

VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY  
UNIVERSITY OF TECHNOLOGY  
FACULTY OF COMPUTER SCIENCE AND ENGINEERING



## DATABASE SYSTEM (CO2014)

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### Lab Assignment

# *Lab 5*

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**Instructor(s):** Nguyễn Minh Tâm

**Students:** Phạm Trần Minh Trí - 2313622 (*Group TN01*)  
Lê Nguyễn Kim Khôi - 2311671 (*Group TN01*)

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```
CREATE DATABASE COMPANY;
GO
USE COMPANY;
```

## 1 Exercise 1

First, we use the script from database lab 4 to create and populate the database.

```
USE master;
CREATE DATABASE COMPANY;
GO
USE COMPANY;

CREATE TABLE EMPLOYEE (
    FNAME            VARCHAR(15)      NOT NULL,
    MINIT           CHAR,
    LNAME            VARCHAR(15)      NOT NULL,
    SSN              CHAR(9),
    BDATE            DATE,
    ADDRESS          VARCHAR(50),
    SEX              CHAR,
    SALARY           DECIMAL(10,2),
    SUPER_SSN        CHAR(9),
    DNO              INT,
    PRIMARY KEY (SSN),
    FOREIGN KEY (SUPER_SSN) REFERENCES EMPLOYEE (SSN)
);

CREATE TABLE DEPARTMENT (
    DNAME            VARCHAR(15)      NOT NULL UNIQUE,
    DNUMBER          INT,
    MGR_SSN          CHAR(9)         NOT NULL,
    MGR_START_DATE   DATE,
    PRIMARY KEY (DNUMBER)
);

CREATE TABLE DEPT_LOCATIONS (
    DNUMBER          INT,
    DLOCATION         VARCHAR(15),
    PRIMARY KEY (DNUMBER, DLOCATION),
    FOREIGN KEY (DNUMBER) REFERENCES DEPARTMENT (DNUMBER)
);

CREATE TABLE PROJECT (
    PNAME            VARCHAR(15)      NOT NULL,
    PNUMBER          INT,
    PLOCATION         VARCHAR(15)      NOT NULL,
    DNUM             INT,
    PRIMARY KEY (PNUMBER),
    FOREIGN KEY (DNUM) REFERENCES DEPARTMENT (DNUMBER)
);

CREATE TABLE WORKS_ON (
    ESSN             CHAR(9),
    PNO              INT,
    HOURS            DECIMAL(3,1),
    PRIMARY KEY (ESSN, PNO),
    FOREIGN KEY (ESSN) REFERENCES EMPLOYEE (SSN),
    FOREIGN KEY (PNO) REFERENCES PROJECT (PNUMBER)
```



```
);

CREATE TABLE DEPENDENT (
    ESSN           CHAR(9),
    DEPENDENT_NAME VARCHAR(15),
    SEX            CHAR,
    BDATE          DATE,
    RELATIONSHIP   VARCHAR(15),
    PRIMARY KEY (ESSN, DEPENDENT_NAME),
    FOREIGN KEY (ESSN) REFERENCES EMPLOYEE (SSN)
);

ALTER TABLE EMPLOYEE
ADD FOREIGN KEY (DNO) REFERENCES DEPARTMENT (DNUMBER);

ALTER TABLE DEPARTMENT
ADD FOREIGN KEY (MGR_SSN) REFERENCES EMPLOYEE (SSN);
```

Listing 1: Create database

```
USE COMPANY;

INSERT INTO EMPLOYEE VALUES
('John', 'B', 'Smith', '123456789', '1965-01-09', '731 Fondren, Houston, TX',
'M', 30000, NULL, NULL),
('Franklin', 'T', 'Wong', '333445555', '1955-12-08', '638 Voss, Houston, TX',
'M', 40000, NULL, NULL),
('Alicia', 'J', 'Zelaya', '999887777', '1968-07-19', '3321 Castle, Spring, TX',
'F', 25000, NULL, NULL),
('Jennifer', 'S', 'Wallace', '987654321', '1941-06-20', '291 Berry, Bellaire,
TX', 'F', 43000, NULL, NULL),
('Ramesh', 'K', 'Narayan', '666884444', '1962-09-15', '975 Fire Oak, Humble,
TX', 'M', 38000, NULL, NULL),
('Joyce', 'A', 'English', '453453453', '1972-07-31', '5631 Rice, Houston, TX',
'F', 25000, NULL, NULL),
('Ahmad', 'V', 'Jabbar', '987987987', '1969-03-29', '980 Dallas, Houston, TX',
'M', 25000, NULL, NULL),
('James', 'E', 'Borg', '888665555', '1937-11-10', '450 Stone, Houston, TX', 'M
', 55000, NULL, NULL);

INSERT INTO DEPARTMENT VALUES
('Research', 5, 333445555, '1988-05-22'),
('Administration', 4, 987654321, '1995-01-01'),
('Headquarters', 1, 888665555, '1981-06-19');

UPDATE EMPLOYEE SET SUPER_SSN = '333445555', DNO = 5 WHERE SSN = '123456789';
UPDATE EMPLOYEE SET SUPER_SSN = '888665555', DNO = 5 WHERE SSN = '333445555';
UPDATE EMPLOYEE SET SUPER_SSN = '987654321', DNO = 4 WHERE SSN = '999887777';
UPDATE EMPLOYEE SET SUPER_SSN = '888665555', DNO = 4 WHERE SSN = '987654321';
UPDATE EMPLOYEE SET SUPER_SSN = '333445555', DNO = 5 WHERE SSN = '666884444';
UPDATE EMPLOYEE SET SUPER_SSN = '333445555', DNO = 5 WHERE SSN = '453453453';
UPDATE EMPLOYEE SET SUPER_SSN = '987654321', DNO = 4 WHERE SSN = '987987987';
UPDATE EMPLOYEE SET SUPER_SSN = NULL, DNO = 1 WHERE SSN = '888665555';

INSERT INTO DEPT_LOCATIONS VALUES
(1, 'Houston'),
(4, 'Stafford'),
(5, 'Bellaire'),
(5, 'Sugarland'),
(5, 'Houston');
```



```
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', '1986-04-05', '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');
```

Listing 2: Populate database

## 1.1 VIEW

```
USE COMPANY;
GO

-- a. A view that has the department name, manager name, and manager salary for
-- every department.
CREATE VIEW VIEW_A
AS
    SELECT DNAME, FNAME, MINIT, LNAME, SALARY
    FROM DEPARTMENT JOIN EMPLOYEE ON MGR_SSN = SSN;
GO

-- b. A view that has the employee name, supervisor name, and employee salary for
-- each employee who works in the 'Research' department.
CREATE VIEW VIEW_B
AS
    SELECT
        E1.FNAME AS EMPLOYEE_FNAME,
        E1.MINIT AS EMPLOYEE_MINIT,
        E1.LNAME AS EMPLOYEE_LNAME,
        E2.FNAME AS SUPER_FNAME,
```



```
E2.MINIT AS SUPER_MINIT,
E2.LNAME AS SUPER_LNAME,
E1.SALARY
FROM (EMPLOYEE E1 JOIN EMPLOYEE E2 ON E1.SUPER_SSN = E2.SSN) JOIN DEPARTMENT
D1 ON E1.DNO = D1.DNUMBER
WHERE D1.DNAME = 'Research';
GO

-- c. A view that has the project name, controlling department name, number of
-- employees, and total hours worked per week on the project for each project.
CREATE VIEW VIEW_C
AS
SELECT
    PNAME,
    DNAME, COUNT(ESSN) AS NUM_EMPLOYEE,
    SUM([HOURS]) AS TOTAL_HOUR
FROM
    (PROJECT JOIN DEPARTMENT ON DNUM = DNUMBER) JOIN WORKS_ON ON PNUMBER = PNO
GROUP BY PNAME, DNAME;
GO

-- d. A view that has the project name, controlling department name, number of
-- employees, and total hours worked per week on the project for each project
-- with more than two employees working on it.
CREATE VIEW VIEW_D
AS
SELECT
    PNAME,
    DNAME, COUNT(ESSN) AS NUM_EMPLOYEE,
    SUM([HOURS]) AS TOTAL_HOUR
FROM
    (PROJECT JOIN DEPARTMENT ON DNUM = DNUMBER) JOIN WORKS_ON ON PNUMBER = PNO
GROUP BY PNAME, DNAME
HAVING COUNT(ESSN) > 2;
GO

-- e. A view (SSN, Full Name of employee, Number of dependents) that includes
-- information about employees who have the number of dependents greater than 2.
CREATE VIEW VIEW_E
AS
SELECT
    SSN,
    CONCAT(FNAME, ' ', MINIT, ' ', LNAME) AS FULL_NAME,
    COUNT(DEPENDENT_NAME) AS NUM_DEPENDENT
FROM EMPLOYEE JOIN DEPENDENT ON SSN = ESSN
GROUP BY SSN, FNAME, MINIT, LNAME
HAVING COUNT(DEPENDENT_NAME) > 2;
GO

-- f. A view (Full Name of employee, date of birth, gender) for those employees
-- who have their birthdate in July.
CREATE VIEW VIEW_F
AS
SELECT
    CONCAT(FNAME, ' ', MINIT, ' ', LNAME) AS FULL_NAME,
    BDATE,
    SEX
FROM EMPLOYEE
WHERE MONTH(BDATE) = 7;
GO

-- g. A view (Name of dependent, SSN of employee, date of birth of dependent) that
```



```
    includes information on all dependents who are less than 18 years old.  
CREATE VIEW VIEW_G  
AS  
    SELECT DEPENDENT_NAME, ESSN, BDATE  
    FROM DEPENDENT  
    WHERE BDATE > DATEADD(YEAR, -18, GETDATE());  
GO
```

**Output results:** See figure 1, 2, 3, 4, 5, 6, 7.

	DNAME	FNAME	MINIT	LNAME	SALARY
1	Headquarters	James	E	Borg	55000.00
2	Administration	Jennifer	S	Wallace	43000.00
3	Research	Franklin	T	Wong	40000.00

Figure 1: Result of VIEW\_A

	EMPLOY...	EMPLOY...	EMPLOY...	SUPER_...	SUPER_...	SUPER_...	SALARY
1	John	B	Smith	Franklin	T	Wong	30000.00
2	Franklin	T	Wong	James	E	Borg	40000.00
3	Joyce	A	English	Franklin	T	Wong	25000.00
4	Ramesh	K	Narayan	Franklin	T	Wong	38000.00

Figure 2: Result of VIEW\_B

	PNAME	DNAME	NUM_E...	TOTAL_...
1	Computerization	Administration	3	55.0
2	Newbenefits	Administration	3	55.0
3	Reorganization	Headquarters	3	25.0
4	ProductX	Research	2	52.5
5	ProductY	Research	3	37.5
6	ProductZ	Research	2	50.0

Figure 3: Result of VIEW\_C

## 1.2 TRIGGER, FUNCTION, STORE PROCEDURE, CURSOR

- (a) Create a database trigger
- (b) Alter table Department
- (c) Write a function
- (d) Create a stored procedure

	PNAME	DNAME	NUM_E...	TOTAL_...
1	Computerization	Administration	3	55.0
2	Newbenefits	Administration	3	55.0
3	Reorganization	Headquarters	3	25.0
4	ProductY	Research	3	37.5

Figure 4: Result of VIEW\_D

	SSN	FULL_NA...	NUM_D...
1	123456789	John B Smith	3
2	333445555	Franklin T Wong	3

Figure 5: Result of VIEW\_E

	FULL_N...	BDATE	SEX
1	Joyce A English	1972-07-31	F
2	Alicia J Zelaya	1968-07-19	F

Figure 6: Result of VIEW\_F

	DEPENDENT_...	ESSN	BDATE

Figure 7: Result of VIEW\_G

- (e) Write a trigger
- (f) Write a stored procedure

## 2 Exercise 2