WAD Lab Test 2 (1 Hour 45 Minutes) [30 marks]

General Instructions:

- You can refer to any offline resources already on your laptop, but you must disable all networking and Bluetooth connections during the test. You must not communicate with anyone via any means during the test.

- You can also refer to your own offline cheat sheets. You may not share your cheat sheets with other students during the test. Please be courteous and keep your cheat sheets in your designated seat area.

- Just before the test, you will be given instructions by the invigilator as to how to obtain resource files required for the lab test and how to submit your solutions.

- No questions will be entertained during the test. If necessary, make your own assumptions.

- You are allowed to use only standard PHP classes and functions in your solutions – do not use any third party libraries.

- Use meaningful names for classes, methods, functions and variables, as well as indent your code correctly.

- You **MUST** include your name as author in the comments of all your submitted source files. Failure to do so WILL attract a penalty of up to **20%** of your score for the corresponding question.

  For example, if your registered name is "KIM Jong Un" and email ID is kim.jongun.2018, include the following comment at the beginning of each source file you write.

```
/*
      Name:  KIM Jong Un
      Email: kim.jongun.2018
*/
```

- You may wish to comment out the parts in your code which cause errors. But commented code will not be marked.

- Unless otherwise stated, you can assume that user inputs are in the correct format.

- Instructions are given for WAMP users considering default setting – the setting that we support for this course. If you are using MAMP, you may need to make necessary changes by yourself (e.g., modifying connection information in `ConnectionManager.php`).

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

Load Database & Configure Connection Manager

Given:

- `database/`
  - `ConnectionManager.php`
  - `LT2.sql`

Instructions:

- Import **LT2.sql** into your local MySQL database (via PHPMyAdmin, MySQL WorkBench or by other means).
  - It will create "2019lt2" database and the following tables:
    - For **Question 1**: "response"
    - For **Question 2**: "employee", "spouse", "child"
    - For **Question 3**: no tables
  - Check the contents of the above-mentioned tables.
    - This may help you in answering Questions 1 and 2 below.
- In **ConnectionManager.php**, verify that the username, password, port number are correct.

Question 1: Survey (Difficulty Level: *) **[9 marks]**

Given:

- `q1/model/`
  - `common.php` (**complete**)
  - `Response.php` (**complete**)
  - `ResponseDAO.php` (**complete**)
- `q1/images/`
  - `sis.png` (**given**)
- `q1/`
  - `display.php` ***(partial)***
  - `survey1.php` **(complete)**
  - `survey2.php` (***partial***)
  - `process_survey.php` ***(partial)***
  - `statistics.php` ***(partial)***

Overview:

In SIS, each term is 16 weeks long and each lesson (of a typical module) is three (3) hours long. Assume that SIS is looking to revamp this based on student preferences. In order to best understand student preferences with regards to **term length** (15 or 16 weeks) and **lesson duration** (2 or 3 hours), you are tasked to develop a web application for collecting student **survey responses**. Upon receiving the response from each student, the web application displays a summary, and it stores the response into a database.

The web application can also display all responses stored in the database and compute some statistics based on those responses.

User Navigation Flow:

- **Part A**: `display.php`
- **Part B**: `survey1.php -> survey2.php -> process_survey.php`
- **Part C**: `statistics.php`

Part A: Complete `display.php` (3 marks)

Update **`display.php`** to display responses that are stored in the database:

- Use **`retrieveAll()`** method of **`ResponseDAO`** to retrieve all records from table "response" in the database as an indexed array of **`Response`** objects. Loading **LT2.sql** given to you results in the creation of two records (a.k.a. rows) in table "response".
- Display the array of **`Response`** objects as a HTML table whose format is shown below:

Name	Preferred Class Length (in hours)	Preferred Sem Length (in weeks)
Andy	3	15
Bob	2	16

If done correctly, **`display.php`** should display this:

`display.php`

Stored Responses

Name	Preferred Class Length (in hours)	Preferred Sem Length (in weeks)
Andy	3	15
Bob	2	16

Note: The above content will change as the table "response" gets updated.

Part B: Complete `survey2.php` and `process_survey.php` (4 marks)

The survey has 3 pages:

1. **`survey1.php`** collects the name of a student (if it is provided by the student).
   a. The student can choose to remain anonymous (by NOT typing in any name in the input text box).
2. **`survey2.php`** collects the preferred class length and semester length of the student.
3. **`process_survey.php`** displays all the pieces of information entered by the student in an HTML table and stores them into the database.

The following shows the navigation flow with a sample set of user inputs.
(**Name** = John; **Preferred Class Length** = 3 hours; **Preferred Semester Length** = 16 weeks):

`survey1.php`

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Survey: Page 1

We want to know your preferences about how courses are offered in SIS.
Please provide your inputs.

Name: John

Next Page

1

`survey2.php`

School of Information Systems

Survey: Page 2

Hi, please provide your preferred class length and semester length:

Preferred class length:
○ 2 hours ◉ 3 hours

Preferred semester length:
○ 15 weeks ◉ 16 weeks

Submit Your Feedback

2

`process_survey.php`

School of Information Systems

Survey: Summary

You entered:

Name:	John
Class Length:	3
Semester Length:	16

Response saved successfully

Your tasks are:

1. Get data passed through the 3 PHP pages:
   a. Complete **`survey2.php`** so that the student name that is entered in **`survey1.php`** gets passed to **`process_survey.php`**.
      i. You may use **`$_SESSION`** or **HTML form hidden input field** as deemed necessary.

2. Display student name and preferences properly in **`process_survey.php`** as an HTML table.
   a. An example HTML table matching the navigation flow from above is as follows:

Name:	John
Class Length:	3
Semester Length:	16

3. Add a new response to the database and display status:
   a. Complete **`process_survey.php`** such that user inputs are added as a new record to the table "response" in the database.
      i. Use the **`addResponse($name,$class_length,$sem_length)`** method of **`ResponseDAO`**.
      ii. The method returns a Boolean flag indicating whether the database insertion was successful or not.

   b. Display a suitable message depending on the success/failure of the database insertion operation.
      i. Echo **`"<strong>Response saved successfully</strong>"`** if the insertion was successful.
      ii. Echo **`"<strong>Response was not saved successfully</strong>"`** if the insertion was not successful.

HINT:
- Use **`display.php`** created in **Part A** to check whether the insertion operation was done properly.
- Otherwise, check the status of the table "response" in your database using either PHPMyAdmin or MySQL Workbench (or by other means).

Part C: Complete `statistics.php` (2 marks)

Update **`statistics.php`** to display some statistics of the responses stored in the database as a HTML table:

- Use **`retrieveAll()`** method of **`ResponseDAO`** to retrieve all records from table "response" in the database as an indexed array of **`Response`** objects.
- Display some statistics of the array of **`Response`** objects as an HTML table with **THREE** rows whose format is shown below:
    - The first row (**# Responses**) corresponds to the total number of responses stored in the database table "response".
    - The second row (**# 2 hours**) corresponds to the total number of responses indicating "2 hours" as the preferred class length.
    - The third row (**% 15 weeks**) corresponds to the percentage (%) of responses indicating "15 weeks" as the preferred semester length (out of all responses). Use the built-in PHP function **number_format** to format the percentage value to TWO decimal places.

# Responses	3
# 2 hours	1
% 15 weeks	33.33%

If done correctly, assuming that you have only added John (preferred class length = 3 hours; preferred semester length = 16 weeks) described in Part B, **`statistics.php`** should display this:

`statistics.php`

Statistics

# Responses	3
# 2 hours	1
% 15 weeks	33.33%

Note: The above will change for different contents of table "response".

Question 2: Employee Management (Difficulty Level: **) **[15 marks]**

Given:

- q2/model/
  - common.php (**complete**)
  - Employee.php (**complete**)
  - Spouse.php (**complete**)
  - protect.php (***partial***)
  - EmployeeDAO.php (***partial***)
- q2/
  - login-view.html(**complete**)
  - login.php (***partial***)
  - viewDetails.php (***partial***)
  - updatePassword.php (***partial***)
  - process.php (***partial***)

Overview:

We want to build a web application that 1) allows retrieval of employees' data - employee ID, name of employee, name of spouse (if any), name and age of the children (if any) and 2) allows the update of an employee's password.

The design of the application:

- The application has TWO roles – **Admin** and **User**.
- An employee is modelled as an **`Employee`** object.
- Spouse is modelled as a **`Spouse`** object.
- Children are modelled as an associative array with the name of the child as the key and age of the child as the value.

User Navigation Flow:

For users with User **role**:

- `login-view.html -> login.php -> viewDetails.php`

This role will be allowed to view only his/her own data from the database.

For users with Admin **role**

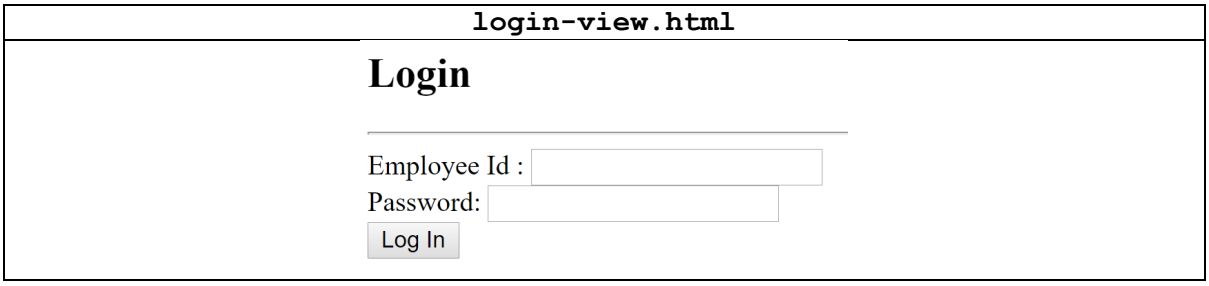
- `login-view.html -> login.php -> viewDetails.php -> updatePassword.php -> process.php`

This role will be allowed to a) view all employees' data from the database and b) update password for each employee.

Part A: Complete `login.php` (3 marks)

`login-view.html` page allows the user (employee) to log in using **employee id** and **password**.

`login-view.html`



Upon clicking on "Log In" submit button, the employee is taken to **`login.php`** which performs employee id and password **authentication**.

In **`login.php`**, perform the following:

1. Retrieve the **`empId`** and **`password`** from **`login-view.html`**

2. Use **`authenticate($empId,$password)`** method from **`EmployeeDAO`** to authenticate the **`empId`** and **`password`**
   a. **NOTE:** For simplicity reasons, the **`password`** information **IS NOT** hashed in this question. It is stored in plain text. Please check the database table using PHPMyAdmin or MySQL WorkBench (or by other means).

3. If **`authenticate($empId,$password)`** returns null (i.e., authentication is unsuccessful):
   a. Initialize or update **`$_SESSION['countUnsuccessful']`** to keep track of the number of **unsuccessful consecutive logins**.
   b. For example:
   - Try using wrong credentials to log in for 2 times, and you will see the following message.

`login.php`

4. Otherwise, if **`authenticate($empId,$password)`** returns a String that denotes the **`role`** of the employee (i.e., authentication is successful):
   a. Store the **`empId`** and **`role`** as **`$_SESSION['empId']`** and **`$_SESSION['role']`** respectively.
   b. Unset **`$_SESSION['countUnsuccessful']`**.
   c. After that, redirect the user to **`viewDetails.php`**

Please use the following accounts for testing purposes:

Employee Id	Password	Role
1	a	Admin
2	b	Admin
3	c	User
4	d	User
5	e	User

HINT: If you are stuck in this part, hard code **`$_SESSION['empId']`** and **`$_SESSION['role']`** following one of the above accounts **(**e.g., **`$_SESSION['empId']`** = 3 and **`$_SESSION['role'] = "User")`** and redirect to **viewDetails.php.**

Part B: Complete `viewDetails.php` and `getAllEmployees()` of `EmployeeDAO.php` (7 marks)

When the employee is redirected to **`viewDetails.php`**, an HTML table with different details will be displayed based on the **role** (Admin or User) of the employee.

- Get the role of the employee from **`$_SESSION['role']`** created in **`login.php`**

- Display the following HTML table for an employee with the User **role** (e.g. if you login with Employee Id: **3**).
  - For the User **role**, there will be no further functions for him/her to perform.
  - Thus, a message will be displayed that he/she has been successfully logged out too.

`viewDetails.php`

Employee ID	Name	Spouse	Child
3	Cindy	Charlie	Chloe : 4 Corrine : 8 Charmaine : 3

You are logged out

- Display the following for an employee with an Admin **role** (e.g. if you login with Employee Id : **1**) .
  - The main difference between the two HTML tables is that the employee with the Admin **role** will see the information for all employees and also an additional column (**Password**).

`viewDetails.php`

Employee ID	Name	Spouse	Child	Password
1	Andrew	Amanda	Alan : 8 Adeline : 3 Ada : 5 Alison : 10	a
2	Bob	None	None	b
3	Cindy	Charlie	Chloe : 4 Corrine : 8 Charmaine : 3	c
4	Danny	None	None	d
5	Elvis	Elle	None	e

Your tasks for User **role**:

1. Retrieve **`empId`** from **`$_SESSION['empId']`** created in **`login.php`**
2. Get an **`Employee`** object corresponding to **`empId`** by calling **`getEmployee($empId)`** method of **`EmployeeDAO`**
3. Display an HTML table containing information about the employee (see above).
   a. Use **`getSpouse($empId)`** method from **`EmployeeDAO`** to get spouse information.
      - Use **`getSpouseName()`** method of **`Spouse`** to get spouse name.
      - Display "None" if the employee has no spouse.
   b. Use **`getChildren($empId)`** method from **`EmployeeDAO`** to get children information.
      - The method returns an associative array with the **`childName`** as the key and **`childAge`** as the value.
      - The employee may still have records of children even if he doesn't have a spouse.
      - Display "None" if the employee has no children.
   c. Use **`getEmpId()`** and **`getName()`** methods from Employee to get other pieces of information.
4. Display "You are logged out message" and clear all data stored in **`$_SESSION`**.

Your tasks for Admin **role**:

1. Complete the **`getAllEmployees`**() method in **`EmployeeDAO.php`**
2. Get an indexed array of **`Employee`** objects by calling **`getAllEmployees`**() method of **`EmployeeDAO`**
3. Display a HTML table containing information about all the employees (see above)
    a. Password column should display the current password as a link that will direct the employee to **`updatePassword.php`** by passing in the corresponding **`empId`** for the specific employee.

Employee Id	Password Link
1	updatePassword?empId=1
2	updatePassword?empId=2
3	updatePassword?empId=3
4	updatePassword?empId=4
5	updatePassword?empId=5

HINT: If you are stuck in this part, directly use one of the above links, e.g., **localhost/lt2/q2/updatePassword?empId=1**, on the address bar of your web browser to proceed to Part C.

Part C: Complete `updatePassword.php` (2 marks)

When the employee is redirected to **`updatePassword.php`**, the following will be displayed. It allows the user to update his password, which is a randomly generated string generated from the application.

`updatePassword.php?empId=1`

EmployeeID : 1
Name : Andrew
Current Password : a
New Password : PwyaB3ql
Update

In **`updatePassword.php`**, perform the following:

1. Display the details of the employee

2. Store the **`empId`** as a HTML Form Hidden Field

3. Create a function **`generateRandomPassword()`** to generate and return a string with 8 alphanumeric characters (containing numbers **and** both lower and upper case alphabets), you may assume that there are no special characters.
    a. The string should be random and not with a specific pattern (e.g. 1st character is a random number, 2nd character is random alphabet, 3rd character is a random number, etc.).
        - **NOTE**: Document your assumptions (if any) as comments in your PHP file
    b. Use **`generateRandomPassword()`** and display the randomly generated password in the **`newPassword`** text field.

4. Clicking on the "Update" submit button will submit the form using **HTTP GET** containing the **`newPassword`** text field and the **`empId`** hidden field to **`process.php`.** We use HTTP GET to allow you to proceed to the next step in case you are stuck (see **HINT** below).

HINT: If you are stuck in this part, you can directly type, e.g., **localhost/lt2/q2/process.php?empId=1&newPassword=123**, on the address bar of your web browser to proceed to Part D.

Part D: Complete `process.php` and `updatePassword` method of `EmployeeDAO.php` (2 marks)

When the employee is directed to **`process.php`**, the following will be displayed after the password has been updated in the database.

`process.php`
Password updated. You are logged out

To complete this part, perform the following:

1. Code **`updatePassword($empId, $new_password)`** function in **`EmployeeDAO`** which returns a Boolean value.
2. Make use of **`updatePassword($empId, $new_password)`** to update the new password into the database.
3. Clear all data stored in **`$_SESSION`**.

Part E: Complete `protect.php` (1 mark)

When an un-authenticated user (i.e., a user who has NOT successfully logged in or has logged out) visits:

- **`viewDetails.php`**
- **`updatePassword.php`**
- **`process.php`**

the user should automatically be redirected back to **`login-view.html`**

NOTE: This part can be done independently from the other parts of this question. Do this part as the last step. Otherwise, the hints provided earlier that can enable you to proceed to the next part (in case you are stuck in one part) may no longer work.

Question 3: Room Allocation (Difficulty Level: *)** **[6 marks]**

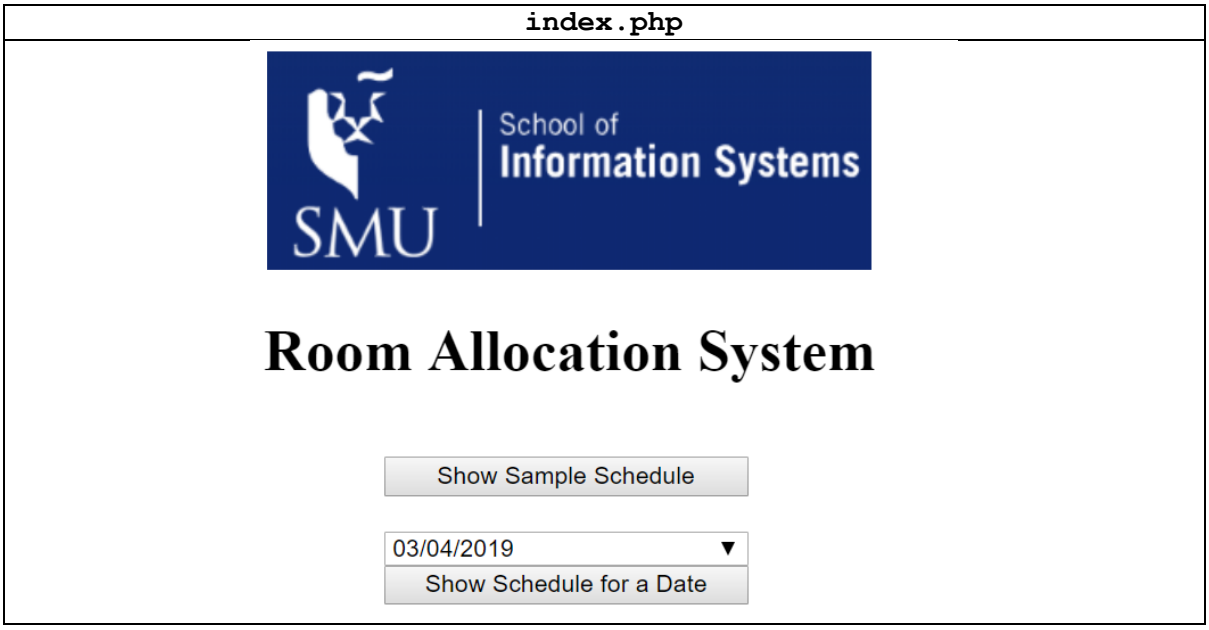
Given:

- `q3/classes/`
  - `Lecture.php` **(complete)**
  - `LectureDAO.php` **(complete)**
  - `Schedule.php` **(complete)**
- `q3/images/`
  - `sis.png` **(given)**
- `q3/tests/`
  - `test-sample.php` **(given)**
  - `test-common.php` **(given)**
- `q3/`
  - `index.php` **(complete)**
  - `display.php` ***(partial; ONLY this file will be marked)***

Overview:

This web application simulates a simple SIS Room Allocation System where 1) lectures are assigned to a minimum number of rooms and 2) more than one lecture cannot happen in the same room at the same time. The main web page (shown below) has two main functionalities – 1) Show a sample schedule, 2) Show schedule for a given date.

`index.php`



User Navigation Flow:

- `index.php -> display.php`

Part A: Complete `display_schedule($schedule)` function in `display.php` (2 marks)

`display_schedule` function displays the room allocation stored in **`$schedule`** as a HTML table. Each column of the table corresponds to a room, and each row corresponds to a 1-hour time slot, starting at 9 to 17 (i.e., 9 AM to 5 PM). **`$schedule`** is a **`Schedule`** object. This object has a property **`$room_allocation`**, which is an associative array containing room names as keys, and indexed arrays of **`Lecture`** objects as values.

Example: **`display.php`** should render the following webpage when "Show Sample Schedule" of **`index.php`** is clicked. It displays a schedule consisting of 10 lectures (L1 to L10) distributed across 3 rooms (Room-1 to Room-3).

display.php

Sample Schedule

	Room-1	Room-2	Room-3
09-10	L10	L7	L1
10-11			
11-12	L9		L2
12-13			
13-14		L6	L3
14-15	L8		
15-16		L5	L4
16-17			
17-18			

NOTE:

- Do not change the name and the number of parameters of **`display_schedule`** function.
- Your code will be tested using different **`Schedule`** objects and results will be visually inspected for grading.
- Each outcome is a **binary** one: ***Pass*** (i.e., perfect/expected table), or ***Fail***
- Marks will be given based on the number ***Pass*** outcomes.
- If your code times out while processing a given **`Schedule`** object, the corresponding outcome will be considered a ***Fail*** case.

Part B: Complete `create_schedule($lectures)` method in `display.php` (4 marks)

`create_schedule` function takes **`$lectures`**, which is an indexed array of **`Lecture`** objects. It assigns the **`Lecture`** objects to a number of rooms, such that the following constraints are met:

[C1] Each **`Lecture`** object in **`$lectures`** is assigned to a room
[C2] The number of rooms is as small as possible
[C3] Multiple lectures do not happen in the same room at the same time
[C4] All **`Lecture`** objects assigned to the rooms appear in **`$lectures`**

The resultant room allocation is an associative array containing room names as keys, and indexed arrays of **`Lecture`** objects as values. Room names start with "Room-", e.g., Room-1, Room-2, Room-3, etc. A *sample* room allocation with 3 rooms and 10 lectures is given below:

```
$room_alloc = [ "Room-1" => [ new Lecture("L10",9,1), new Lecture("L9",11,3),
                              new Lecture("L8",14,3) ],
                "Room-2" => [ new Lecture("L6",13,1), new Lecture("L7",9,3),
                              new Lecture("L5",15,1) ],
                "Room-3" => [ new Lecture("L2",11,1), new Lecture("L1",9,1),
                              new Lecture("L3",13,1), new Lecture("L4",15,1)]];
```

Store a room allocation as the **`$room_allocation`** property of a new **`Schedule`** object. Return this new **`Schedule`** object.

Example: **`display.php`** should render the following pages when "Show Schedule for a Date" button is clicked in **`index.php`** with "03/04/2019" (*left*) and "04/04/2019" (*right*) selected respectively:

`display.php`

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Schedule for 03/04/2019

	Room-1	Room-2
09-10	L5	L1
10-11		
11-12		L4
12-13		
13-14		
14-15		
15-16		
16-17		
17-18		

`display.php`

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Schedule for 04/04/2019

	Room-1	Room-2	Room-3
09-10	L10	L7	L1
10-11			
11-12	L9		L2
12-13			
13-14		L6	L3
14-15	L8		
15-16		L5	L4
16-17			
17-18			

NOTE:

- There may be **multiple** correct schedules that satisfy the four constraints (C1-C4) given above, and your solution needs to produce just **one** of such schedules.
- It is possible that the number of rooms is larger than 3.
- Do not change the name and the number of parameters of **`create_schedule`** function.
- We will be using a set of test cases to automatically test **`create_schedule`** function.
- A sample test case is included (`q3/tests/test-sample.php`). A successful run will produce the following outputs:

`test-sample.php`

```
Constraints C1 & C4: OK
Constraint C2: OK
Constraint C3: OK
Test Case Outcome (Sample): PASS
```

- Test cases that time out will be considered as ***failed***.

HINT: You may find the built-in PHP function **`uasort`** useful. You may use other built-in functions as deemed necessary.

- END -