SINGAPORE INSTITUTE OF TECHNOLOGY

INF1001: Introduction to Computing

L2b: Database – SQL - supplementary

Aug 2023

4. SQL – SELECT: Nested Queries

- A very powerful feature of SQL: a WHERE clause can itself contain an SQL query!

- To understand semantics of nested queries, think of a *nested loops* evaluation

- *Two SELECT statements can produce the same results:*
  - *Nested Queries*
  - *SELECT from 2 tables*

4. Problem

Q: Calculate the average number of students in classes where the teacher teaches History or English

Students

id	name	class_id	GPA
1	Jack Black	3	3.45
2	Daniel White	1	3.15
3	Kathrine Star	1	3.85
4	Helen Bright	2	3.10
5	Steve May	2	2.40

Teachers

id	name	subject	class_id	monthly_salary
1	Elisabeth Grey	History	3	2,500
2	Robert Sun	Literature	[NULL]	2,000
3	John Churchill	English	1	2,350
4	Sara Parker	Math	2	3,000

Classes

id	grade	teacher_id	number_of_students
1	10	3	21
2	11	4	25
3	12	1	28

4. SQL – SELECT: Nested Queries

Q: Calculate the average number of students in classes where the teacher teaches History or English

```
SELECT AVG(number_of_students)
FROM classes
WHERE teacher_id IN (
   SELECT id
   FROM teachers
   WHERE subject = 'English' OR subject =
'History');
```

Classes

id	grade	teacher_id	number_of_students
1	10	3	21
2	11	4	25
3	12	1	28

Teachers

id	name	subject	class_id	monthly_salary
1	Elisabeth Grey	History	3	2,500
2	Robert Sun	Literature	[NULL]	2,000
3	John Churchill	English	1	2,350
4	Sara Parker	Math	2	3,000

id
1
3

= (21+28)/2
= 24.5

4. SQL – SELECT: one SELECT from 2 tables

Q: Calculate the average number of students in classes where the teacher teaches History or English

Teachers

id	name	subject	class_id	monthly_salary
1	Elisabeth Grey	History	3	2,500
2	Robert Sun	Literature	[NULL]	2,000
3	John Churchill	English	1	2,350
4	Sara Parker	Math	2	3,000

Classes

id	grade	teacher_id	number_of_students
1	10	3	21
2	11	4	25
3	12	1	28

id	name	subject	class_id	monthy_salary	id2	grade	teacher_id	number_of_students
1	Elizabeth Grey	History	3	2,500	1	10	3	21
1	Elizabeth Grey	History	3	2,500	2	11	4	25
1	Elizabeth Grey	History	3	2,500	3	12	1	28
2	Rober Sun	Literature	[NULL]	2,000	1	10	3	21
2	Rober Sun	Literature	[NULL]	2,001	2	11	4	25
2	Rober Sun	Literature	[NULL]	2,002	3	12	1	28
3	John Churchill	English	1	2,500	1	10	3	21
3	John Churchill	English	1	2,500	2	11	4	25
3	John Churchill	English	1	2,500	3	12	1	28
4	Sara Parker	Math	2	3,000	1	10	3	21
4	Sara Parker	Math	2	3,000	2	11	4	25
4	Sara Parker	Math	2	3,000	3	12	1	28

Cross product: classes and teachers

id	name	subject	class_id	monthy_salary	id2	grade	teacher_id	number_of_students
1	Elizabeth Grey	History	3	2,500	1	10	3	21
1	Elizabeth Grey	History	3	2,500	2	11	4	25
1	Elizabeth Grey	History	3	2,500	3	12	1	28
2	Rober Sun	Literature	[NULL]	2,000	1	10	3	21
2	Rober Sun	Literature	[NULL]	2,001	2	11	4	25
2	Rober Sun	Literature	[NULL]	2,002	3	12	1	28
3	John Churchill	English	1	2,500	1	10	3	21
3	John Churchill	English	1	2,500	2	11	4	25
3	John Churchill	English	1	2,500	3	12	1	28
4	Sara Parker	Math	2	3,000	1	10	3	21
4	Sara Parker	Math	2	3,000	2	11	4	25
4	Sara Parker	Math	2	3,000	3	12	1	28

Subject = ‘History’
or ‘English

T.Id = C.teacher_id

```
SELECT AVG(number_of_students)
FROM classes C, teachers T
WHERE T.id = C.teacher_id AND
subject = 'English' OR subject = 'History';
```

= (21+28)/2
= 24.5

Which one is better?

- If you are experience, you will find using One SELECT statement is earlier.
- If you are inexperience, you will find using nested query is earlier to understand but with more complex syntax

We will discuss this example again when we study “algorithm” next week.