BIMU3064

Veritabanı Yönetim Sistemleri

ÖDEV 1

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1) **‘Ali KURT’ (name) adlı öğrencinin sid’sini ve notlarını (grade) listeleyiniz.**

```
SELECT student.sid, take.grade

FROM student, take

WHERE student.sid = take.sid AND student.name = 'Ali Kurt';
```

➔ MariaDB [school]> SELECT student.sid, take.grade FROM student, take WHERE student.sid = take.sid AND student.name = 'Ali Kurt';

```
+-----+---------+

| sid | grade |

+-----+---------+

|   1 |      75 |

|   1 |    62.5 |

|   1 |    75.5 |

|   1 |      75 |

|   1 |     100 |

|   1 |      75 |

+-----+---------+

6 rows in set (0.001 sec)
```

İLİŞKİSEL CEBİR:

$\pi_{\text{student.sid, take.grade}}\ \sigma_{\text{student.sid = take.sid and student.name = 'Ali Kurt'}}\ (\text{student} \times \text{take})$

2) **‘Ayşe KURT’ (name) adlı öğrencinin aldığı, fakat ‘Ali KURT’ adlı öğrencinin almadığı derslerin kayıtlarını (yani course tablosunun tüm sütunlarını) listeleyiniz. (EXCEPT kullanınız gerekiyor)**

```
SELECT c.*

FROM student s, course c, take t

WHERE  s.name = 'Ayse Kurt' AND s.sid = t.sid AND t.cid = c.cid

AND c.cid NOT IN (

        SELECT t.cid

        FROM take t, student s

        WHERE s.name = 'Ali Kurt' AND s.sid = t.sid

);
```

➔ MariaDB [school]> SELECT c.* FROM student s, course c, take t WHERE s.name = 'Ayse Kurt' AND s.sid = t.sid AND t.cid = c.cid AND c.cid NOT IN (SELECT t.cid FROM take t, student s WHERE s.name = 'Ali Kurt' AND s.sid = t.sid);

```
+-----+---------------------------+----------+------+--------------+
| cid | title                     | credits | did  | avgGrade |
+-----+---------------------------+----------+------+--------------+
|   2 | Operating Systems     |        3 |    1 |        NULL |
|   5 | Statistic                 |        4 |    4 |        NULL |
|   7 | Introduction to Env   |        3 |    2 |        NULL |
|   8 | Operation Research    |        3 |    4 |        NULL |
|  11 | Summer Practice       |        3 |    1 |        NULL |
+-----+---------------------------+----------+------+----------------+
```

5 rows in set (0.002 sec)

İLİŞKİSEL CEBİR:

π c.cid, c.title, c.credits, c.did, c.avgGrade σ s.name = 'Ayse Kurt' and s.sid = t.sid and t.cid = c.cid ((ρ_s student × ρ_c course) × ρ_t take) - π c.cid, c.title, c.credits, c.did, c.avgGrade σ s.name = 'Ali Kurt' and s.sid = t.sid and t.cid = c.cid ((ρ_t take × ρ_s student) × ρ_c course)

3) Öğrencilerin sid'lerini ve aldıkları derslerin sayısını, not ortalamasını, en yüksek ve en düşük notlarını listeleyiniz.

```
SELECT sid,
        COUNT(sid),
        AVG(grade),
        MAX(grade),
        MIN(grade)
FROM take
GROUP BY sid;
```

➔ MariaDB [school]> SELECT sid, COUNT(sid), AVG(grade), MAX(grade), MIN(grade)FROM take GROUP BY sid;

```
+-----+----------------+-----------------------------+----------------+----------------+
```

sid	COUNT(sid)	AVG(grade)	MAX(grade)	MIN(grade)
1	6	77.16666666666667	100	62.5
2	11	71.18181818181819	100	4
3	11	69.31818181818181	100	23
4	2	47.75	62.5	33
5	3	61.16666666666666	75.5	33
6	1	100	100	100
7	4	50.875	75	33
8	2	52.75	75.5	30
9	2	22	23	21
10	2	87.5	100	75
11	1	25	25	25

11 rows in set (0.001 sec)

4) Bölümlerin did'leri, öğrenci sayılarını öğrenci sayılarına göre azalan sırada listeleyiniz (İlişkisel cebirle yazmayınız)

```
SELECT d.did, COUNT(s.sid) as student_count
FROM department d, student s
WHERE d.did = s.did
GROUP BY d.did
ORDER BY student_count DESC;
```

➔ MariaDB [school]> SELECT d.did, COUNT(s.sid) as student_count FROM department d, student s WHERE d.did = s.did GROUP BY d.did ORDER BY student_count DESC;

did	student_count
1	3
2	3
4	3
3	2

+-----+--------------------+

4 rows in set (0.001 sec)

5) **2'den fazla ders veren hocaların sid'leri, verdikleri ders sayısı ve derslerini alan öğrencilerin sayılarını listeleyiniz.**

```
SELECT teacher.tid, COUNT(DISTINCT teach.cid), COUNT(DISTINCT take.sid)
FROM teacher, teach, take
WHERE teacher.tid = teach.tid AND teach.cid = take.cid
AND (sid, take.cid) IN (
        SELECT s.sid, take.cid
        FROM student s, take t
        WHERE s.sid = t.sid
  )
GROUP BY teacher.tid HAVING COUNT(DISTINCT teach.cid) > 2;
```

➔ MariaDB [school]> SELECT teacher.tid, COUNT(DISTINCT teach.cid), COUNT(DISTINCT take.sid) FROM teacher, teach, take WHERE teacher.tid = teach.tid AND teach.cid = take.cid AND (sid, take.cid) IN (SELECT s.sid, take.cid FROM student s, take t WHERE s.sid = t.sid) GROUP BY teacher.tid HAVING COUNT(DISTINCT teach.cid) > 2;

+-----+--------------------------------------+----------------------------------+

| tid | COUNT(DISTINCT teach.cid) | COUNT(DISTINCT take.sid) |

+-----+--------------------------------------+----------------------------------+

| 4 | 4 | 6 |

| 7 | 3 | 9 |

+-----+--------------------------------------+----------------------------------+

2 rows in set (0.001 sec)

İLİŞKİSEL CEBİR:

π teacher.tid, a, b σ a > 2 γ teacher.tid; COUNT(teach.cid)→a, COUNT(take.sid)→b σ teacher.tid = teach.tid and teach.cid = take.cid and take.sid = student.sid (((teacher × teach) × take) × student)

6) **'Bilgisayar Müh' (department.name) adlı bölümdeki öğrencilerden 'Elektrik Müh' (department.name) adlı bölümdeki derslerden alanlarının (take tablosunu kullan) kayıtlarını (student tablosundaki tüm alanları listele) listeleyiniz.**

```
SELECT s.*
FROM student s, department d
WHERE s.did = d.did AND d.name = 'Bilgisayar Muhendisligi'
AND sid IN (
        SELECT s.sid
        FROM student s, take t, department d, course c
        WHERE d.name = 'Elektrik Muhendisligi'
        AND d.did = c.did AND c.cid = t.cid AND t.sid = s.sid
);
```

➔ MariaDB [school]> SELECT s.* FROM student s, department d WHERE s.did = d.did AND d.name = 'Bilgisayar Muhendisligi' AND sid IN (SELECT s.sid FROM student s, take t, department d, course c WHERE d.name = 'Elektrik Muhendisligi' AND d.did = c.did AND c.cid = t.cid AND t.sid = s.sid);

```
+-----+--------------+-------+--------------+
| sid | name       | did  | avgGrade |
+-----+--------------+------+--------------+
|   1 | Ali Kurt     |    1 |       NULL |
|   2 | Ayse Kurt  |    1 |       NULL |
|   3 | Kamil Kuru |    1 |       NULL |
+-----+---------------+------+-------------+
3 rows in set (0.001 sec)
```

İLİŞKİSEL CEBİR:

π s.sid, s.name, s.did, s.avgGrade σ s.did = d.did and d.name = 'Bilgisayar Muhendisligi' (ρ_s student × ρ_d department) ∩ (π s.sid, s.name, s.did, s.avgGrade σ d.name = 'Elektrik Muhendisligi' and d.did = c.did and c.cid = t.cid and t.sid = s.sid (((ρ_s student × ρ_t take) × ρ_d department) × ρ_c course))

7) **Her dersteki öğrenci sayılarının ortalamalarını (take tablosundan her dersi kaç öğrencinin aldığı bulunacak, sonra da bu sayıların ortalamaları bulunacak) bulup, bu ortalamadan daha fazla öğrencisi olan derslerin kayıtlarını listeleyiniz. (önce ortalamadan daha fazla**

öğrencisi olan derslerin cid'leri bulunacak, sonra bu cid'lerden yola çıkarak course tablosundaki ders kayıtları bulunacak)

```
SELECT c.*
FROM course c, (
                    SELECT c.cid, COUNT(t.cid) as COUNT
                    FROM course c, take t
                    WHERE c.cid = t.cid
                    GROUP BY cid) y
WHERE y.cid = c.cid AND y.COUNT > (
                    SELECT AVG(a.COUNT) as avarage
                    FROM (
                            SELECT c.cid, COUNT(t.cid) as COUNT
                            FROM course c, take t
                            WHERE c.cid = t.cid
                            GROUP BY cid
                    ) a
                );
```

➔ MariaDB [school]> SELECT c.* FROM course c, (SELECT c.cid, COUNT(t.cid) as COUNT FROM course c, take t WHERE c.cid = t.cid GROUP BY cid) y WHERE y.cid = c.cid AND y.COUNT > (SELECT AVG(a.COUNT) as avarage FROM (SELECT c.cid, COUNT(t.cid) as COUNT FROM course c, take t WHERE c.cid = t.cid GROUP BY cid) a);

```
+-----+----------------------------+-----------+------+--------------+
| cid | title                      | credits | did  | avgGrade |
+-----+----------------------------+-----------+------+--------------+
|   1 | Database Systems     |         3 |    1 |        NULL |
|   2 | Operating Systems    |         3 |    1 |        NULL |
|   3 | Introduction to Prog |         4 |    1 |        NULL |
|   4 | Introduction to Elect |         2 |    2 |        NULL |
|   5 | Statistic                  |         4 |    4 |        NULL |
|   8 | Operation Research   |         3 |    4 |        NULL |
+-----+----------------------------+-----------+------+--------------+
```

6 rows in set (0.001 sec)

İLİŞKİSEL CEBİR:

π c.cid, c.title, c.credits, c.did,
c.avgGrade σ y.cid = c.cid and y.casd > w.avarage ((ρ c course × ρ y (π c.cid, casd γ c.cid;
COUNT(t.cid)→casd σ c.cid = t.cid (ρ c course × ρ t take))) × ρ w (π avarage γ ;
AVG(a.asd)→avarage ρ a (π c.cid, asd γ c.cid;
COUNT(t.cid)→asd σ c.cid = t.cid (ρ c course × ρ t take))))

8) **GROUP BY kullanmadan iki farklı ders alan öğrencilerin kayıtlarını listeleyiniz. (2 farklı ders alan dendiği için take tablosunun 2 defa kullanılması gerekiyor! Sınıfta örnek yapmıştık. Slidelarda da örnek var. NOT: önce bu öğrencilerin sid'leri bir (alt) sorgu ile bulunacak sonra bu sid'ler üzerinden student tablosundaki kayıtlara yani tüm sütunlara ulaşılacak)**

```
SELECT s.*, GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_sayisi
FROM student s, (
                    SELECT s.sid, (
                                SELECT COUNT(cid)
                                FROM take
                                WHERE take.sid = s.sid
                            ) ders_sayisi
                    FROM student s
                ) GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU
WHERE GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.sid = s.sid AND
GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_sayisi >= 2;
```

➔ MariaDB [school]> SELECT s.*, GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_sayisi FROM student s, (SELECT s.sid, (SELECT COUNT(cid) FROM take WHERE take.sid = s.sid) ders_sayisi FROM student s) GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU WHERE GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.sid = s.sid AND GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_sayisi >= 2;

ERROR 2006 (HY000): MySQL server has gone away

No connection. Trying to reconnect...

Connection id: 21

Current database: school

+-----+----------------------+------+---------------+----------------+

sid	name	did	avgGrade	ders_sayisi
1	Ali Kurt	1	NULL	6
2	Ayse Kurt	1	NULL	11
3	Kamil Kuru	1	NULL	11
4	Yavuz Genc	2	NULL	2
5	Nejat Fulu	2	NULL	3
7	Serkan Aslan	3	NULL	4
8	Osman Sonat	4	NULL	2
9	Neriman Bandi	2	NULL	2
10	Peril Ovun	4	NULL	2
12	Kamuran Akkus	1	NULL	3

10 rows in set (0.001 sec)

İLİŞKİSEL CEBİR:

π s.sid, s.name, s.did, s.avgGrade,
GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_count σ GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.tr = s.sid and GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU.ders_count ≥ 2 (ρ s student × ρ GROUP_BY_OLMADAN_DERS_SAYISINI_BULAN_ALT_SORGU (ρ tr←s.sid, ders_count←ders_sayisi.asd π s.sid,
ders_sayisi.asd (ρ s student × ρ ders_sayisi (π asd γ ;
COUNT(take.cid)→asd σ take.sid = student.sid (take × student)))))

9) Hiç ders vermeyen (take tablosunda bu hocaya ait kayıt yok demektir) hocaları listeleyiniz.

```
SELECT t.*
FROM teacher t
WHERE NOT EXISTS (
                        SELECT cid
                        FROM teach
                         WHERE teach.tid = t.tid
                );
```

➔ MariaDB [school]> SELECT t.* FROM teacher t WHERE NOT EXISTS (SELECT cid FROM teach WHERE teach.tid = t.tid);

```
+-----+-------------------+------+-----------------+
| tid | name              | did  | courseCount |
+-----+-------------------+------+-----------------+
|   8 | Alparslan Kurt |    1 |               0 |
+-----+-------------------+------+-----------------+
```

1 row in set (0.001 sec)

İLİŞKİSEL CEBİR:

π t.tid, t.name, t.did,
t.courseCount σ ders_count.ders = 0 (ρ t teacher × ρ ders_count (π ders γ ;
COUNT(teach.cid)→ders σ teach.tid = teacher.tid (teach × teacher)))

10) Ders veren hocaların kayıtlarını (teacher tablosundaki tüm sütunları) listeleyiniz. (Yani take tablosunda tid geçen tüm hocalar)

```
SELECT t.*
FROM teacher t
WHERE EXISTS (
        SELECT cid
        FROM teach
        WHERE teach.tid = t.tid
    );
```

➔ MariaDB [school]> SELECT t.* FROM teacher t WHERE EXISTS (SELECT cid FROM teach WHERE teach.tid = t.tid);

```
+-----+-------------------+------+-----------------+
| tid | name              | did  | courseCount |
+-----+-------------------+------+-----------------+
|   1 | Ozgur Abuy     |    1 |               0 |
|   2 | Sibel Akin     |    1 |               0 |
|   3 | Safiye Guclu   |    1 |               0 |
|   4 | Yucel Tufekci  |    2 |               0 |
|   5 | Ali Ozer       |    3 |               0 |
```

| 6 | Serhat Colak | 4 | 0 |

| 7 | Ece Sevil | 4 | 0 |

+-----+------------------+------+--------------------+

7 rows in set (0.001 sec)

İLİŞKİSEL CEBİR:

$$\pi_{\text{t.tid, t.name, t.did, t.courseCount}} \sigma_{\text{course\_count.ders} > 0} (\rho_{\text{t}} \text{teacher} \times \rho_{\text{course\_count}} (\pi_{\text{ders}} \gamma_{\text{COUNT(teach.cid)} \rightarrow \text{ders}} \sigma_{\text{teach.tid} = \text{teacher.tid}} (\text{teach} \times \text{teacher})))$$