

CSC 343 Inverted course material: Basic RA/SQL

1 Queries

1. How many students received a mark lower than 50?

Solution:

RA:

$Ans := \sigma_{grade < 50}(Students)$

SQL:

```
SELECT *  
FROM Students  
WHERE grade < 50;
```

SQL result (some columns omitted):

id	surname	name	grade
185141	Lee	Feng	32
348003	Lee	Jeffrey	37
476218	Mendonca	Victor	49
639807	Hok	Neil	42
699791	Ji	Dongyang	23
852713	Azmi	Mohammad	48
921680	Vu	Marian	39

(7 rows)

There are 7 students received a mark between 60 and 80.

2. How many students received a mark between 60 and 80?

Solution:

RA:

$$Ans := \sigma_{grade \leq 80 \wedge grade \geq 60}(Students)$$

SQL:

```
SELECT *
FROM Students
WHERE grade >= 60 and grade <= 80;
```

SQL result (some columns omitted):

id	surname	name	grade
103365	Khan	Alharith	78
153190	Giree	Waqas	79
200786	Liu	Shao-Wei	78
211870	Lin	Tai	70
253381	Lam	Wai	68
308394	Lai	Meng	71
314675	Xu	Sangin	76
329142	Shang	Shan	73
376641	Wang	Danyang	74
384318	Parker	Alexander	64
406624	Syed	Ather	69
495655	Zhou	Mark	64
506495	Aqeel	Nijan	73
813370	Zhang	Bin	77
930582	Rizvi	Asra	76
964048	Lee	Sabrina	80

(16 rows)

There are 16 students received a mark between 60 and 80.

3. How many students have nicknames?

Solution:

RA:

$$Ans := \sigma_{\neg null(nickname)}(Students)$$

SQL:

```

SELECT *
FROM Students
WHERE nickname IS NOT NULL;

```

SQL result (some columns omitted):

id	surname	name	nickname
153190	Giree	Waqas	Ryan
200786	Liu	Shao-Wei	Wei
364487	Li	YingPeng	Peng
376641	Wang	Danyang	David
384318	Parker	Alexander	Alex
495655	Zhou	Mark	Yangli
529609	Lai	Hsieh-Yun	Yun
566879	Lacuna	Dan	Daniel
574173	Nawaz	Zaki	Zack
699791	Ji	Dongyang	Donald
824280	Jingoi	Mark-Eric	Eric
852713	Azmi	Mohammad	Mo

(12 rows)

There are 12 students with nicknames.

4. Which grade was earned by the most students?

Solution:

RA:

$$Ans := \tau_{grade}(Students)$$

SQL:

```

SELECT grade
FROM Students
ORDER BY grade;

```

SQL result (some rows omitted):

grade
23
32

```

      37
      39
.....
      81
      81
      81
      81
      81
      82
      83
      84
.....
     103
(47 rows)

```

The grade earned by the most students is 81.

5. How many students with nicknames received a mark lower than 50?

Solution:

RA:

$$Ans := \sigma_{grade < 50 \wedge \neg null(nickname)}(Students)$$

SQL:

```

SELECT *
FROM Students
WHERE grade < 50 AND nickname IS NOT NULL;

```

SQL result:

id	surname	name	grade
699791	Ji	Dongyang	23
852713	Azmi	Mohammad	48

(2 rows)

There are 2 students with nicknames received a mark lower than 50.

6. Redo Q5 by reusing your answers to Q1 and Q3.

Solution:

RA:

From Q1:

$$R_1 := \sigma_{grade < 50}(Students)$$

From Q3:

$$R_2 := \sigma_{\neg null(nickname)}(Students)$$

$$Ans := R_1 \cap R_2$$

SQL:

```
(SELECT *
  FROM Students
  WHERE grade < 50
)INTERSECT (
  SELECT *
  FROM Students
  WHERE nickname IS NOT NULL);
```

There are 2 students with nicknames received a mark lower than 50.

7. Redo Q2 without using the keyword “and”.

Solution:

RA:

$$Ans := \sigma_{grade \geq 60}(Students) \cap \sigma_{grade \leq 80}(Students),$$

or

$$Ans := \sigma_{\neg (grade > 80 \vee grade < 60)}(Students)$$

SQL:

```
(SELECT *
  FROM Students
  WHERE grade >= 60
)INTERSECT (
  SELECT *
  FROM Students
  WHERE grade <= 80);,
```

or

```
SELECT *
FROM Students
WHERE NOT (grade < 60 OR grade > 80);
```

There are 16 students received a mark between 60 and 80.

8. What is the highest mark in the class? (SQL should produce the exact answer, RA should come close).

Solution:

RA:

$$Ans := \tau_{grade}(Students)$$

SQL:

```
SELECT grade
FROM Students
ORDER BY grade DESC limit 1;
```

SQL result:

```
  grade
-----
    103
(1 row)
```

The highest mark in the class is 103.

9. How many students use a gmail address?

Solution:

RA:

$$Ans := \sigma_{like(email, 'gmail.com')}(Students)$$

SQL:

```
SELECT *
FROM Students
WHERE email LIKE '%gmail.com';
```

SQL result (some columns omitted):

id	surname	name	email
153190	Giree	Waqas	stormysaint@gmail.com
200786	Liu	Shao-Wei	jadedragon@gmail.com
329142	Shang	Shan	shans@gmail.com
385904	Li	Yi	yi.li@gmail.com
420439	Yang	Ruopeng	ruopeng.yang@gmail.com
444496	Roberts	Van	slimyfish@gmail.com
506495	Aqeel	Nijan	naqeel@gmail.com
648227	Chua	Chikara	chikara.chua@gmail.com
732994	Wu	Kaixiang	kaixiangw@gmail.com
964048	Lee	Sabrina	sabrinal@gmail.com

(10 rows)

There are 10 students using a gmail address.

10. Of the students in Q9, who received the highest grade?

Solution:

RA:

$$Ans := \tau_{grade} \sigma_{like(email, 'gmail.com')}(Students)$$

SQL:

```
SELECT *
FROM Students
WHERE email LIKE '%gmail.com'
ORDER BY grade DESC limit 1;
```

SQL result (some columns omitted):

id	surname	name	email	grade
385904	Li	Yi	yi.li@gmail.com	99