# DBMS Laboratory

## UE19CS304

## 5th Semester, Academic Year 2021-22

Week #: 4 - Constraints and Views

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| | | |
|---|---|---|
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1. Constraints:

- Creating and using a db called db519

```
postgres=# create database db519;
CREATE DATABASE
postgres=# \d db519;
Did not find any relation named "db519".
postgres=# \c db519;
You are now connected to database "db519" as user "postgres".
db519=#
```

- Create employee table called employee519. Set primary key, not null and check constrainsts as specified

```
db519=# create table EMPLOYEE519(fname varchar(30) not null, minit varchar(30), lname varchar(30) not null, ssn int primary key, bdate date, address varchar(30), sex varchar, salaray int, super_ssn int,
dno int, constraint chk1 check (bdate < TO_DATE('1985-01-01', 'yyyy-mm-dd')));
CREATE TABLE
```

- Create department table called department519. Set primary key and unique constraints as specified.

```
db519=# create table DEPARTMENT519(dname varchar(10) unique, dnumer int primary key unique, mgr_ssn int, mgr_start_date date);
CREATE TABLE
```

- Create dept_locations table called dept_locations519. Set primary keys.

```
db519=# create table DEPT_LOCATIONS519(dnumber int, dlocation int, primary key(dnumber, dlocation));
CREATE TABLE
```

- Create projects table called project519. Set primary keys, default value.

```
db519=# create table PROJECT519(pname varchar(10) default 'unknown', pnumber int, plocation varchar(50), dnum int, primary key(pnumber, plocation) );
CREATE TABLE
db519=#
```

- Create works_on table called works_on519. Set primary keys.

```
db519=# create table works_on519(essn int, pno int, hours int, primary key(essn, pno));
CREATE TABLE
db519=#
```

- Create dependents table called dependents519. Set primary keys, check constraint, default value and not null constraint as specified.

```
db519=# create table dependent519(essn int, dependent_name varchar(10), sex varchar, bdate date check(bdate < TO_DATE('1985-01-01', 'yyyy-mm-dd')), relationship varchar(10) not null default 'parent', pri
mary key(essn, dependent_name));
CREATE TABLE
db519=#
```

- Set foreign keys in all the tables using alter command:

```
db519=# alter table employee519 add constraint fk1 foreign key(super_ssn) references employee519(ssn);
ALTER TABLE
db519=#
```

```
db519=# alter table employee519 add constraint fk2 foreign key(dno) references department519(dnumer);
ALTER TABLE
db519=#
```

```
db519=# alter table dept_locations519 add constraint fk3 foreign key(dnumber) references department519(dnumer);
ALTER TABLE
db519=#
```

```
db519=# alter table project519 add constraint fk4 foreign key(dnum) references department519(dnumer);
ALTER TABLE
db519=#
```

```
db519=# alter table works_on519 add constraint fk5 foreign key(essn) references employee519(ssn);
ALTER TABLE
db519=# alter table works_on519 add constraint fk6 foreign key(pno) references project519(pnumber);
ERROR:  there is no unique constraint matching given keys for referenced table "project519"
db519=# alter table project519 add constraint uk3 unique(pnumber);
ALTER TABLE
db519=# alter table works_on519 add constraint fk6 foreign key(pno) references project519(pnumber);
ALTER TABLE
db519=# alter table dependent519 add constraint fk7 foreign key(essn) references employee519(ssn);
ALTER TABLE
db519=#
```

- Resultant schemas after all the mentioned commands:

```
                    Table "public.employee519"
 Column   |         Type          | Collation | Nullable | Default
----------+-----------------------+-----------+----------+---------
fname     | character varying(30) |           | not null |
minit     | character varying(30) |           |          |
lname     | character varying(30) |           | not null |
ssn       | integer               |           | not null |
bdate     | date                  |           |          |
address   | character varying(30) |           |          |
sex       | character varying     |           |          |
salaray   | integer               |           |          |
super_ssn | integer               |           |          |
dno       | integer               |           |          |
Indexes:
    "employee519_pkey" PRIMARY KEY, btree (ssn)
Check constraints:
    "chk1" CHECK (bdate < to_date('1985-01-01'::text, 'yyyy-mm-dd'::text))
Foreign-key constraints:
    "fk1" FOREIGN KEY (super_ssn) REFERENCES employee519(ssn)
    "fk2" FOREIGN KEY (dno) REFERENCES department519(dnumer)
Referenced by:
    TABLE "employee519" CONSTRAINT "fk1" FOREIGN KEY (super_ssn) REFERENCES employee519(ssn)
    TABLE "works_on519" CONSTRAINT "fk5" FOREIGN KEY (essn) REFERENCES employee519(ssn)
    TABLE "dependent519" CONSTRAINT "fk7" FOREIGN KEY (essn) REFERENCES employee519(ssn)
```

```
db519=# \d department519;
                    Table "public.department519"
     Column     |         Type          | Collation | Nullable | Default
----------------+-----------------------+-----------+----------+---------
 dname          | character varying(10) |           |          |
 dnumer         | integer               |           | not null |
 mgr_ssn        | integer               |           |          |
 mgr_start_date | date                  |           |          |
Indexes:
    "department519_pkey" PRIMARY KEY, btree (dnumer)
    "department519_dname_key" UNIQUE CONSTRAINT, btree (dname)
Referenced by:
    TABLE "employee519" CONSTRAINT "fk2" FOREIGN KEY (dno) REFERENCES department519(dnumer)
    TABLE "dept_locations519" CONSTRAINT "fk3" FOREIGN KEY (dnumber) REFERENCES department519(dnumer)
    TABLE "project519" CONSTRAINT "fk4" FOREIGN KEY (dnum) REFERENCES department519(dnumer)

db519-#
```

```
db519=# \d project519;
                              Table "public.project519"
  Column   |         Type          | Collation | Nullable |           Default
-----------+-----------------------+-----------+----------+-----------------------------
 pname     | character varying(10) |           |          | 'unknown'::character vary
 pnumber   | integer               |           | not null |
 plocation | character varying(50) |           | not null |
 dnum      | integer               |           |          |
Indexes:
    "project519_pkey" PRIMARY KEY, btree (pnumber, plocation)
    "uk3" UNIQUE CONSTRAINT, btree (pnumber)
Foreign-key constraints:
    "fk4" FOREIGN KEY (dnum) REFERENCES department519(dnumer)
Referenced by:
    TABLE "works_on519" CONSTRAINT "fk6" FOREIGN KEY (pno) REFERENCES project519(pnumber)
```

```
db519=# \d works_on519;
            Table "public.works_on519"
 Column |  Type   | Collation | Nullable | Default
--------+---------+-----------+----------+---------
 essn   | integer |           | not null |
 pno    | integer |           | not null |
 hours  | integer |           |          |
Indexes:
    "works_on519_pkey" PRIMARY KEY, btree (essn, pno)
Foreign-key constraints:
    "fk5" FOREIGN KEY (essn) REFERENCES employee519(ssn)
    "fk6" FOREIGN KEY (pno) REFERENCES project519(pnumber)
```

```
db519=# \d dependent519;
                                Table "public.dependent519"
     Column     |         Type          | Collation | Nullable |            Default
----------------+-----------------------+-----------+----------+-------------------------------
 essn           | integer               |           | not null |
 dependent_name | character varying(10) |           | not null |
 sex            | character varying     |           |          |
 bdate          | date                  |           |          |
 relationship   | character varying(10) |           | not null | 'parent'::character varying
Indexes:
    "dependent519_pkey" PRIMARY KEY, btree (essn, dependent_name)
Check constraints:
    "dependent519_bdate_check" CHECK (bdate < to_date('1985-01-01'::text, 'yyyy-mm-dd'::text))
Foreign-key constraints:
    "fk7" FOREIGN KEY (essn) REFERENCES employee519(ssn)

db519=# \d dept_locations519;
           Table "public.dept_locations519"
  Column   |  Type   | Collation | Nullable | Default
-----------+---------+-----------+----------+---------
 dnumber   | integer |           | not null |
 dlocation | integer |           | not null |
Indexes:
    "dept_locations519_pkey" PRIMARY KEY, btree (dnumber, dlocation)
Foreign-key constraints:
    "fk3" FOREIGN KEY (dnumber) REFERENCES department519(dnumer)
```

2. (b) Views:

- Insert some values into the department519 table to showcase view commands

```
db519=# insert into department519 vadb519=# insert into department519 values('a', 1, 1, '1985-6-7');
INSERT 0 1
db519=# insert into department519 values('b', 2, 2, '1987-6-7');
INSERT 0 1
db519=# insert into department519 values('b', 2, 2, '1999-8-7');
ERROR:  duplicate key value violates unique constraint "department519_pkey"
DETAIL:  Key (dnumer)=(2) already exists.
db519=# insert into department519 values('c', 3, 3, '1999-8-7');
INSERT 0 1
db519=# insert into department519 values('d', 4, 4, '2005-9-17');
INSERT 0 1
```

- Create 2 views new_mgrs and old_mgrs based on mgr_start_date with a

threshold of 1990 using create view command. The resultant view is also shown using select command. Finally they are dropped using drop view command.

```
db519=# create view old_mgrs as select * from department519 where mgr_start_date < TO_DATE('1990-01-01','yyyy-mm-dd');
CREATE VIEW
```

```
db519=# create view new_mgrs as select * from department519 where mgr_start_date > TO_DATE('1990-01-01','yyyy-mm-dd');
CREATE VIEW
db519=# select * from new_mgrs;
 dname | dnumer | mgr_ssn | mgr_start_date
-------+--------+---------+----------------
 c     |      3 |       3 | 1999-08-07
 d     |      4 |       4 | 2005-09-17
(2 rows)

db519=# select * from old_mgrs;
 dname | dnumer | mgr_ssn | mgr_start_date
-------+--------+---------+----------------
 a     |      1 |       1 | 1985-06-07
 b     |      2 |       2 | 1987-06-07
(2 rows)

db519=# drop view old_mgrs;
DROP VIEW
db519=# drop view new_mgrs;
DROP VIEW
db519=#
```

c) (2.c.) Create users, grant and revoke previliges

- Create users

```
db519=# create user user1 with password 'user1' createdb;
CREATE ROLE
db519=# create user user2 with password 'user2' createdb;
CREATE ROLE
db519=# create user user3 with password 'user3' createdb;
CREATE ROLE
db519=# create user user4 with password 'user4' createdb;
CREATE ROLE
db519=#
```

i) Grant select previliges to user1 on employee table

```
CREATE ROLE
db519=# grant select on employee519 to user1;
GRANT
db519=#
```

Verification:

```
postgres@SRBs-PC:~$ psql -h localhost -d db519 -U user1 -p 5432
Password for user user1:
psql (13.4 (Ubuntu 13.4-1.pgdg20.04+1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

db519=> select * from employee519;
db519=> select * from employee519;
 fname | minit | lname | ssn |   bdate    | address | sex | salaray | super_ssn | dno | contact
-------+-------+-------+-----+------------+---------+-----+---------+-----------+-----+---------
 A     | B     | C     |   1 | 1980-05-06 | XYZ     | m   |    5620 |           |   1 |
 D     | F     | G     |   3 | 1978-05-16 | KLF     | m   |    5620 |         1 |   2 |
(2 rows)

db519=>
```

ii) Grant insert previliges on department table to user2

```
db519=# grant insert on department519 to user2;
GRANT
db519=#
```

Verification:

```
postgres@SRBs-PC:~$ psql -h localhost -d db519 -U user2 -p 5432
Password for user user2:
psql (13.4 (Ubuntu 13.4-1.pgdg20.04+1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.
```

```
db519=> insert into department519 values('YUI', 5, 5, '1980-8-3');
INSERT 0 1
db519=>
```

iii) Grant all previliges to user3 on all tables

```
db519=# grant all on database db519 to user3;
GRANT
db519=#
```

OR

```
db519=# grant all on all tables in schema public to user3;
GRANT
db519=#
```

Verification:

```
postgres@SRBs-PC:~$ psql -h localhost -d db519 -U user3 -p 5432
Password for user user3:
psql (13.4 (Ubuntu 13.4-1.pgdg20.04+1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

db519=> insert into project519 values('iul', 6, 'XUY', 1);
INSERT 0 1
db519=> select * from employee519;
db519=> select * from employee519;
 fname | minit | lname | ssn |   bdate    | address | sex | salaray | super_ssn | dno | contact
-------+-------+-------+-----+------------+---------+-----+---------+-----------+-----+---------
 A     | B     | C     |   1 | 1980-05-06 | XYZ     | m   |    5620 |           |   1 |
 D     | F     | G     |   3 | 1978-05-16 | KLF     | m   |    5620 |         1 |   2 |
(2 rows)

db519=> \d
              List of relations
 Schema |       Name        | Type  |  Owner
--------+-------------------+-------+----------
 public | department519     | table | postgres
 public | dependent         | table | postgres
 public | dependent519      | table | postgres
 public | dept_locations519 | table | postgres
 public | employee519       | table | postgres
 public | project519        | table | postgres
(6 rows)
```

```
db519=> insert into department519 values('YUI', 5, 5, '1980-8-3');
INSERT 0 1
db519=>
```

```
db519=> truncate table dependent519;
TRUNCATE TABLE
db519=>
```

```
db519=> UPDATE department519
SET dname = 'p' where dname = 'c';
UPDATE 1
db519=> select * from department519;
 dname | dnumer | mgr_ssn | mgr_start_date
-------+--------+---------+----------------
 a     |      1 |       1 | 1985-06-07
 b     |      2 |       2 | 1987-06-07
 d     |      4 |       4 | 2005-09-17
 YUI   |      5 |       5 | 1980-08-03
 p     |      3 |       3 | 1999-08-07
(5 rows)
```

iv) Grant insert, delete, update previliges on project and dependent table to user4

```
db519=# grant insert, delete, update on project519, dependent519 to user4;
GRANT
db519=#
```

NOTE: to use the where clause for deleting specific records and updating specific records, we need to provide previlige of select command as well.

```
db519=# grant select on project519, dependent519 to user4;
GRANT
db519=#
```

Verification:

```
postgres@SRBs-PC:~$ psql -h localhost -d db519 -U user4 -p 5432
Password for user user4:
psql (13.4 (Ubuntu 13.4-1.pgdg20.04+1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

db519=> insert into dependent519 values(1, 'hju', 'm', '1970-9-6');
INSERT 0 1
```

```
db519=> insert into project519 values('ret',8,'ghu',5);
INSERT 0 1
db519=>
```

```
db519=> delete from project519 where pname = 'ret';
DELETE 1
db519=> delete from dependent519 where essn = 1;
DELETE 1
db519=>
```

```
db519=> update dependent519 set dependent_name = 'rectified' where essn = 1 ;
UPDATE 1
db519=>
```

```
db519=> update project519 set pname = 'rectified' where pnumber=6 ;
UPDATE 1
```

d) (2.d.)Add and drop columns using alter command

- Add new column contact in employee and duration in project. For the purpose of showcasing drop column, columns X and Y are newly added and dropped. The effect is also shown. The schema has no X and Y after dropping which is initially added.

```
db519=# alter table employee519 add contact int;
ALTER TABLE
db519=# alter table project519 add duration int;
ALTER TABLE
db519=# alter table dependent519 add column X;
ERROR:  syntax error at or near ";"
LINE 1: alter table dependent519 add column X;
                                            ^
db519=# alter table dependent519 add column X int;
ALTER TABLE
db519=# alter table dependent519 add column Y int;
ALTER TABLE
db519=# alter table dependent519 drop column X;
ALTER TABLE
db519=# alter table dependent519 drop column Y;
ALTER TABLE
db519=# \d dependent519
                          Table "public.dependent519"
     Column     |         Type          | Collation | Nullable |           Default
----------------+-----------------------+-----------+----------+-----------------------------
 essn           | integer               |           | not null |
 dependent_name | character varying(10) |           | not null |
 sex            | character varying     |           |          |
 bdate          | date                  |           |          |
 relationship   | character varying(10) |           | not null | 'parent'::character varying
Indexes:
    "dependent519_pkey" PRIMARY KEY, btree (essn, dependent_name)
Check constraints:
    "dependent519_bdate_check" CHECK (bdate < to_date('1985-01-01'::text, 'yyyy-mm-dd'::text))
Foreign-key constraints:
    "fk7" FOREIGN KEY (essn) REFERENCES employee519(ssn)

db519=#
```

a) (2.a.) Drop and truncate tables

- Drop works_on table. We can see that the schema is not present after dropping. As drop deletes all the entries and also the schema.

```
db519=# drop table works_on519;
DROP TABLE
db519=# \d
```

```
              List of relations
 Schema |        Name         | Type  |  Owner
--------+---------------------+-------+----------
 public | department519       | table | postgres
 public | dependent           | table | postgres
 public | dependent519        | table | postgres
 public | dept_locations519   | table | postgres
 public | employee519         | table | postgres
 public | project519          | table | postgres
(6 rows)
```

- Truncate dependents table. Even after truncating, the schema is present because truncate deletes only the entries and keeps the schema.

```
db519=# truncate table dependent519;
TRUNCATE TABLE
db519=# \d
              List of relations
 Schema |        Name         | Type  |  Owner
--------+---------------------+-------+----------
 public | department519       | table | postgres
 public | dependent           | table | postgres
 public | dependent519        | table | postgres
 public | dept_locations519   | table | postgres
 public | employee519         | table | postgres
 public | project519          | table | postgres
(6 rows)
```