Report on Lab-06
DATABASE MANAGEMENT SYSTEMS LAB

Submitted by

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Course Title: CSE 4308

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Introduction

In the lab class, we were given four tasks to solve using SQL command line to understand advanced data definition and data manipulation using views and roles.

Task 1

Create a view named Advisor_Selection that shows the ID, name and department name of instructors.

1.1 Solution

```
create or replace view advisor_Selection as
select ID, name, dept_name
from instructor;
```

1.2 Analysis and Explanation

This task was completed easily by following the instructions in the PDF document.

1.3 Difficulties

I did not face any difficulties when doing this task and no mentionable issues were encountered.

1.4 Output

```
SQL> create or replace view advisor_Selection as
  2  select ID, name, dept_name
  3  from instructor;

View created.
```

Task 2

Create another view named Student_Count using Advisor_Selection and advisor to show the name of the instructor and the number students assigned under them.

2.1 Solution

```
create or replace view student_Selection as
select max(advisor_Selection.name) as advisor_name, count(advisor.s_ID) as
student_count
from advisor_Selection left join advisor
on advisor_Selection.ID = advisor.i_ID
group by advisor_Selection.ID;
```

2.2 Analysis and Explanation

This task was also completed easily by following the instructions in the PDF document.

2.3 Difficulties

I did face some difficulties when using group by clause since we are grouping by Advisor_Selection.id here but it is not present in the select clause. So, I used an aggregate function like max() for the attributes remaining in the select clause which will not alter the value of the attribute.

2.4 Output

```
SQL> create or replace view student_Selection as
  2  select max(advisor_Selection.name) as advisor_name, count(advisor.s_ID) as student_count
  3  from advisor_Selection left join advisor
  4  on advisor_Selection.ID = advisor.i_ID
  5  group by advisor_Selection.ID;

View created.
```

Task 3

Four categories of users have been identified in the database:

(a) Students should be able to view information regarding advisors and courses.

(b) Course teachers should be able to view information about the students and courses.

(c) Head of the Departments should have all the privileges that a course teacher has. Additionally, s/he should be able to add new instructors.

(d) Administrator should be able to see information about department and instructors. They should also be able to update the department budget.

Create roles for these categories and grant them appropriate privileges.

3.1 Solution

```
--a--
drop role student_role;
create role student_role;
grant create session, resource, create tablespace to student_role;
grant select on course to student_role;
grant select on advisor to student_role;

--b--
drop role course_teacher;
create role course_teacher;
grant create session, resource, create tablespace to course_teacher;
grant select on course to course_teacher;
grant select on student to course_teacher;

--c--
drop role head_dept;
create role head_dept;
grant create session, resource, create tablespace to head_dept;
grant course_teacher to head_dept;
grant select on instructor to head_dept;
grant insert on instructor to head_dept;

--d--
drop role administrator;
create role administrator;
grant create session, resource, create tablespace to administrator;
grant select on department to administrator;
grant select on instructor to administrator;
grant update(budget) on department to administrator;
```

3.2 Analysis and Explanation

I This problem was easy to solve by following the instructions in the PDF document.

For (a) and (b), I granted the create session and select commands to the roles for connecting to the user identified by that role and viewing tables. The select command was granted for the required tables only.

For(c), I granted the same commands as the ones granted to the course_teacher role by granting that role to the head_dept role. I also granted the insert role only for the instructor table to this role. The select command was granted for the required tables only.

For(d), I granted the create session and select commands to the role for connecting to the user identified by that role and viewing tables. The select command was granted for the required tables only. I also granted the update command but only for the budget attribute in the department table.

3.3 Difficulties

I did not face any difficulties when doing this task and no mentionable issues were encountered.

3.4 Output

```
SQL> --a--
SQL> drop role student_role;

Role dropped.

SQL> create role student_role;

Role created.

SQL> grant create session, resource, create tablespace to student_role;

Grant succeeded.

SQL> grant select on course to student_role;

Grant succeeded.

SQL> grant select on advisor to student_role;

Grant succeeded.
```

```
SQL> --b--
SQL> drop role course_teacher;

Role dropped.

SQL> create role course_teacher;

Role created.

SQL> grant create session, resource, create tablespace to course_teacher;

Grant succeeded.

SQL> grant select on course to course_teacher;

Grant succeeded.

SQL> grant select on student to course_teacher;

Grant succeeded.
```

```
SQL> --c--
SQL> drop role head_dept;

Role dropped.

SQL> create role head_dept;

Role created.

SQL> grant create session, resource, create tablespace to head_dept;

Grant succeeded.

SQL> grant course_teacher to head_dept;

Grant succeeded.

SQL> grant select on instructor to head_dept;

Grant succeeded.

SQL> grant insert on instructor to head_dept;

Grant succeeded.
```

```
SQL> --d--
SQL> drop role administrator;

Role dropped.

SQL> create role administrator;

Role created.

SQL> grant create session, resource, create tablespace to administrator;

Grant succeeded.

SQL> grant select on department to administrator;

Grant succeeded.

SQL> grant select on instructor to administrator;

Grant succeeded.

SQL> grant update(budget) on department to administrator;

Grant succeeded.
```

Task 4

Create users under these roles and write relevant SQL queries to demonstrate that the imposed access control works.

4.1 Solution

```
--a--
create user student1 identified by ps1;
grant student_role to student1;
connect student1/ps1;
select * from System.advisor;
select * from System.course;
drop table System.course; --Won't work

--b--
create user teacher1 identified by ps1;
grant course_teacher to teacher1;
connect teacher1/ps1;
select * from System.student;
select * from System.course;
drop table System.course; --Won't work

--c--
create user head1 identified by ps1;
grant head_dept to head1;
connect head1/ps1;
select * from System.student;
select * from System.course;
insert into System.instructor values ('21172', 'Adid', 'Math', '456700');
drop table System.course; --Won't work

--d--
create user admin1 identified by ps1;
grant administrator to admin1;
connect admin1/ps1;
select * from System.department;
select * from System.instructor;
update System.department set budget='150000' where dept_name='Music';
drop table System.department; --Won't work
```

4.2 Analysis and Explanation

For this task, I created 4 new users then granted each user to a one of the four roles from task 3 and tested the privileges granted to each role using SQL queries. To check for permissions not granted to the roles, I used drop to try and drop the tables.

4.3 Difficulties

I faced some difficulty when using the insert command. The structure of the inserting values had to match the attribute constrictions of the table and the dept_name had to be an existing one from department table which I did not understand at first and faced-errors.

4.4 Output

(a)

```
SQL> create user student1 identified by ps1;

User created.

SQL> grant student_role to student1;

Grant succeeded.

SQL> connect student1/ps1;
Connected.
SQL> select * from System.advisor;

S_ID   I_ID
-----  -----
00128  45565
12345  10101
23121  76543
44553  22222
45678  22222
76543  45565
76653  98345
98765  98345
98988  76766

9 rows selected.
```

```
SQL> select * from System.course;

COURSE_I TITLE                                               DEPT_NAME
-------- -------------------------------------------------- ---------------------
   CREDITS
----------
BIO-101  Intro. to Biology                                   Biology
         4

BIO-301  Genetics                                            Biology
         4

BIO-399  Computational Biology                               Biology
         3


COURSE_I TITLE                                               DEPT_NAME
-------- -------------------------------------------------- ---------------------
   CREDITS
----------
CS-101   Intro. to Computer Science                          Comp. Sci.
         4

CS-190   Game Design                                         Comp. Sci.
         4

CS-315   Robotics                                            Comp. Sci.
         3


COURSE_I TITLE                                               DEPT_NAME
-------- -------------------------------------------------- ---------------------
   CREDITS
----------
CS-319   Image Processing                                    Comp. Sci.
         3

CS-347   Database System Concepts                            Comp. Sci.
         3

EE-181   Intro. to Digital Systems                           Elec. Eng.
         3
```

```
COURSE_I TITLE                                              DEPT_NAME
-------- -------------------------------------------------- --------------------
   CREDITS
----------
FIN-201  Investment Banking                                 Finance
         3

HIS-351  World History                                      History
         3

MU-199   Music Video Production                             Music
         3


COURSE_I TITLE                                              DEPT_NAME
-------- -------------------------------------------------- --------------------
   CREDITS
----------
PHY-101  Physical Principles                                Physics
         4


13 rows selected.

SQL> drop table System.course;
drop table System.course
                *
ERROR at line 1:
ORA-01031: insufficient privileges
```

(b)

```
SQL> --b--
SQL> create user teacher1 identified by ps1;

User created.

SQL> grant course_teacher to teacher1;

Grant succeeded.

SQL> connect teacher1/ps1;
Connected.
SQL> select * from System.student;

ID    NAME                   DEPT_NAME                TOT_CRED
----- ---------------------- ---------------------- -----------
00128 Zhang                  Comp. Sci.                     102
12345 Shankar                Comp. Sci.                      32
19991 Brandt                 History                         80
23121 Chavez                 Finance                        110
44553 Peltier                Physics                         56
45678 Levy                   Physics                         46
54321 Williams               Comp. Sci.                      54
55739 Sanchez                Music                           38
70557 Snow                   Physics                          0
76543 Brown                  Comp. Sci.                      58
76653 Aoi                    Elec. Eng.                      60

ID    NAME                   DEPT_NAME                TOT_CRED
----- ---------------------- ---------------------- -----------
98765 Bourikas               Elec. Eng.                      98
98988 Tanaka                 Biology                        120

13 rows selected.
```

```
SQL> select * from System.course;

COURSE_I TITLE                                             DEPT_NAME
-------- -------------------------------------------------- --------------------
   CREDITS
----------
BIO-101  Intro. to Biology                                 Biology
         4

BIO-301  Genetics                                          Biology
         4

BIO-399  Computational Biology                             Biology
         3


COURSE_I TITLE                                             DEPT_NAME
-------- -------------------------------------------------- --------------------
   CREDITS
----------
CS-101   Intro. to Computer Science                        Comp. Sci.
         4

CS-190   Game Design                                       Comp. Sci.
         4

CS-315   Robotics                                          Comp. Sci.
         3


COURSE_I TITLE                                             DEPT_NAME
-------- -------------------------------------------------- --------------------
   CREDITS
----------
CS-319   Image Processing                                  Comp. Sci.
         3

CS-347   Database System Concepts                          Comp. Sci.
         3

EE-181   Intro. to Digital Systems                         Elec. Eng.
         3
```

```
COURSE_I TITLE                                                DEPT_NAME
-------- ----------------------------------------------------- --------------------
   CREDITS
----------
FIN-201  Investment Banking                                    Finance
         3

HIS-351  World History                                         History
         3

MU-199   Music Video Production                                Music
         3


COURSE_I TITLE                                                DEPT_NAME
-------- ----------------------------------------------------- --------------------
   CREDITS
----------
PHY-101  Physical Principles                                   Physics
         4


13 rows selected.

SQL> drop table System.course;
drop table System.course
                   *
ERROR at line 1:
ORA-01031: insufficient privileges
```

(c)

```
SQL> create user head1 identified by ps1;

User created.

SQL> grant head_dept to head1;

Grant succeeded.

SQL> connect head1/ps1;
Connected.
SQL> select * from System.student;

ID    NAME                 DEPT_NAME              TOT_CRED
----- -------------------- ---------------------- ----------
00128 Zhang                Comp. Sci.                    102
12345 Shankar              Comp. Sci.                     32
19991 Brandt               History                        80
23121 Chavez               Finance                       110
44553 Peltier              Physics                        56
45678 Levy                 Physics                        46
54321 Williams             Comp. Sci.                     54
55739 Sanchez              Music                          38
70557 Snow                 Physics                         0
76543 Brown                Comp. Sci.                     58
76653 Aoi                  Elec. Eng.                     60

ID    NAME                 DEPT_NAME              TOT_CRED
----- -------------------- ---------------------- ----------
98765 Bourikas             Elec. Eng.                     98
98988 Tanaka               Biology                       120

13 rows selected.
```

```
COURSE_I TITLE                                               DEPT_NAME
-------- --------------------------------------------------- --------------------
   CREDITS
----------
FIN-201  Investment Banking                                  Finance
         3

HIS-351  World History                                       History
         3

MU-199   Music Video Production                              Music
         3


COURSE_I TITLE                                               DEPT_NAME
-------- --------------------------------------------------- --------------------
   CREDITS
----------
PHY-101  Physical Principles                                 Physics
         4


13 rows selected.

SQL> insert into System.instructor values ('21172', 'Adid', 'Math', '456700');
insert into System.instructor values ('21172', 'Adid', 'Math', '456700')
*
ERROR at line 1:
ORA-02291: integrity constraint (SYSTEM.SYS_C007469) violated - parent key not
found


SQL> drop table System.course;
drop table System.course
                    *
ERROR at line 1:
ORA-01031: insufficient privileges


SQL> insert into System.instructor values ('21172', 'Adid', 'Music', '456700');

1 row created.
```

```
SQL> select * from System.course;

COURSE_I TITLE                                        DEPT_NAME
-------- -------------------------------------------- ---------------------
   CREDITS
----------
BIO-101  Intro. to Biology                            Biology
         4

BIO-301  Genetics                                     Biology
         4

BIO-399  Computational Biology                        Biology
         3


COURSE_I TITLE                                        DEPT_NAME
-------- -------------------------------------------- ---------------------
   CREDITS
----------
CS-101   Intro. to Computer Science                   Comp. Sci.
         4

CS-190   Game Design                                  Comp. Sci.
         4

CS-315   Robotics                                     Comp. Sci.
         3


COURSE_I TITLE                                        DEPT_NAME
-------- -------------------------------------------- ---------------------
   CREDITS
----------
CS-319   Image Processing                             Comp. Sci.
         3

CS-347   Database System Concepts                     Comp. Sci.
         3

EE-181   Intro. to Digital Systems                    Elec. Eng.
         3
```

(d)

```
SQL> create user admin1 identified by ps1;

User created.

SQL> grant administrator to admin1;

Grant succeeded.

SQL> connect admin1/ps1;
Connected.
SQL> select * from System.department;

DEPT_NAME            BUILDING             BUDGET
-------------------- ---------------- ----------
Biology              Watson                90000
Comp. Sci.           Taylor               100000
Elec. Eng.           Taylor                85000
Finance              Painter              120000
History              Painter               50000
Music                Packard               80000
Physics              Watson                70000

7 rows selected.
```

```
SQL> select * from System.instructor;

ID    NAME                 DEPT_NAME                SALARY
----- -------------------- -------------------- ----------
10101 Srinivasan           Comp. Sci.                65000
12121 Wu                   Finance                   90000
15151 Mozart               Music                     40000
22222 Einstein             Physics                   95000
32343 El Said              History                   60000
33456 Gold                 Physics                   87000
45565 Katz                 Comp. Sci.                75000
58583 Califieri            History                   62000
76543 Singh                Finance                   80000
76766 Crick                Biology                   72000
83821 Brandt               Comp. Sci.                92000

ID    NAME                 DEPT_NAME                SALARY
----- -------------------- -------------------- ----------
98345 Kim                  Elec. Eng.                80000
21172 Adid                 Music                    456700

13 rows selected.

SQL> update System.department set budget='150000' where dept_name='Music';

1 row updated.

SQL> drop table System.department;
drop table System.department
                *
ERROR at line 1:
ORA-01031: insufficient privileges
```