CSI2532 - Lab 07 - Project Data

Overview

The intent of today's tutorial is to give you time to work on your database models for the project.

The outcome of today should be

- Review of the requirements (mapping functional dependencies)
- Modelling Events and Competitions in detail
- Building concrete examples for your "seed"

Requirements

MeFit hosts an annual fitness competition but is looking to expand by allowing partners to host their competitions. Those partners will be responsible for competition registrations, payments and other logistical details, but MeFit wants to maintain control over the competition's leaderboard that tracks the ranking of athletes.

MeFit has asked you to help them build a competition's leaderboard database and application as described below.

The leaderboard needs to manage athletes. An athlete has a name, email, date of birth and an identified gender. They are identified by a globally unique ID. Athletes can include any number of additional attributes such as (as an example only) the athlete's nationality.

For every partner, we need to know their company name, the address of their headquarters, a contact person including their email and phone number.

The competitions (there can be many) of each partner are within a competition year. For each competition we need to know the competition date (it can span multiple days), the maximum number of athletes (based on identified gender), number of events, the competition address, and a contact person (including an email and phone number). Note that some events have no maximums allowing as people to join as possible.

For each event in a competition, we need to know how it is scored. The two main ways to score

an event are based on time (the faster the better), on the number of repetitions (the more the better), or the weight moved (also the more the better).

But, not all events can be completed in time requiring tie breakers. Tiebreakers are scored the same as the event can be scored. The tiebreaker can be based on time (the faster the better), on the number of repetitions (the more are better), or on the weight moved (also the more the better). Not all events have tie-breakers.

If there is still a tie after that, then the athletes tie and each is awarded the same rank for that event. The overall score of an athlete is the sum of their rank on each competition, and this time the lower the number the better.

A few examples are below.

Event	Score	Time Capped	Tie-Breaker
10k run	Time	N/A	None
As many burpees in 7 minutes	# Reps	N/A	None
21/15/9 of thrusters and pull-ups in 10 minutes	Time	# Reps	Time of last round
As many rounds of A, B, C in 10 minutes	# Reps	N/A	Time of last round

A competition's leaderboard shows the rank of each athlete on each event but can also show the overall rank of the athlete. Custom leaderboards can be created by filtering the athletes based on one or more of their attributes. For example, a leaderboard based on gender; or another based on nationality AND gender.

Athlete	Points	20.1	20.2	20.3	20.4	20.5
Dan Shrum (M / 18)	1 (10 points)	2 (12:40)	1 (784 reps)	1 (131 reps)	2 (211 reps 15:12)	4 (234 reps)
Audrey Begin (F / 18)	3 (38 points)	4 (13:51)	2 (682 reps)	17 (83 reps)	3 (201 reps 16:35)	12 (208 reps 11:08)
Kevin Sourapha (M / 18)	4 (43 points)	1 (12:30)	3 (609 reps)	5 (101 reps)	6 (187 reps)	28 (--)
Matthieu Desloges (M / 18)	2 (19 points)	3 (12:53)	4 (588 reps)	3 (111 reps)	8 (169 reps 12:51)	1 (16:40)
Taylor Stewart (M / 18)	10 (66 points)	49 (--)	5 (585 reps)	2 (119 reps)	5 (200 reps 19:17)	5 (232 reps)
Eleonor Buteau (F / 18)	6 (50 points)	7 (171 reps)	6 (578 reps)	20 (66 reps)	4 (200 reps 16:58)	13 (208 reps 11:35)
Andrew Forward (M / 40)	8 (60 points)	15 (149 reps)	7 (513 reps)	11 (90 reps 07:31)	20 (125 reps 11:30)	7 (228 reps 19:43)

MeFit admins can add new companies as sanctioned partners to host competitions. Using a secure token, partners can register athletes into a competition through online API / application.

Users can search the leaderboard for partners, competitions and leaderboard. A leaderboard can be searched for athletes.

We should be able to delete from our database the partners, competitions and events. We cannot have in the database information about an event without having in the database the information about the corresponding competition (i.e. the competition in which the event belongs too). In the same way, we cannot have in the database information about competitions without having in the database the information about the corresponding partner (i.e. the partner in which the competition belongs too).

Competitors register as a particular gender

Competitions are for males and females.

Each competitor identifies their registration gender and that will be used as one of the leaderboard filters (i.e. top male versus top female athlete in the competition).

A competitor may choose to change their identified gender for a future competition, and that should not change past competition data.

Competitions can be limited to X athletes (per gender)

A competition can limit itself to X athletes. This means that at most X male and X female athletes can register.

The system does not need to track a waiting list.

Scoring Events

In general, a scores are based on:

- Time ASC (like how fast you complete the work, lower is better)
- Time DESC (like how long you do certain work, higher is better)
- Count DESC (like # reps where higher is better)
- Count ASC (like a golf score, where lower is better)

A NULL score should always be scored *last*.

An event is either *until done*, or *time capped*.

Until Done

An example of a *until done* event would be

- Event Burpees: Do as many burpees in 8 minutes

The event would be scored as a `Count DESC` where the more burpees, the better.

Sample results are

```
Event Burpees (Score):
80 Ayana
72 Hayden
72 Jayla
58 August
25 Andrew
```

The rankings for this event would be

```
Event Burpees (Rank):
1 Ayana
2 Hayden
2 Jayla
4 August
5 Andrew
```

Notice that Hayden and Jayla both came in 2nd (as they tied) but then Andrew came in 4th (as the 3rd position was a tie).

Tie Break

Some (but not all) events have a tie-breaker. Let's consider an event with a tie breaker

- Event Fran: Do 21/15/9 of thrusters and pull-ups. Tie-breaker time is when you complete the round of 15 thrusters/pull-ups.

Sample results (Scores):

```
Event Fran (Main, Tie Breaker):
2:45, 1:59 Ayana
3:01, 2:30 Hayden
3:02, 2:20 August
4:00, 3:30 Jayla
4:00, 3:31 Andrew
```

The rankings for this event would be

```
Event Fran (Rank):
1 Ayana
2 Hayden
3 August
4 Jayla
5 Andrew
```

Note that Hayden had a better main score, so he ranks above August. Jayla and Andrew were decided by the tie-breaker, with Jayla winning over Andrew by 1 second. Just like *without a time-breaker*, competitors can still be tied after a tie-breaker and the ranking follows the same pattern as shown with the burpees (where Hayden and Jayla both placed 2nd, and then Andrew placed 4th).

The examples above, are just examples, the main and tie-Breakers scores can be based on any of the scoring scales, which are

- Time ASC (like how fast you complete the work, lower is better)
- Time DESC (like how long you do certain work, higher is better)
- Count DESC (like # reps where higher is better)
- Count ASC (like a golf score, where lower is better)

Time Capped

Some events are *too long* for all competitors to finish. In that case there is a secondary set of scores to help rank athletes.

Let's consider a time-capped event

- Event Muscle-Ups: Do 40 MUs, 80 Wall Balls and 120 Cals Rower in under 20 minutes. If you do not complete in time then track the total number of reps.

Sample results (Scores):

```
Event MUs (Main, Secondary):
18:59, 240 Hayden
19:03, 240 Ayana
20:00, 201 Andrew
20:00, 200 Jayla
20:00, 200 August
```

Hayden finished the event with the best score. Ayana also finished. Andrew, Jayle and August did not finish, with Andrew doing one more rep than Jayla and August.

The rankings for this event would be

```
Event MUs (Rank):
1 Hayden
2 Ayana
3 Andrew
4 Jayla
4 August
```

Tie Break

Some (but not all) time-capped events have a tie-breaker. Let's add a tie-breaker to our MUs

event above.

- Event Muscle-Ups with Tie-Breaker: Do 40 MUs, 80 Wall Balls and 120 Cals Rower in under 20 minutes. If you do not complete in time then track the total number of reps. Tie-breaker time is when you complete the wall-balls and calories.

Here both the main score and the secondary score use the same time breaker time. But that is not always the case.

Sample results with tie-breaker (Scores):

```
Event MUs (Main, Main Tie-Break, Secondary, Secondary Tie-Break):
18:59, 13:15, 240, 13:15 Hayden
18:59, 13:45, 240, 13:45 Ayana
20:00, 11:00, 201, 11:00 Andrew
20:00, 9:15, 200, 9:15 Jayla
20:00, 11:12, 200, 11:12 August
```

In the scenario above, Hayden and Ayana had the same main score, but Hayden had a better tie-break. Andrew did not finish, but had the next best secondary score. Jayla beat August in the secondary time-break score.

The rankings for this event would be

```
Event MUs (Rank):
1 Hayden
2 Ayana
3 Andrew
4 Jayla
5 August
```

Event Ranking

As we saw, events can be *until done* or *time capped*. Events can be scored with a primary score and an optional time-breaker. Time capped scores also include a secondary score for those that do not finish the work in time. Time capped scores can also have an optional time-breaker.

When ranking athletes on a particular event, we use the following guidelines

1. Best main score
2. If tied, best tie-break score (if there is one)
3. If time capped, and did not finish, best secondary score

4. If still tied, best secondary tie-break score (if there is one)

The ranking for a particular event goes from 1 to N (for N competitors). Let's say we had 5 competitors Andrew, Ayana, Hayden, August and Jayla. With the following ranking

```
Event X
1 Ayana
2 Hayden
2 Jayla
4 August
5 Andrew
```

Hayden and Jayla were still tied after all those tie breakers, so they each rank as "2" in the event. And August gets the next position which is 4th.

Competition Score

A competition is scored by summing up the ranks of each individual event. Let's say our competition had 2 events and the ranks are below.

Name	Event 1	Event 2	Competition Score
Andrew	5	4	9
August	4	2	6
Ayana	1	1	2
Hayden	2	3	5
Jayla	2	4	6

A competition is ranked using `COUNT ASC` where the lowest score wins.

The rankings for this competition would be

```
Competition (Rank):
1 Ayana
2 Hayden
3 August
3 Jayla
5 Andrew
```

Notice that August and Jayla are still tied and both finished 3rd, but then Andrew finished 5th.

Exercises

You will now create sample data and test cases for your project. This data should be used to populate your project (and provided in your seed.sql of your project deliverables) and should also be used to demonstate (i.e. test) that your application behaves as expected.

E1) Athlete Data

Create 20 female athletes and 20 male athletes to seed for your project.

E2) Competition Data

Create 5 competitions (name, date, etc)

E3) Event Matrix

A score is one of the following:

- Time ASC (like how fast you complete the work, lower is better)
- Time DESC (like how long you do certain work, higher is better)
- Count DESC (like # reps where higher is better)
- Count ASC (like a golf score, where lower is better)

An event is always score based on

- Main score

An event might include a tie-breaker

- Tie-Break score (optional)

An event with a time cap (where main score is `Time ASC`) might include additional scores to help rank athletes including

- Secondary score (optional)
- Secondary Tie-Break score (optional)

Finish the matrix of all possible ways to score an event. Use *truth table* like approach to ensure you cover all scenarios.

#	Main Score	Main Tie-Break	Secondary Score	Secondary Tie-Break
1	Count DESC	NULL	NULL	NULL
2	Count DESC	Time ASC	NULL	NULL
3	Count DESC	Time DESC	NULL	NULL
4	Count DESC	Count DESC	NULL	NULL
5	Count DESC	Count ASC	NULL	NULL
6	Count ASC	NULL	NULL	NULL
7	Count ASC	Time ASC	NULL	NULL
8	Count ASC	Time DESC	NULL	NULL
9	Count ASC	Count DESC	NULL	NULL
10	Count ASC	Count ASC	NULL	NULL
11	Time DESC	NULL	NULL	NULL
12	Time DESC	Time ASC	NULL	NULL
13	Time DESC	Time DESC	NULL	NULL
14	Time DESC	Count DESC	NULL	NULL
15	Time DESC	Count ASC	NULL	NULL
...	Time ASC	...	...	...

E4) Database Models

Now that you have plenty of sample data, re-work your competitions database to ensure the scenarios above are fully supported.