T-SQL Lab 01: Create Database Objects and Manipulate Data

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Contents

Introduction

This lab aims to help students get used to DDL statements to create database objects and manipulate data in SQL Server environment.

Lab Activities

Create an instance level login

```
5   use master;
6   go
7
8   --drop hr instance level login
9
```

```
10   if exists (
11          select name
12          from master.sys.server_principals
13          where name = 'hr')
14   begin
15          drop login hr;
16   end
17   go
18
19
20   --Create instance level login hr
21   if not exists (
22          select name
23          from master.sys.server_principals
24          where name = 'hr')
25   begin
26          create login hr
27                  with password = 'dbsys2018';
28   end
29   go
30
31   --verify that the hr user has been created
32   select *
33          from master.sys.server_principals
34          where name = 'hr';
35   go
```

Create and set options for a database

```
39   --drop database if already exists
40   drop database if exists company;
41   go
42
43   --for earlier versions of SQL Server
44   /*
45   if DB_ID('COMPANY') is not null
46          drop database company;
47   */
48
49   --create the database
50   create database company;
51   go
52   /*
53
54   alter database company
```

```
55          set read_only;
56   go
57
58   --the folowing statements will cause error
59   use company;
60   go
61
62   create table test(id int primary key,
63          name varchar(30));
64   go
65
66   --set the database option back to read_write
67   use master;
68   go
69
70   alter database company
71   set read_write;
72   go
73   */
```

Create a database user

```
77   --creating database user mapped to login
78   use company;
79   go
80
81   if USER_ID('hr') is null
82          begin
83                  CREATE USER hr FOR LOGIN hr;
84                  alter role [db_owner] add member [hr];
85          end
86   go
```

Create a database schema

```
90   --drop hr schema if already exists
91   drop schema if exists hr;
92   go
93   --for earlier versions
94   /*
95   if schema_ID('hr') is not null
96          drop schema hr;
97   go
98   */
```

```
 99
100    --create hr schema with hr user as owner
101    create schema hr authorization hr;
102    go
103
104    --verify that hr shema created
105    select * from sys.schemas
106    where name = 'hr';
107    go
108
109    --assign hr as default schema for user hr
110    alter user hr
111            with default_schema = hr;
112    go
113
114    select name, default_schema_name
115    from sys.database_principals
116    where name = 'hr';
117    go
```

Create and transfer tables between schemas

```
121    --creating tables
122    create table department (
123      dname varchar(20) not null,
124      dnumber int not null,
125      mgrssn char(9) not null,
126      mgrstartdate date not null,
127      constraint pk_department primary key (dnumber),
128      constraint ck_department unique (dname)
129    );
130
131    --verify that department table created in the default schema dbo
132    select s.name, t.name
133    from sys.tables t join sys.schemas s
134            on t.schema_id = s.schema_id
135    order by s.name, t.name;
136
137    --switch to hr user's security context
138    execute as user = 'hr';
139
140    --creating employee table in the default dbo schema
141    create table employee (
142      fname varchar(15) not null,
143      lname varchar(20) not null,
```

4

```sql
      ssn char(9) not null,
      bdate date not null,
      address varchar(30) not null,
      sex char(1) not null,
      salary decimal(10,2) not null,
      superssn char(9),
      dno int  not null,
      constraint pk_employee primary key (ssn)
);

--verify that employee table created in hr schema, which is the default schema for hr user
select s.name, t.name
from sys.tables t join sys.schemas s
          on t.schema_id = s.schema_id
order by s.name, t.name;

--go back to previous security context
revert;
go

--move employee table from dbo schema to hr schema
alter schema dbo transfer hr.employee;
go

--verify
select s.name, t.name
from sys.tables t join sys.schemas s
          on t.schema_id = s.schema_id
order by s.name, t.name;
```

Create other tables for the database

```sql
--creating other tables in the default dbo schema
create table project (
  pname varchar(20) not null,
  pnumber int not null,
  plocation varchar(20) not null,
  dnum int not null,
  constraint pk_project primary key (pnumber),
  constraint ck_project unique (pname)
);

create table works_on (
  essn char(9) not null,
  pno int not null,
```

5

```
189    hours decimal(5,1),
190    constraint pk_works_on primary key (essn, pno)
191    );
192
193  create table dependent (
194    essn char(9) not null,
195    dependent_name varchar(10) not null,
196    sex char(1) not null,
197    bdate date not null,
198    relationship varchar(30) not null,
199    constraint pk_dependent primary key (essn, dependent_name)
200    );
201
202  create table dept_locations (
203    dnumber int not null,
204    dlocation varchar (15) not null,
205    constraint pk_dept_locations primary key (dnumber, dlocation)
206    );
```

Insert data into created tables

```
--insert data into tables
insert into department values
 ('Research',5,'333445555','1988-05-22'),
 ('Administration',4,'987654321','1995-01-01'),
 ('Headquarters',1,'888665555','1981-06-19');

insert into employee values
 ('John','Smith','123456789','1965-01-09',
        '731 Fondren, Houston TX','M',30000,'333445555',5),
 ('Franklin','Wong','333445555','1965-12-08',
        '638 Voss, Houston TX','M',40000,'888665555',5),
 ('Alicia','Zelaya','999887777','1968-01-19',
        '3321 Castle, Spring TX','F',25000,'987654321',4),
 ('Jennifer','Wallace','987654321','1941-06-20',
        '291 Berry, Bellaire TX','F',43000,'888665555',4),
 ('Ramesh','Narayan','666884444','1962-09-15',
        '975 Fire Oak, Humble TX','M',38000,'333445555',5),
 ('Joyce','English','453453453','1972-07-31',
        '5631 Rice, Houston TX','F',25000,'333445555',5),
 ('Ahmad','Jabbar','987987987','1969-03-29',
        '980 Dallas, Houston TX','M',25000,'987654321',4),
 ('James','Borg','888665555','1937-11-10',
        '450 Stone, Houston TX','M',55000,null,1);
```

```sql
insert into project values
('ProductX',1,'Bellaire',5),
('ProductY',2,'Sugarland',5),
('ProductZ',3,'Houston',5),
('Computerization',10,'Stafford',4),
('Reorganization',20,'Houston',1),
('Newbenefits',30,'Stafford',4);

insert into works_on values
('123456789',1,32.5),
('123456789',2,7.5),
('666884444',3,40.0),
('453453453',1,20.0),
('453453453',2,20.0),
('333445555',2,10.0),
('333445555',3,10.0),
('333445555',10,10.0),
('333445555',20,10.0),
('999887777',30,30.0),
('999887777',10,10.0),
('987987987',10,35.0),
('987987987',30,5.0),
('987654321',30,20.0),
('987654321',20,15.0),
('888665555',20,null);

insert into dependent values
('333445555','Alice','F','1986-04-04','Daughter'),
('333445555','Theodore','M','1983-10-25','Son'),
('333445555','Joy','F','1958-05-03','Spouse'),
('987654321','Abner','M','1942-02-28','Spouse'),
('123456789','Michael','M','1988-01-04','Son'),
('123456789','Alice','F','1988-12-30','Daughter'),
('123456789','Elizabeth','F','1967-05-05','Spouse');

insert into dept_locations values
(1,'Houston'),
(4,'Stafford'),
(5,'Bellaire'),
(5,'Sugarland'),
(5,'Houston');
```

Create and enforce foreign key constraints

```
278  --create and enforce foreign key constraints
279  alter table department
280  with nocheck add constraint fk_department_employee
281          foreign key (mgrssn) references employee(ssn);
282  go
283
284  alter table department
285          check constraint fk_department_employee;
286  go
287
288  alter table employee
289  with nocheck add constraint fk_employee_department
290          foreign key (dno) references department(dnumber);
291  go
292
293  alter table employee
294  with nocheck add constraint fk_employee_employee
295          foreign key (superssn) references employee(ssn);
296
297
298  alter table employee
299          check constraint fk_employee_department;
300  go
301
302  alter table employee
303          check constraint fk_employee_employee;
304  go
305
306  alter table project
307  with nocheck add constraint fk_project_department
308          foreign key (dnum) references department(dnumber);
309  go
310
311  alter table project
312          check constraint fk_project_department;
313  go
314
315  alter table works_on
316  with nocheck add constraint fk_works_on_employee
317          foreign key (essn) references employee(ssn);
318  go
319
320  alter table works_on
```

```sql
321  with nocheck add constraint fk_works_on_project
322          foreign key (pno) references project(pnumber);
323  go
324
325  alter table works_on
326          check constraint fk_works_on_employee;
327  go
328
329  alter table works_on
330          check constraint fk_works_on_project;
331  go
332
333  alter table dependent
334  with nocheck add constraint fk_dependent_employee
335   foreign key (essn) references employee(ssn);
336  go
337
338  alter table dependent
339  check constraint fk_dependent_employee;
340  go
341
342  alter table dept_locations
343  with nocheck add constraint fk_dept_locations_department
344          foreign key (dnumber) references department(dnumber);
345  go
346
347  alter table dept_locations
348  check constraint fk_dept_locations_department;
349  go
```

Drop tables

```sql
353  --drop foreign key constraints then drop tables
354  /*
355  alter table department
356          drop constraint fk_department_employee;
357  alter table employee
358          drop constraint fk_employee_department;
359  alter table employee
360          drop constraint fk_employee_employee;
361  alter table project
362          drop constraint fk_project_department;
363  alter table works_on
364          drop constraint fk_works_on_employee;
365  alter table works_on
```

```
366            drop constraint fk_works_on_project;
367    alter table dependent
368            drop constraint fk_dependent_employee;
369    alter table dept_locations
370            drop constraint fk_dept_locations_department;
371    go
372
373    drop table department;
374    drop table employee;
375    drop table project;
376    drop table works_on;
377    drop table dependent;
378    drop table dept_locations;
379    go
380    */
```