

[COSE371 Database]
Lab – Intermediate SQL

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Exercise 1.

1. The university database schema contains various integrity constraints. Execute some SQL statements violating them.

- 1) Not null constraint

```
SQL Shell (psql)
practice2=# insert into instructor values (null, 'Hwang', 'Comp. Sci.', 10000);
오류: "id" 칼럼(해당 릴레이션 "instructor")의 null 값이 not null 제약조건을 위반했습니다.
상세정보: 실패한 자료: (null, Hwang, Comp. Sci., 10000.00)
practice2=#
```

- 2) Primary key constraint

```
SQL Shell (psql)
practice2=# insert into instructor values (12121, 'Hwang', 'Comp. Sci.', 10000);
오류: 중복된 키 값이 "instructor_pkey" 고유 제약 조건을 위반함
상세정보: (id)=(12121) 키가 이미 있습니다.
practice2=#
```

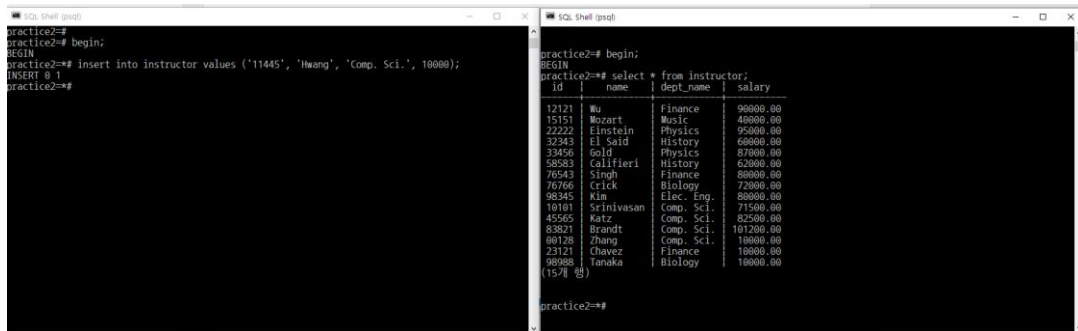
- 3) Foreign key constraint

```
SQL Shell (psql)
practice2=#
practice2=# insert into instructor values (11445, 'Hwang', 'Comp. Engineering', 10000);
오류: "instructor" 테이블에서 자료 추가, 갱신 작업이 "instructor_dept_name_fkey" 참조키(foreign key) 제약 조건을 위배했습니다
상세정보: (dept_name)=(Comp. Engineering) 키가 "department" 테이블에 없습니다.
practice2=#
```

- 4) Other constraint

```
SQL Shell (psql)
practice2=#
practice2=#
practice2=# insert into instructor values (11445, 'Hwang', 'Comp. Sci.', 10000);
오류: 새 자료가 "instructor" 릴레이션의 "instructor_salary_check" 체크 제약 조건을 위반했습니다
상세정보: 실패한 자료: (11445, Hwang, Comp. Sci., 10000.00)
practice2=#
```

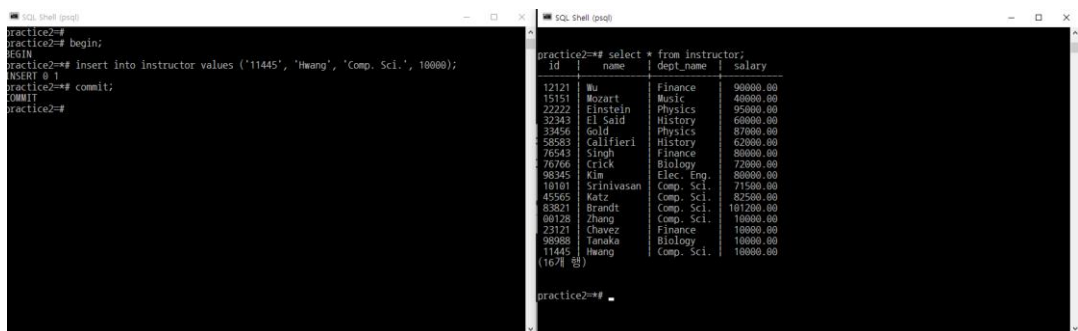
2. Make two or more concurrently executed transactions, and show they are executed in an isolated manner.



```
practice2=# begin;
practice2=# insert into instructor values ('11445', 'Hwang', 'Comp. Sci.', 10000);
practice2=#
```

```
practice2=# select * from instructor;
id      name      dept_name  salary
-----
12121    Wu         Finance    90000.00
15151    Mozart    Music       40000.00
22222    Einstein   Physics     95000.00
32343    El Said    History     60000.00
33456    Gold       Physics     87000.00
58583    Callieri   History     62000.00
76543    Singh      Finance     80000.00
76766    Crick      Biology     72000.00
98345    Kim        Elec. Eng.  80000.00
10101    Srinivasan Comp. Sci.  71500.00
45565    Katz        Comp. Sci.  82500.00
83821    Brandt     Comp. Sci. 101200.00
80128    Zhang      Comp. Sci. 10000.00
23121    Chavez     Finance     10000.00
98988    Tanaka     Biology     10000.00
(15개 행)
```

한 transaction에서 insert를 했지만 commit하지 않아 다른 transaction에서 확인했을 때 반영되지 않은 모습을 볼 수 있습니다.



```
practice2=# begin;
practice2=# insert into instructor values ('11445', 'Hwang', 'Comp. Sci.', 10000);
practice2=# commit;
practice2=#
```

```
practice2=# select * from instructor;
id      name      dept_name  salary
-----
12121    Wu         Finance    90000.00
15151    Mozart    Music       40000.00
22222    Einstein   Physics     95000.00
32343    El Said    History     60000.00
33456    Gold       Physics     87000.00
58583    Callieri   History     62000.00
76543    Singh      Finance     80000.00
76766    Crick      Biology     72000.00
98345    Kim        Elec. Eng.  80000.00
10101    Srinivasan Comp. Sci.  71500.00
45565    Katz        Comp. Sci.  82500.00
83821    Brandt     Comp. Sci. 101200.00
80128    Zhang      Comp. Sci. 10000.00
23121    Chavez     Finance     10000.00
98988    Tanaka     Biology     10000.00
11445    Hwang      Comp. Sci. 10000.00
(16개 행)
```

Commit 후에는 새로 추가된 row를 확인할 수 있습니다.

3. Make users and set up a few authorization rules; Show some non-authorized accesses.

```
SQL Shell (psql)

practice2=# CREATE USER guest LOGIN PASSWORD '1234';
CREATE ROLE
practice2=# grant select on instructor to guest;
GRANT
practice2=#
```

Guest라는 이름의 user를 생성하고 instructor 테이블에 select 권한을 부여하였습니다.

```
SQL Shell (psql)

Server [localhost]:
Database [postgres]:
Port [5432]:
Username [postgres]: guest
guest 사용자의 암호:
psql (15.2)
도움말을 보려면 "help"를 입력하십시오.

postgres=>
postgres=>
postgres=> \c practice2;
접속정보: 데이터베이스="practice2", 사용자="guest".
practice2=> select * from instructor where dept_name='Comp. Sci.';
 id      | name      | dept_name | salary
-----+-----+-----+-----
 10101   | Srinivasan | Comp. Sci. | 71500.00
 45565   | Katz       | Comp. Sci. | 82500.00
 83821   | Brandt    | Comp. Sci. | 101200.00
 00128   | Zhang     | Comp. Sci. | 10000.00
 11445   | Hwang     | Comp. Sci. | 10000.00
(5개 행)
```

```
SQL Shell (psql)

practice2=>
practice2=> insert into instructor values ('11445', 'Sang', 'Comp. Sci.', 10000);
오류: instructor 테이블에 대한 접근 권한 없음
practice2=> update instructor set salary=10000;
오류: instructor 테이블에 대한 접근 권한 없음
practice2=> delete from instructor where dept_name = 'Comp. Sci.';
오류: instructor 테이블에 대한 접근 권한 없음
practice2=> .
```

Guest로 로그인한 후 select문을 실행하니 결과가 잘 출력되는 모습을 볼 수 있습니다. 그러나 권한이 없는 update, insert, delete 등의 쿼리는 실행되지 않습니다.

4. Create some views and show how view maintenance works and how view update is processed.

```
SQL Shell (psql)

practice2=#
practice2=# create view faculty as
practice2=# select id, name, dept_name from instructor;
CREATE VIEW
practice2=#
```

Instructor 테이블을 이용하여 faculty라는 simple view를 생성한 모습입니다.

```
SQL Shell (psql)

practice2=#
practice2=# update instructor set dept_name='Music' where id='11445';
UPDATE 1
practice2=# select * from faculty;
 id | name      | dept_name
-----+-----+-----
12121 | Wu        | Finance
15151 | Mozart    | Music
22222 | Einstein  | Physics
32343 | El Said   | History
33456 | Gold      | Physics
58583 | Califieri | History
76543 | Singh     | Finance
76766 | Crick     | Biology
98345 | Kim       | Elec. Eng.
10101 | Srinivasan | Comp. Sci.
45565 | Katz       | Comp. Sci.
83821 | Brandt    | Comp. Sci.
00128 | Zhang     | Comp. Sci.
23121 | Chavez    | Finance
98988 | Tanaka    | Biology
11445 | Hwang     | Music
(16개 행)

practice2=#
```

```
SQL Shell (psql)

practice2=#
practice2=# update faculty set dept_name='Finance' where id='11445';
UPDATE 1
practice2=# select * from instructor;
 id | name      | dept_name | salary
-----+-----+-----+-----
12121 | Wu        | Finance   | 90000.00
15151 | Mozart    | Music     | 40000.00
22222 | Einstein  | Physics   | 95000.00
32343 | El Said   | History    | 60000.00
33456 | Gold      | Physics    | 87000.00
58583 | Califieri | History    | 62000.00
76543 | Singh     | Finance    | 80000.00
76766 | Crick     | Biology    | 72000.00
98345 | Kim       | Elec. Eng. | 80000.00
10101 | Srinivasan | Comp. Sci. | 71500.00
45565 | Katz       | Comp. Sci. | 82500.00
83821 | Brandt    | Comp. Sci. | 101200.00
00128 | Zhang     | Comp. Sci. | 10000.00
23121 | Chavez    | Finance    | 10000.00
98988 | Tanaka    | Biology    | 10000.00
11445 | Hwang     | Finance    | 10000.00
(16개 행)

practice2=#
```

Source relation에 update를 수행하자 view에도 잘 반영되고, view에 update를 수행해도 source relation에 잘 반영됩니다.

```
SQL Shell (psql)

practice2=# create view dept_salary as select dept_name, salary from instructor, prereq;
CREATE VIEW
practice2=# insert into dept_salary values ('Music', 10000);
오류: "dept_salary" 뷰에 자료를 입력할 수 없습니다
상세정보: Views that do not select from a single table or view are not automatically updatable
힌트: 뷰를 통해 자료를 입력하려면, INSTEAD OF INSERT 트리거나 ON INSERT DO INSTEAD 쿼리를 사용하세요
practice2=#
```

그러나 simple view가 아닌 view에 insert를 수행할 경우 거부되는 것을 볼 수 있습니다.

```
practice2=# create materialized view material_dept_salary
practice2=# as select dept_name, salary from instructor;
SELECT 16
practice2=#
```

이번엔 material view를 생성하였습니다.

```
SQL Shell (psql)
practice2=# select * from material_dept_salary;
 dept_name | salary
-----+-----
 Finance   | 90000.00
 Music     | 40000.00
 Physics    | 95000.00
 History    | 60000.00
 Physics    | 87000.00
 History    | 62000.00
 Finance    | 80000.00
 Biology    | 72000.00
 Elec. Eng. | 80000.00
 Comp. Sci. | 71500.00
 Comp. Sci. | 82500.00
 Comp. Sci. | 101200.00
 Comp. Sci. | 10000.00
 Finance    | 10000.00
 Biology    | 10000.00
 Comp. Sci. | 77777.00
(16개 행)
```

```
SQL Shell (psql)
practice2=# delete from instructor where salary=77777;
DELETE 1
practice2=# select * from material_dept_salary where salary=77777;
 dept_name | salary
-----+-----
 Comp. Sci. | 77777.00
(1개 행)

practice2=#
practice2=# delete from material_dept_salary where salary=77777;
오류: "material_dept_salary" 구체화된 뷰를 바꿀 수 없음
practice2=#
```

이전과는 달리 source relation에 변경을 가해도 materialized view에 반영되지 않는 모습입니다. 또한 materialized view를 변경하는 것이 허용되지 않습니다.

```
SQL Shell (psql)
practice2=#
practice2=# refresh materialized view material_dept_salary;
REFRESH MATERIALIZED VIEW
practice2=# select * from material_dept_salary where salary=77777;
 dept_name | salary
-----+-----
(0개 행)
```

명시적으로 Refresh 명령을 수행해야 source relation의 변경 내역이 반영됩니다.