report for the database with demonstration of user interface

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COMP23111 Database System

23111 Cwk2 Advanced Database

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Contents

1. Normalization of database tables

- UNF

  For the UNF, I firstly collect all of information from information source provided by the instruction of the coursework and transfer all of data into the table with rows and columns. At the same time, a primary key for the data is identified and marked by bold font with underline in the table which is the quiz id for the table in the UNF as well.

Quiz ID	34		
Quiz Name	SQL		
Quiz Author	Peter Parker		
Quiz Available	Yes		
Quiz Duration	60 minutes		
Student ID	44		
Student Name	Duncan Hull		
Date of Attempt	22/11/2020		
Question Number	1	2	3
Question	Which SQL statement is used to extract data form a database?	Which SQL statement is used to insert new data in database?	With SQL, how do you select all the records from a table named “Persons” where the value of column “FirstName” is “Peter”?
Option 1	SELECT	INSERT NEW	SELECT * FROM Persons WHERE FirstName<>'Peter'
Option 2	OPEN	INSERT INTO	SELECT[all] FROM Persons WHERE FirstName = 'Peter'
Option 3	EXTRACT	ADD RECORD	SELECT*FROM Persons WHERE FirstNmae = 'Peter'
Option 4	GET	ADD NEW	SELECT*FROM Persons WHERE FirstNmae LIKE 'Peter'

- 1NF

  After inserting data into the table, the repeating groups with more than one values will be removed from the UNF table into another table making sure that there is a table without repeating groups. It means that a new table holding all of the repeating groups will be generated following with a foreign key from the atomic table. According to the information source， the question number is the primary key while quiz id is the foreign key for the new table.

Quiz

Quiz ID	34
Quiz Name	SQL
Quiz Author	Peter Parker
Quiz Available	Yes
Quiz Duration	60 minutes
Student ID	44
Student Name	Duncan Hull
Date of Attempt	22/11/2020

Question info

question number	1	2	3
Questions	Which SQL statement is used to extract data form a database?	Which SQL statement is used to insert new data in database?	With SQL, how do you select all the records from a table named “Persons” where the value of column “FirstName” is “Peter”?
Option 1	SELECT	INSERT NEW	SELECT * FROM Persons WHERE FirstName<>'Peter'
Option 2	OPEN	INSERT INTO	SELECT[all] FROM Persons WHERE FirstName = 'Peter'
Option 3	EXTRACT	ADD RECORD	SELECT*FROM Persons WHERE FirstNmae = 'Peter'
Option 4	GET	ADD NEW	SELECT*FROM Persons WHERE FirstNmae LIKE 'Peter'
Quiz ID	34	34	34

- 2NF

2NF requires that all of the non-key attributes are fully functional dependent on its primary with no partial dependency. However, the student id, student name and date of attempt are partially functional dependent to the primary key which is the quiz id in the Quiz table. A new relation called quiz_stu is created to contains those three attributes with a quiz id as a primary key. Likewise, the quiz id and question number in the Question info should also be remove to another table. Therefore, there are four tables in the 2NF which makes all of the non-key attribute are fully functional dependent to the primary key of table instead of a subset of another attribute.

Quiz

Quiz ID	34
Quiz Name	SQL
Quiz Author	Peter Parker
Quiz Available	Yes
Quiz Duration	60 minutes

Question info

question number	1
Questions	Which SQL statement is used to extract data form a database?
Option 1	SELECT
Option 2	OPEN
Option 3	EXTRACT
Option 4	GET
Quiz ID	34

Question_Number

Quiz ID	34
question number	1

Quiz Stu

Quiz ID	**34**
Student ID	44
Student Name	Duncan Hall
Date of Attempt	22/11/2020

- 3NF

It’s compulsory for 3NF that there is no transitive dependency in each relation. But student name can be reached by student id, and there is a date of attempt matched with student name. Therefore, the student id and student name should be placed to another relation in order to make no transitive dependency in relation with name quiz stu.

Quiz

Quiz ID(pk)	34
Quiz Name	SQL
Quiz Author	Peter Parker
Quiz Available	Yes
Quiz Duration	60 minutes

Question info

question number(pk)	1
Questions	Which SQL statement is used to extract data form a database?
Option 1	SELECT
Option 2	OPEN

Option 3	EXTRACT
Option 4	GET
Quiz ID(fk)	34

Question_Number

Quiz ID(pk, fk)	34
question number(pk, fk)	1

Quiz Stu

Quiz ID	**34**
Student ID	44
Student Name	Duncan Hall
Date of Attempt	22/11/2020

2. Relational schema for tables

In the relational schema, it’s important to clearly identifies the relation, attributes and any constraints. Due to the incomplete information source provided, there are some other relations are created based on the requirements that the database work properly. Take for an instance, a staff relation which contains the staff id, name, username and password are created in order to make the application and front-end hold a relatively full function. At the same time, in the relational schema, the primary key and foreign key following with the references for the foreign key are also clearly listed. All of the attributes of each relation follows the relation closely as well.

The schema:

Student(student_id, student_name, student_grade, student_username, student_password):
pk[student_id, student_username]

Staff(staff_id, staff_name, staff_username, staff_password):
pk[staff_id, staff_username]

Quiz(quiz_id, quiz_name, quiz_author, quiz_available, quiz_duration, date of attempt, full_score, staff_id):
pk[quiz_id]
fk[staff_id -> Staff.staff_id]

Question_info(question_number, question, option_1, option_2, option_3, option_4, answer, score):
pk[question_number]

```
Question_Number(question_number, quiz_id):
    pk[question_number, quiz_id]
    fk[question_number -> Question_info.question_number,
        quiz_id -> Quiz.quiz_id]

Quiz_stu(quiz_id, student_id, score):
    pk[quiz_id]
    fk[quiz_id -> Quiz.quiz_id,
        student_id -> Student.student_id,
                    score -> Student.student_grade]
```

3. Code Implementation of tables

After finishing the relational schema, the MySQL statement is required to create tables for database. According to what we have written for the relational schema, it's less time-consuming to create tables in SQL query. In the statements, all of attributes, primary key and foreign key for each relation should exactly match the one in the relational schema. However, the data type and data size for varchar attribute clearly defined in the statements. What's more, for those foreign key coming from other relations, they should share the same data type and data size with the attribute in the reference relation.

Creating a database and inserting data into the database are two compulsory steps required to successfully build a database that work correctly. Data can also be inserted, update and delete from database by SQL queries.

MYSQL Statement:

```
CREATE TABLE Student
(
 student_id INTEGER UNSIGNED,
 student_name VARCHAR(255),
 student_grade SMALLINT UNSIGNED,
 student_username VARCHAR(255) NOT NULL,
 student_password VARCHAR(255) NOT NULL,
 PRIMARY KEY(student_id,student_username)
 );

CREATE TABLE Staff
(
 staff_id INTEGER UNSIGNED,
 staff_name VARCHAR(255),
 staff_username VARCHAR(255) NOT NULL,
 staff_password VARCHAR(255) NOT NULL,
 PRIMARY KEY(staff_id, staff_username)
 );

CREATE TABLE Question_info
(
 question_number INTEGER UNSIGNED,
 question VARCHAR(255),
 option_1 VARCHAR(255),
 option_2 VARCHAR(255),
 option_3 VARCHAR(255),
 option_4 VARCHAR(255),
 answer VARCHAR(255),
 score SMALLINT UNSIGNED,
 PRIMARY KEY(question_number)
 );

 CREATE TABLE Quiz
(
 quiz_id INTEGER UNSIGNED,
 quiz_name VARCHAR(255),
 quiz_author VARCHAR(255),
 quiz_available VARCHAR(255),
 quiz_duration VARCHAR(255),
 date_of_attempt DATE,
 full_score INTEGER UNSIGNED,
 staff_id INTEGER UNSIGNED,
 PRIMARY KEY(quiz_id)
 );

 CREATE TABLE Quiz_stu
 (
   quiz_id INTEGER UNSIGNED,
   student_id INTEGER UNSIGNED,
   score INTEGER UNSIGNED,
   PRIMARY KEY(quiz_id, student_id),
   FOREIGN KEY(quiz_id)
   REFERENCES Quiz(quiz_id),
   FOREIGN KEY(student_id)
   REFERENCES Student(student_id)
 );

 CREATE TABLE Question_Number
(
 question_number INTEGER UNSIGNED,
 quiz_id INTEGER UNSIGNED,
 PRIMARY KEY(question_number, quiz_id),
 FOREIGN KEY(question_number)
 REFERENCES Question_info(question_number),
 FOREIGN KEY(quiz_id)
 REFERENCES Quiz(quiz_id)
);
```

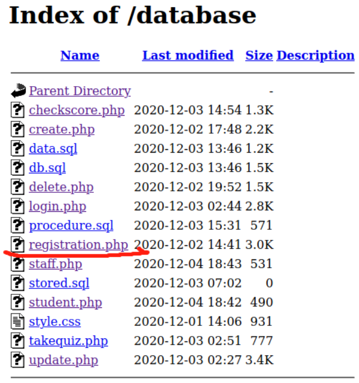
SQL query(insert data, update data and delete data):

```
INSERT INTO Student VALUES ('44', 'Duncan Hull','3','databasestudent','database');
INSERT INTO Student VALUES(‘33’, ‘Bob’, ‘2’, ‘databasebase’, ‘database’);
UPDATE Student SET student_score = ‘1’ WHERE student_id = ‘44’;
DELETE DROM Student WHERE student_id = ‘33’;

INSERT INTO Staff VALUES ('100','Steward Blakeway', 'databasestaff', 'database');

INSERT INTO Question_info VALUES ('1','Which SQL statement is used to extract data form a database?','SELECT','OPEN','EXTRACT','GET','SELECT','1');

INSERT INTO Question_info VALUES ('2', 'Which SQL statement is used to insert new data in database?', 'INSERT NEW', 'INSERT INTO', 'ADD RECORD', 'ADD NEW ', 'INSERT INTO', '1');

INSERT INTO Question_info VALUES ('3', 'With SQL, how do you select all the records from a table named “Persons” where the value of column “FirstName” is “Peter”?', 'SELECT * FROM Persons WHERE FirstName<>"Peter"', 'SELECT[all] FROM Persons WHERE FirstName = "Peter"', 'SELECT * FROM Persons WHERE FirstNmae = "Peter"', 'SELECT * FROM Persons WHERE FirstNmae LIKE "Peter"', 'SELECT*FROM Persons WHERE FirstNmae = "Peter"', '1');

INSERT INTO Quiz VALUES ('34', 'SQL', 'Peter Parker', 'Yes', '60 minutes', '2020/11/22', '3', '100');
UPDATE Quiz SET quiz_duration='60 minutes' WHERE quiz_id='34';

INSERT INTO Quiz_stu VALUES ('34','44','3');
INSERT INTO Question_Number VALUES ('1', '34');
INSERT INTO Question_Number VALUES ('2', '34');
INSERT INTO Question_Number VALUES ('3', '34');
```

4. Application with demonstration of database

When the MYSQL is successfully built and the data is inserted into the database, both php and MYSQL takes responsibility to create the front-end user interface which users can interact with.

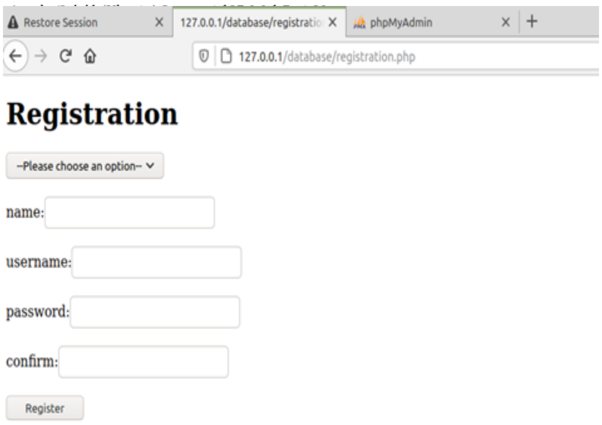
Instruction:



Index of /database

Name	Last modified	Size	Description
Parent Directory		-	
checkscore.php	2020-12-03 14:54	1.3K	
create.php	2020-12-02 17:48	2.2K	
data.sql	2020-12-03 13:46	1.2K	
db.sql	2020-12-03 13:46	1.5K	
delete.php	2020-12-02 19:52	1.5K	
login.php	2020-12-03 02:44	2.8K	
procedure.sql	2020-12-03 15:31	571	
registration.php	2020-12-02 14:41	3.0K	
staff.php	2020-12-04 18:43	531	
stored.sql	2020-12-03 07:02	0	
student.php	2020-12-04 18:42	490	
style.css	2020-12-01 14:06	931	
takequiz.php	2020-12-03 02:51	777	
update.php	2020-12-03 02:27	3.4K	

For those users who is new in the application, the application will start by selecting registration.php leading users to register an account.


Restore Session
127.0.0.1/database/registratio
phpMyAdmin
127.0.0.1/database/registration.php

Registration

--Please choose an option--

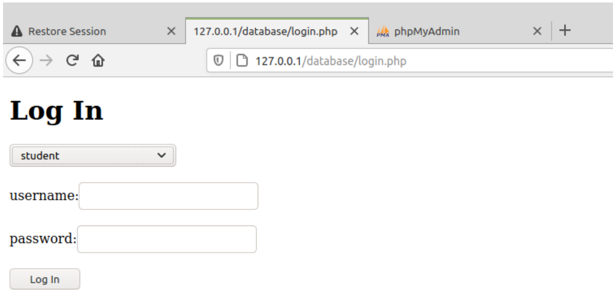
name:

username:

password:

confirm:

the Register page will ask user to select an identity as student or staff. At the same time, the user name, username, password and confirmed password are required to fill as well. As long as all of the blank is completed and the identity is selected, the register will jump to login page. Otherwise, the registration page will ask user to fill all of the blank or select identity. At the same time, if the username that user entered share the same username with an existing account, the application will ask user to renter a new username or switch to login page.



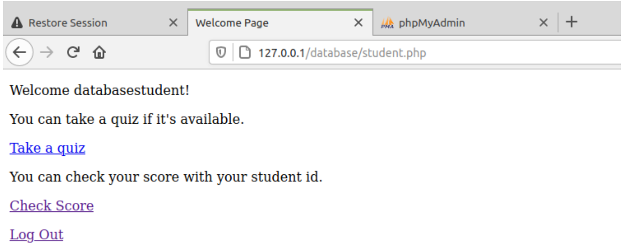
Log In

student

username:

password:

Users can try to login their account by selecting their identity as a student or staff and entering correct username and password. If there is no account associated with username that have entered, a notification will notify user to register since the username does not exist. When user successfully login, the application will jump to different welcome page depending on the identity.



Welcome databasestudent!

You can take a quiz if it's available.

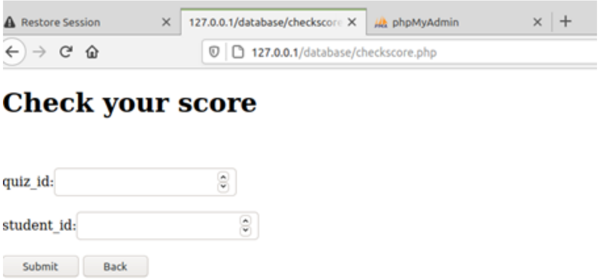
Take a quiz

You can check your score with your student id.

Check Score

Log Out

If a student log in, the welcome page will display a welcome following with the username. Student can choose to take a quiz, check their score or log out.

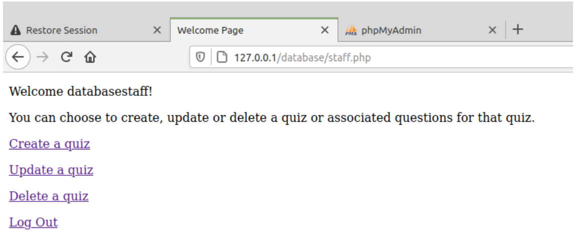

Restore Session
127.0.0.1/database/checkscore
phpMyAdmin
127.0.0.1/database/checkscore.php

Check your score

quiz_id:

student_id:

Student will be required to enter the quiz id and student id to check their score for the specific quiz. The back button can make user jump back to welcome page.



Welcome databasestaff!

You can choose to create, update or delete a quiz or associated questions for that quiz.

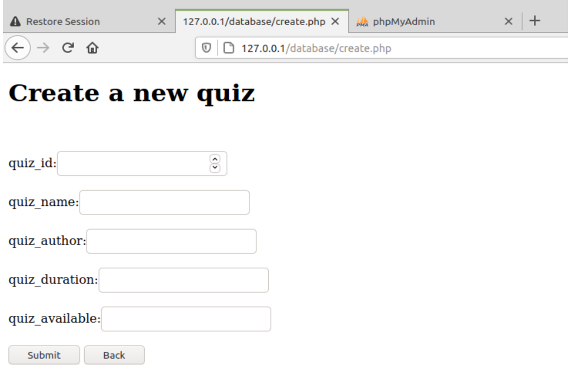
Create a quiz

Update a quiz

Delete a quiz

Log Out

If a staff log in, the application will jump to a welcome page for staff which allows user to select to create, update or delete a quiz.



Create a new quiz

quiz_id:

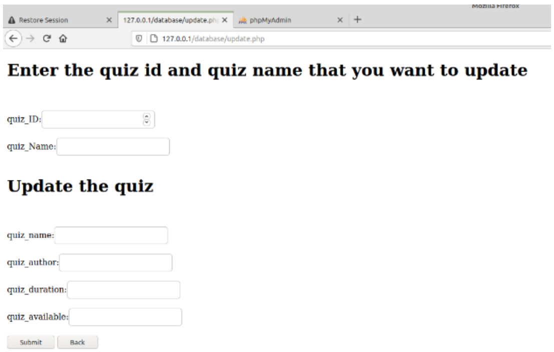
quiz_name:

quiz_author:

quiz_duration:

quiz_available:

For quiz creation option, the staff needs to fill all of the blank in this page including quiz id, quiz name, quiz author, quiz duration and quiz available. If any of them is left as empty, the application will ask staff to complete all of them. Otherwise, it will lead to a failure in quiz creation.



Enter the quiz id and quiz name that you want to update

quiz_ID:

quiz_Name:

Update the quiz

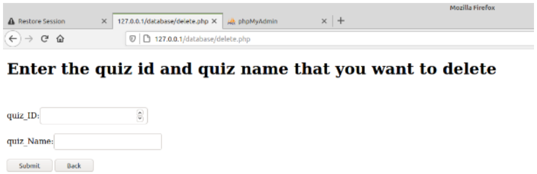
quiz_name:

quiz_author:

quiz_duration:

quiz_available:

Updating quiz is quite similar compared with quiz creation. User should fill the top two compulsory blanks which are quiz id and quiz name and four optional blanks to update a quiz. If the quiz id and quiz name matches a quiz with same id and name, the quiz will be updated based on the optional blanks. But the application will display a notification about the wrong quiz id or name.



Enter the quiz id and quiz name that you want to delete

quiz_ID:

quiz_Name:

The delete page is relatively simple as a comparison with the update page and create page. There are two requirements to staff to delete a quiz including quiz id and quiz name. When the id or name is wrong, a failure deletion notification will be sent.

5. Stored procedure and trigger

The stored procedure is written in MYSQL which is used to display those students holding less than 40 percent of score in the quiz. The quiz id, student id, student name, student grade and full score in that quiz will be shown when the requirement is reached.

```
DELIMITER ^
CREATE PROCEDURE StudentNotEnough()
BEGIN

        SELECT Quiz_stu.quiz_id, Quiz_stu.student_id, Student.student_name, Quiz_stu.score,
Quiz.full_score FROM Quiz_stu
    LEFT JOIN Student on Quiz_stu.student_id = Student.student_id
    LEFT JOIN Quiz on Quiz_stu.quiz_id = Quiz.quiz_id
    WHERE Quiz_stu.score < (Quiz.full_score) * 0.4;

END

DELIMITER ;
```

The trigger is to create a new table with all of data which is deleted from Quiz table.

```
CREATE TABLE Quiz_audit
(
quiz_id INTEGER UNSIGNED,
student_id INTEGER UNSIGNED,
Day date,
Time_day time
);

DELIMITER ^
CREATE TRIGGER delete_record
BEFORE DELETE ON Quiz FOR EACH ROW
BEGIN
        INSERT INTO Quiz_audit
    SET quiz_id = OLD.quiz_id,
        staff_id = OLD.staff_id,
         day = CURDATE();

END ^
DELIMITER;
```