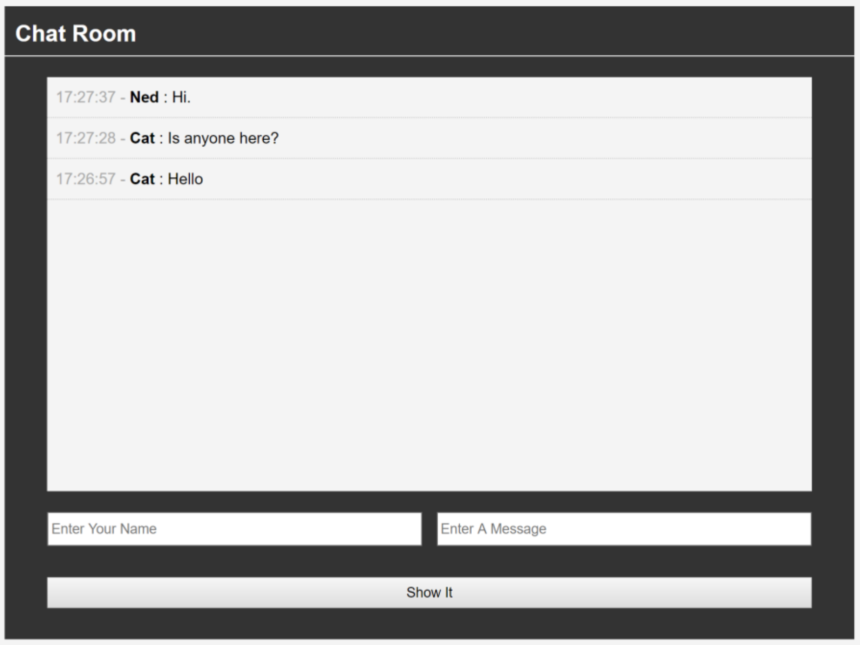
- Upload your draft ER diagram.
- Create a SQL database for your project.
  - Remember you can make changes in the future!
- Add PHP scripts to your project to insert, display, or delete database rows.

PHP example

Basic chatroom

- Provides a simple chat application.
- Illustrates the combination of:
  - HTML + CSS to have a basic responsive interface.
  - PHP code running on the web server.
  - MySQL database running on the database server.

User interface



Chat Room

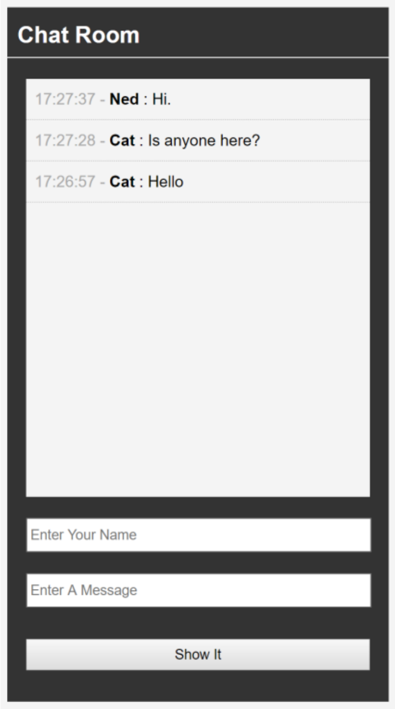
17:27:37 - **Ned** : Hi.

17:27:28 - **Cat** : Is anyone here?

17:26:57 - **Cat** : Hello

Responsive design

- Changes layout for smaller screens.



Chat Room

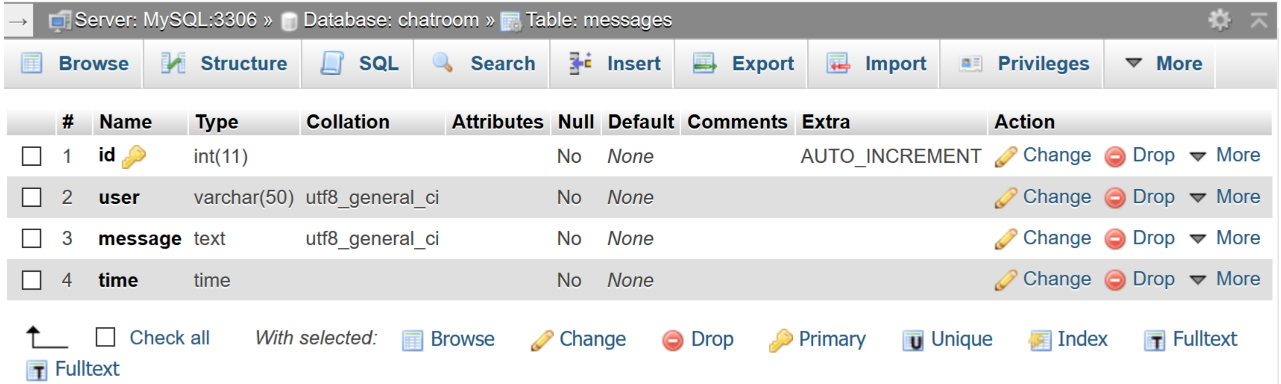
17:27:37 - **Ned** : Hi.

17:27:28 - **Cat** : Is anyone here?

17:26:57 - **Cat** : Hello

The database

- Created using phpMyAdmin.
- One table, 4 columns, id is the primary key.



	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
□	1	**id**	int(11)			No	*None*		AUTO_INCREMENT	Change Drop More
□	2	**user**	varchar(50)	utf8_general_ci		No	*None*			Change Drop More
□	3	**message**	text	utf8_general_ci		No	*None*			Change Drop More
□	4	**time**	time			No	*None*			Change Drop More

index.php (1/3)

Includes / runs another PHP file

```
<?php include 'database.php'; ?>
<?php
  $query = "SELECT * FROM messages ORDER BY id
DESC";
  $messages = mysqli_query($connection, $query);
?>
<!doctype html>
<html>
  <head>
    <meta charset="utf-8"/>
    <title>CHAT!</title>
    <link rel="stylesheet" href="css/style.css"
type="text/css" />
  </head>
```

Retrieve all messages from DB

index.php (2/3)

```
<body>
  <div id="container">
    <header>
      <h1>Chat Room</h1>
    </header>
    <div id="messages">
      <ul>
        <?php while($row = mysqli_fetch_assoc($messages)) : ?>
          <li class="message">
            <span><?php echo $row['time'] ?> - </span><strong>
            <?php echo $row['user']?></strong>
            : <?php echo $row['message'] ?>
          </li>
        <?php endwhile; ?>
      </ul>
    </div>
```

Interleaved HTML and PHP
to display messages

index.php (3/3)

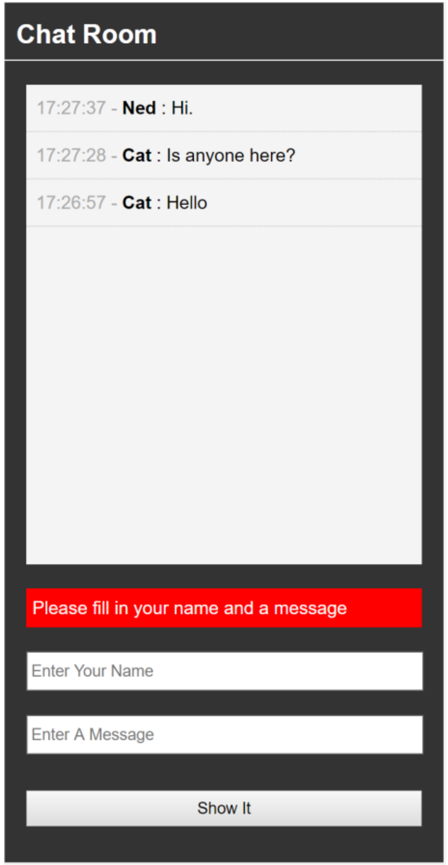
If there was an error in previous input data, display a message

```
  <div id="input">
    <?php if (isset($_GET['error'])) : ?>
      <div class="error"><?php echo $_GET['error']; ?></div>
    <?php endif; ?>
    <form method="post" action="process.php">
      <input type="text" id="user" name="user"
placeholder="Enter Your Name"/>
      <input type="text" id="newmessage" name="message"
placeholder="Enter A Message"/>
      <input id="show-btn" type="submit" name="submit"
value="Show It"/>
    </form>
  </div>
</div>
</body>
</html>
```

Form is submitted to process.php

Data validation

- index.php?error=Please+fill+in+your+name+and+a+message



Chat Room

17:27:37 - **Ned** : Hi.

17:27:28 - **Cat** : Is anyone here?

17:26:57 - **Cat** : Hello

Please fill in your name and a message

database.php

```
<?php
  $connection = mysqli_connect("localhost",
"chatadmin", "adminpassword", "chatroom");

  if (mysqli_connect_errno())
    echo 'Failed to connect to the MySQL
server: '. mysqli_connect_error();

?>
```

process.php (1/2)

Clean up the input to avoid SQL injection attacks

```
<?php
   include 'database.php’;
   if (isset($_POST['submit'])) {
     $user = mysqli_real_escape_string($connection,
$_POST['user’]);
     $message = mysqli_real_escape_string($connection,
$_POST['message’]);
     date_default_timezone_set('Europe/London’);
     $time = date(‘H:i:s', time());
     if (!isset($user) || $user == '' || !isset($message) ||
$message == ‘’) {
       $error = "Please fill in your name and a message";
       header("Location: index.php?error=" . urlencode($error));
       exit();
   }
```

process.php (2/2)

Insert into database

```
  else {
   $query = "INSERT INTO messages (user, message, time)
        VALUES ('$user', '$message', '$time’)";
   if (!mysqli_query($connection, $query)) {
    die('Error: ' . mysqli_error($connection));
   }
   else {
    header('Location: index.php’);
    exit();
   }
  }
 }
?>
```

Redirect to this URL

The CSS

- Refer to .css file for some more examples:

```
*{
  margin: 0;
  padding: 0;
}
body {
  font-family: arial;
  font-size: 15px;
  line-height: 1.5em;
  background: #f4f4f4;
}
```

```
#container {
  background: #333333;
  margin: 50px auto;
  overflow: auto;
  width: 60%;
}
header h1 {
  color: #ffffff;
  font-size: 22px;
  ...
```