Problem Sheet 2 - Intermediate SQL

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Introduction

These problems aim to test your intermediate SQL knowledge, building on the basic SQL concepts tested in problem sheet 1. The questions and solutions are of a more esoteric nature than problem sheet 1 yet still useful as a SQL coder. For the purposes of this series of problem sheets, a database of dummy Marathon results data has been generated. More information on the **Marathon** database is presented below.

The concepts tested in this sheet are covered by the LinkedIn learning course **Intermediate SQL for Data Scientists** - (https://www.linkedin.com/learning/intermediate-sql-for-data-scientists/) .

Useful Prepatory Resources

In addition to this problem sheet, there are two useful resources you can draw upon to better understand these SQL concepts:

- **Two RMarkdown documents** - one to generate some dummy 'Universities' data (https://github.com/georgemelrose/SQL_Practice/blob/main/0_generating_databasestar_dummy_data.Rmd). This was copied from the excellent SQL learning resource databasestar (https://github.com/bbrumm/databasestar/tree/main/sample_databases/sample_db_university/sqlite).

  The other document is an RMD HTML going over intermediate SQL concepts and how they can be applied to databasestar dummy data (https://github.com/georgemelrose/SQL_Practice/blob/main/03_Intermediate_SQL_for_Data_Scientists.html).

- **A video presentation** - a recording of a meeting in which I presented the **Intermediate SQL for Data Scientists** HTML , explaining varying higher level concepts- (https://universityofcambridgecloud.sharepoint.com/sites/AD_Progress/SitePages/Learning-SQL-in-a-New-Format.aspx).

Marathon Database

Firstly, the data to be put into the Marathon database was formulated from the following Python script - (https://github.com/georgemelrose/SQL_Practice/blob/main/Dummy_Marathon_Data/marathon_data_generation.ipynb).

The **marathon data generation** python script generates the following tables:

1. Runners - Randomly generate 1000 runners with names common in their locale/country, together with their birth date and sex.

2. Events - The 6 Major World marathons (Berlin, Boston, Chicago,London,New York City, Tokyo), with an event per year from 2012 to 2023.

3. Results - Gives results for runners in hh:mm:ss format, ensuring there aren't duplicate results for each runner per event. Prevents any results breaking either the male marathon world-record (2:00:35 Eliud

Kipchoge 2023) or the female marathon world-record (2:11:53 Brigid Kosgei 2019). Also determines, with a True/False column, if a result is elite by the male standard (below 02:15:00) or the female standard (below 02:30:00).

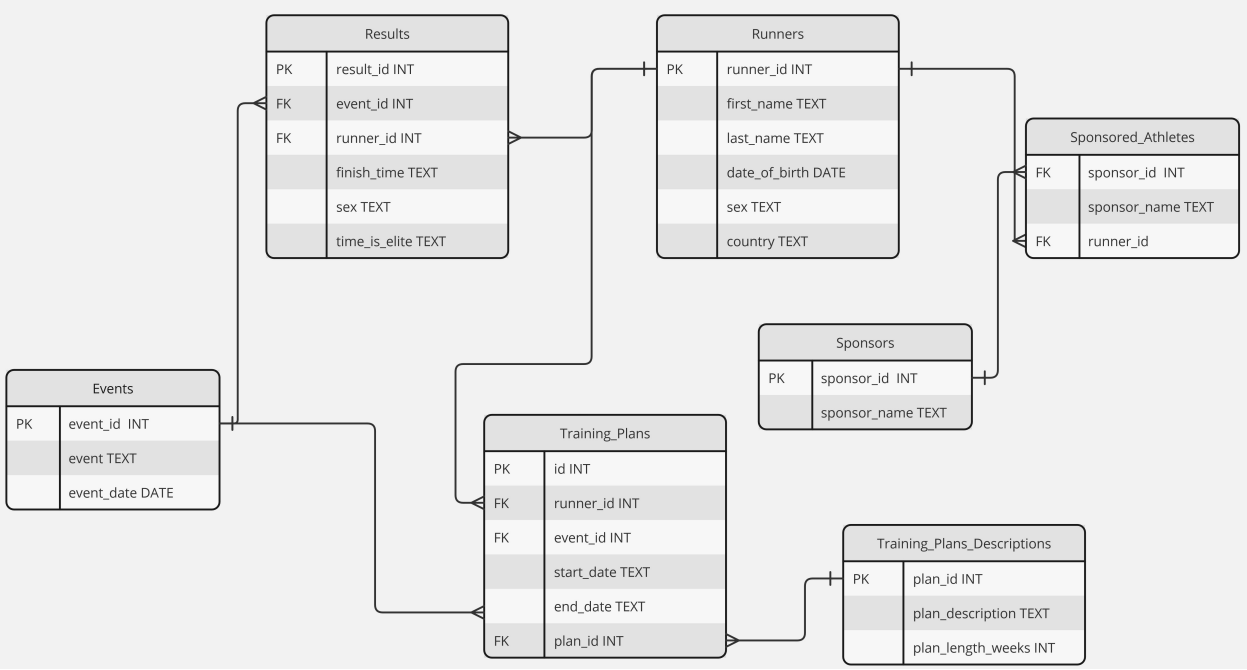
4. Sponsors - Lists the following 10 major companies that typically act as sponsors to runners - “Nike”, “Adidas”, “Asics”, “Saucony”, “Hoka”,“Brooks”, “New Balance”, “Puma”, “Under Armour”, “Tracksmith”.

5. Sponsored Athletes - A table listing the fraction of the elite athletes that have a sponsor.

6. Training Plans Descriptions - The descriptions of 10 different training plans and their respective lengths in weeks.

7. Training Plans - The training plans of athletes. Only 72% of runner-event combinations have an associated training plan.

Marathon Database Entity Relationship Diagram



Intermediate SQL Problems

Indexes

Q1. - Create a basic index on the runner_id column in the Results table to speed up searches and joins involving runner information?

Solution -

CREATE INDEX idx_results_runner_id ON Results(runner_id);

Q2. - Construct a unique index on the event_id column of the Events table to ensure no duplicate event entries exist?

Solution -

CREATE UNIQUE INDEX idx_events_event_id ON Events(event_id);