**Homework Assignment: Working with SQLite and Pandas**

**Objective:**

The goal of this assignment is to:

1. Create a database using SQLite.
2. Create tables and insert data.
3. Perform SQL queries on the data.
4. Load the data into a Pandas DataFrame for further analysis.

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**Instructions:**

**1. Set Up the Database**

1. **Create a connection** to an SQLite database file named student_grades.db. If the database file does not exist, SQLite will automatically create it.
2. Create a **cursor** object to interact with the database.

**2. Create the Necessary Tables**

You will need two tables for this assignment:

- **students**: A table to store student information.
- **grades**: A table to store student grades for different subjects.

The structure of the tables should be as follows:

**students** table:

- student_id (INTEGER, Primary Key, Auto-increment)
- first_name (TEXT)
- last_name (TEXT)

**grades** table:

- grade_id (INTEGER, Primary Key, Auto-increment)
- student_id (INTEGER, Foreign Key linked to students table)
- subject (TEXT)

- grade (INTEGER)

**3. Insert Data into the Tables**

Insert at least 5 students into the students table and at least 3 grades for each student into the grades table.

Sample data for the **students** table:

| student_id | first_name | last_name |
|---|---|---|
| 1 | Alice | Johnson |
| 2 | Bob | Smith |
| 3 | Carol | White |
| 4 | David | Brown |
| 5 | Eve | Davis |

Sample data for the **grades** table:

| grade_id | student_id | subject | grade |
|---|---|---|---|
| 1 | 1 | Math | 95 |
| 2 | 1 | English | 88 |
| 3 | 1 | History | 90 |
| 4 | 2 | Math | 82 |
| 5 | 2 | English | 76 |
| 6 | 2 | History | 85 |
| ... | ... | ... | ... |

**4. Perform SQL Queries**

Write SQL queries to answer the following questions:

1. Retrieve all students' names and their grades.
2. Find the average grade for each student.

3. Find the student with the highest average grade.
4. Find the average grade for the **Math** subject.
5. List all students who scored above 90 in **any subject**.

**5. Load Data into Pandas**

1. Use **Pandas** to load the data from the **students** and **grades** tables into DataFrames.
2. Use **JOIN** queries to combine the data from both tables into a single DataFrame that includes each student's name, subject, and grade.
3. Visualize the data with **Matplotlib**:
    - Plot the average grades for each student.
    - Create a bar chart showing the average grade for each subject.

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**Submission:**

- Upload the **Python script** or **Jupyter Notebook** containing your code to GITHUB and put the link in Canvas
- Ensure your script:
    1. Creates the database.
    2. Inserts the data.
    3. Performs the queries.
    4. Loads the data into Pandas.
    5. Outputs the results of the queries and the visualizations.

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**Bonus Task: (5pts)**

- Implement a query that finds the student with the highest grade in each subject.
- Visualize the results using a **grouped bar chart**.

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**Grading:**

- Correct creation and structure of the database and tables: **5pts**

- Correct insertion of data: **5pts**
- Correct execution of queries and accurate results: **10pts**
- Proper use of Pandas for analysis: **5pts**
- Visualization of results: **5pts**