

## Questions to be discussed: 1, 2, 3, 4

1. Consider the table `Exams(sid, cid, score)`, such that:

- Each `sid` is an integer and represents a student ID.
- Each `cid` is an integer and represents a course ID.
- Each `score` is an integer and represents a final exam score of a student in a course.

Write a function `max_min` with the following properties:

- It has an input parameter `stu_id`, which is an integer.
- It has two output parameters `max_cid` and `min_cid`, both of which are integers.
- It examines the records in `Exams` whose `sid` is equal to `stu_id` and identifies the two records among them with the largest and smallest `score` where *ties are broken arbitrarily*. For the record with the largest `score`, its `cid` is assigned to `max_cid`. For the record with the smallest `score`, its `cid` is assigned to `min_cid` *only if it is smaller than the largest score*. Otherwise, `min_cid` is set to `NULL`.

A template for `max_min` is provided below:

```
1 CREATE OR REPLACE FUNCTION max_min (IN stu_id INT, OUT max_cid
   INT, OUT min_cid INT)
2 RETURNS RECORD AS $$
3 DECLARE
4     max_score INT;
5     min_score INT;
6 BEGIN
7     /* write your code here */
8 END;
9 $$ LANGUAGE plpgsql;
```

2. Consider the same table `Exams(sid, cid, score)` from the previous question. Write a function `revised_avg` with the following properties:

- It has an input parameter `stu_id`, which is an integer.
- It has an output parameter `r_avg`, which is a numeric.
- It examines the records in `Exams` whose `sid` is equal to `stu_id`. If there are *at least* 3 such records, the function returns the average `score` of these records but *excludes* one record with the highest `score` with *ties broker arbitrarily* as well as one record with the lowest `score` with *ties broker arbitrarily*. If there are fewer than 3 such records, the function returns `NULL`.

A template for `revised_avg` is provided below:

```
1 CREATE OR REPLACE FUNCTION revised_avg (IN stu_id INT, OUT r_avg
   FLOAT)
2 RETURNS FLOAT AS $$
3   /* write your code here */
4   $$ LANGUAGE plpgsql;
```

3. Consider the same table `Exams(sid, cid, score)` from the first question as well as the concept of "revised average score" in the previous question. Write a function `list_r_avg` that returns the `sid` of each student in `Exams` along with their revised average `score`. For simplicity, we assume that all `sid` in `Exams` are non-negative integers.

A template for `list_r_avg` is provided below:

```
1 CREATE OR REPLACE FUNCTION list_r_avg ()
2 RETURNS TABLE (stu_id INT, ravg FLOAT) AS $$
3 DECLARE
4     curs CURSOR FOR (SELECT sid, score FROM Exams ORDER BY sid);
5     /* add other variables here */
6 BEGIN
7     /* write your code here */
8 END;
9 $$ LANGUAGE plpgsql;
```

4. Consider the same table `Exams(sid, cid, score)` from the first question. Write a function `list_scnd_highest` that returns the `sid` of each student in `Exams` along with their second highest `score` with *ties broken arbitrarily*. If the student only have one `score`, then the second highest `score` is `NULL`. For simplicity, we assume that all `sid` in `Exams` are non-negative integers.

A template for `list_scnd_highest` is provided below:

```
1 CREATE OR REPLACE FUNCTION list_scnd_highest ()
2 RETURNS TABLE (stu_id INT, scnd_highest INT) AS $$
3     /* write your code here */
4 $$ LANGUAGE plpgsql;
```