Bilkent University
Department of Computer Engineering

CS353 Database Systems

Homework #3

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This document is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Database Systems, course CS353.

Question 1 Queries into SQL

1.

```
select S.s-id, S.s-name, S.s-year
from Student S
join Enroll E on S.s-id = E.s-id
join Course C on E.c-id = C.c-id
where S.s-dept = 'CS'
and C.c-dept = 'MATH'
and C.credits = 4
and E.semester = 'Spring'
and E.year = 2023;
```

2.

```
select S.s-id, S.s-name
from Student S
where S.s-year = 4 and S.s-id not in (
      select E.s-id
      from Enroll E
      where E.grade = 'F'
);
```

3.

```
select S.s-id, S.s-name
from Student S
join Enroll E on S.s-id = E.s-id
join Course C on E.c-id = C.c-id
where S.s-year = 1
and S.s-dept = 'CS'
and C.c-name = 'CS101'
and E.grade = 'A'
and E.semester = 'Spring'
and E.year = 2023
order by S.s-name ASC;
```

4.

```
select S.s-id, S.s-name
from Student S
join Enroll E on S.s-id = E.s-id
join Course C on E.c-id = C.c-id
where S.s-dept = 'CS'
and E.grade = 'A'
and E.semester = 'Spring'
and E.year = 2023
and C.c-id in (
      select E-other.c-id
      from Prereq P
      join Course C-other on P.p-id = C-other.c-id
      join Enroll E-other on C-other.c-id = E-other.c-id
      where P.c-id = 'MATH101'
);
```

5.

```
select S.s-id, S.s-name, S.s-dept
from Student S
join Enroll E on S.s-id = E.s-id
join Course C on E.c-id = C.c-id
where E.c-id = 'MATH101'
and E.grade = 'F'
and ((E.semester = 'Spring' and E.year = 2022)
      or (E.semester = 'Fall' and E.year = 2022))
group by S.s-id, S.s-name, S.s-dept
having count (E.semester) = 2
order by S.s-dept ASC, S.s-name ASC;
```

6.

```
select S.s-id, S.s-name
from Student S
where S.s-dept = 'EE'
and S.s-year = 4
and not exists (
      select C1.c-id
      from Course C1
      where C1.c-dept = 'MATH' and exists (
            select P.c-id
            from Prereq P
            where P.p-id = 'MATH101' and P.c-id = C1.c-id
      ) and not exists (
            select E1.c-id
            from Enroll E1
            where E1.s-id = S.s-id and E1.c-id = C1.c-id
    )
);
```

7.

```
select S.s-id, S.s-name
from Student S
join Enroll E on S.s-id = E.s-id
join Course C on E.c-id = C.c-id
where S.s-dept = 'CS'
and C.c-name = 'PHYS101'
group by S.s-id, S.s-name
having count (E.c-id) = 1;
```

8.

```
select S.s-id, S.s-name
from Student S
join Enroll E on S.s-id = E.s-id
where S.s-dept = 'CS'
and E.semester = 'Spring'
and E.year = 2023
and E.grade = 'A'
group by S.s-id, S.s-name
having count (E.grade) >= 3;
```

9.

```
select S.s-dept, count (S.s-id) as num_students_received_A_from_math101
from Student S
join Enroll E on S.s-id = E.s-id
where E.c-id = 'MATH101'
and E.semester = 'Spring'
and E.year = 2023
and E.grade = 'A'
group by S.s-dept;
```

Question 2 Relational Algebra Expressions into SQL

a.

```
select c.cname
from customers c
join purchase p on c.cid = p.cid
join books b on p.isbn = b.isbn
where b.publisher = 'ABC';
```

b.

```
select publish-year, count (distinct isbn) as book-count
from books
where publisher = 'ABC'
group by publish-year;
```

c.

```
select c.cname
from customers c
join (
      select p.cid, count (distinct isbn) as book-count
      from purchase p
      join books b on b.isbn = p.isbn
      where b.publisher = ‘ABC'
      group by cid
) as Temp on c.cid = Temp.cid
where Temp.book-count > 10;
```