**-- Example 31.1**

CREATE DATABASE graph\_db;

GO;

USE graph\_db;

CREATE TABLE dbo.Company (

ID INT NOT NULL PRIMARY KEY,

name VARCHAR (100) NULL,

sector VARCHAR(25) NULL,

city VARCHAR (100) NULL) AS NODE;

CREATE TABLE dbo.Employee (

ID INT NOT NULL PRIMARY KEY,

name VARCHAR (100) NULL,

age INT NULL,

sex char (10) NULL) AS NODE;

CREATE TABLE dbo.City (

ID INT NOT NULL PRIMARY KEY,

name VARCHAR(100) NULL,

stateName VARCHAR(100) NULL) AS NODE;

**-- Example 31.2**

USE graph\_db;

INSERT INTO Employee (ID,Name,Sex)

VALUES (1,'Matthew Smith','Male');

INSERT INTO Employee (ID,Name,Sex)

VALUES (2,'Ann Jones','Female');

INSERT INTO Employee (ID,Name,Sex)

VALUES (3,'John Barrimore','Male');

INSERT INTO Employee (ID,Name,Sex)

VALUES (4,'James James','Male');

INSERT INTO Employee (ID,Name,Sex)

VALUES (5,'Elsa Bertoni','Female');

INSERT INTO Employee (ID,Name,Sex)

VALUES (6,'Elke Hansel','Female');

INSERT INTO Company VALUES (1,'Comp\_A','Pharma','Kansas City');

INSERT INTO Company VALUES (2,'Comp\_B','Manufacturing','Hoboken');

INSERT INTO Company VALUES (3,'Comp\_C','Pharma','Indianopolis');

INSERT INTO Company VALUES (4,'Comp\_D','IT','Lexington');

INSERT INTO Company VALUES (5,'Comp\_E','IT','Madison');

INSERT INTO City VALUES (1,'Kansas City','Kansas');

INSERT INTO City VALUES (2,'Hoboken','New Jersey');

INSERT INTO City VALUES (3,'Indianopolis','Indiana');

INSERT INTO City VALUES (4,'Lexington','Kentucky');

INSERT INTO City VALUES (5,'Minneapolis','Wisconsin');

INSERT INTO City VALUES (6,'Madison','Wisconsin');

**-- Example 31.3**

USE graph\_db;

CREATE TABLE WorksIn (starts INT) AS EDGE;

CREATE TABLE LocatedIn AS EDGE;

CREATE TABLE LivesIn (Since DATE NULL

CONSTRAINT Emp\_to\_City CONNECTION (Employee TO City)) AS EDGE;

**-- Example 31.4**

--To insert data into an edge table we need to provide the reference for

-- the $from\_id and $to\_id as a reference point to both nodes

USE graph\_db;

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 1),

(SELECT $node\_id FROM Company WHERE id = 1), 2015);

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 2),

(SELECT $node\_id FROM Company WHERE id = 2), 2018);

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 3),

(SELECT $node\_id FROM Company WHERE id = 3), 2015);

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 4),

(SELECT $node\_id FROM Company WHERE id = 3), 2016);

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 5),

(SELECT $node\_id FROM Company WHERE id = 3), 2017);

INSERT INTO WorksIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 6),

(SELECT $node\_id FROM Company WHERE id = 4), 2018);

**-- Example 31.5**

USE graph\_db;

INSERT INTO LocatedIn VALUES ((SELECT $node\_id FROM Company WHERE id = 1),

(SELECT $node\_id FROM City WHERE id=2))

INSERT INTO LocatedIn VALUES ((SELECT $node\_id FROM Company WHERE id = 2),

(SELECT $node\_id FROM City WHERE id=1));

INSERT INTO LocatedIn VALUES ((SELECT $node\_id FROM Company WHERE id = 3),

(SELECT $node\_id FROM City WHERE id=3));

INSERT INTO LocatedIn VALUES ((SELECT $node\_id FROM Company WHERE id = 4),

(SELECT $node\_id FROM City WHERE id=2));

**-- Example 31.6**

USE graph\_db;

INSERT INTO LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 1),

(SELECT $node\_id FROM City WHERE id=6), '1.1.2018');

INSERT INTO LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 2),

(SELECT $node\_id FROM City WHERE id=5), '2.1.2018');

INSERT INTO LivesIn VALUES ((select $node\_id FROM Employee WHERE id = 3),

(SELECT $node\_id FROM City WHERE id=4), '3.1.2018');

INSERT INTO LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 4),

(SELECT $node\_id FROM City WHERE id=2), '4.1.2018');

INSERT INTO LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 5),

(SELECT $node\_id FROM City WHERE id=3), '5.1.2018')

INSERT INTO LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 6),

(SELECT $node\_id FROM City WHERE id=1), '6.1.2018');

**-- Example 31.7**

-- Get the names of the companies and the names of their employees

USE graph\_db;

SELECT DISTINCT Cmp.Name CName, Emp.Name EName

FROM Employee Emp, WorksIn, Company Cmp

WHERE MATCH(Emp-(WorksIn)->Cmp);

**-- Example 31.8**

-- Get the name of the company where Matthew Smith works

USE graph\_db;

SELECT Cmp.Name CName

FROM Employee Emp, WorksIn, Company Cmp

WHERE MATCH(Emp-(WorksIn)->Cmp)

AND Emp.Name= 'Matthew Smith';

**-- Example 31.9**

-- Get the list of the employees who live in Madison

USE graph\_db;

SELECT Emp.Name EName

FROM Employee Emp, LivesIn, City

WHERE MATCH(Emp-(LivesIn)->City)

AND City.Name='Madison';

**-- Example 31.10**

-- Get the list of companies located in the city of Hoboken

-- Sort the companies according to their names

USE graph\_db;

SELECT Cmp.Name CName

FROM City C, LocatedIn, Company Cmp

WHERE MATCH(Cmp-(LocatedIn)->C)

AND C.Name='Hoboken' ORDER BY 1;

**-- Example 31.11**

USE graph\_db;

SELECT Employee.name EName, Company.name CName

FROM Employee, WorksIn, Company, LocatedIn, City

WHERE MATCH(Employee-(WorksIn)->Company

AND Company-(LocatedIn)->City )

AND WorksIn.Starts='2017' AND Company.name='Comp\_C';

**-- Example 31.12**

USE graph\_db;

SELECT Employee.name, Company.name

FROM Employee, WorksIn, Company, LocatedIn, City

WHERE MATCH(Employee-(WorksIn)->Company-(LocatedIn)->City)

AND WorksIn.Starts='2017' and Company.name='Comp\_C';

**-- Example 31.13**

-- Create an edge table for the recursive relationship

USE graph\_db;

CREATE TABLE dbo.Is\_Liked(start\_date DATE) AS EDGE;

-- Insert several rows

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 1),

(SELECT $node\_id FROM Employee WHERE ID = 2),'1.1.2017');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 1),

(SELECT $node\_id FROM Employee WHERE ID = 3),'2.1.2018');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 1),

(SELECT $node\_id FROM Employee WHERE ID = 4),'3.1.2019');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 2),

(SELECT $node\_id FROM Employee WHERE ID = 3),'4.1.2016');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 2),

(SELECT $node\_id FROM Employee WHERE ID = 5),'5.1.2017');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee WHERE ID = 2),

(SELECT $node\_id FROM Employee WHERE ID = 6),'6.1.2017');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee where ID = 3),

(SELECT $node\_id FROM Employee WHERE ID = 4),'7.1.2018');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee where ID = 4),

(SELECT $node\_id FROM Employee WHERE ID = 5),'8.1.2016');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee where ID = 4),

(SELECT $node\_id FROM Employee WHERE ID = 6),'9.1.2017');

INSERT INTO Is\_Liked VALUES

((SELECT $node\_id FROM employee where ID = 5),

(SELECT $node\_id FROM Employee WHERE ID = 6),'10.1.2019');

**-- Example 31.14**

USE graph\_db;

SELECT E1.name AS SourceName, E2.name AS TargetName

FROM Employee E1, Is\_Liked, Employee E2

WHERE MATCH(E1-(Is\_Liked)->E2);

**-- Example 31.15**

-- Display all employees that like Matthew Smith

USE graph\_db;

SELECT E2.name AS FriendName

FROM Employee E1, Is\_Liked, Employee E2

WHERE MATCH(E1-(Is\_Liked)->E2)

AND E1.name = 'Matthew Smith';

**-- Example 31.16**

-- Display all employees who are liked by Matthew Smith

USE graph\_db

SELECT E2.name AS FriendName

FROM Employee E1, Is\_Liked, Employee E2

WHERE MATCH(E2-(Is\_Liked)->E1) AND E1.name = 'Matthew Smith';

**-- Example 31.17**

-- Display all employees who like employees that like Ann Jones

USE graph\_db;

SELECT Person3.name AS FriendName

FROM Employee Person1, Employee Person2,

Is\_Liked, Is\_Liked Is\_Liked2, Employee Person3

WHERE MATCH(Person1-(Is\_Liked)->Person2-(Is\_Liked2)->Person3)

AND Person1.name = 'Ann Jones';

**-- Example 31.18**

USE graph\_db;

INSERT into LivesIn VALUES ((SELECT $node\_id FROM Employee WHERE id = 6),

(SELECT $node\_id FROM City WHERE id = 5), '2.1.2018');

**-- Example 31.19**

USE graph\_db;

SELECT E.Name, C.Name

FROM Employee E, LivesIn, City C

WHERE MATCH(E -(LivesIn)->C) AND E.id = 6 AND C.id = 5;

**-- Example 31.20**

USE graph\_db;

DELETE FROM LivesIn

WHERE $from\_id =(SELECT $node\_id FROM Employee WHERE id = 6)

AND $to\_id = (SELECT $node\_id FROM City WHERE id = 5);

**-- Example 31.21**

USE graph\_db;

DELETE LivesIn

FROM Employee E, LivesIn, City C

WHERE MATCH(E-(LivesIn)->C) AND E.id = 6 AND C.id = 5;

**-- Example 31.22**

USE graph\_db;

UPDATE WorksIn SET Starts = 2020

WHERE $from\_id = (SELECT $node\_id FROM Employee WHERE id = 6)

AND $to\_id = (SELECT $node\_id FROM Company WHERE id = 1);

**-- Example 31.23**

USE graph\_db;

SELECT name, is\_node, is\_edge

FROM sys.tables

WHERE is\_node = 1 OR is\_edge = 1;

**-- Example 31.24**

USE graph\_db;

SELECT EC.name AS Edge\_constraint

, OBJECT\_NAME(EC.parent\_object\_id) AS Edge\_table

, OBJECT\_NAME(ECC.from\_object\_id) AS From\_node\_table

, OBJECT\_NAME(ECC.to\_object\_id) AS To\_node\_table

FROM sys.edge\_constraints EC

INNER JOIN sys.edge\_constraint\_clauses ECC

ON EC.object\_id = ECC.object\_id

WHERE EC.parent\_object\_id = object\_id('LivesIn');

**-- Example 31.25**

USE graph\_db;

SELECT NODE\_ID\_FROM\_PARTS(OBJECT\_ID('dbo.Company'), 0);

**-- Example 31.26**

DECLARE @table1 INT = OBJECT\_ID('dbo.Company');

DECLARE @table2 INT = OBJECT\_ID('dbo.City');

INSERT INTO LocatedIn ($from\_id, $to\_id)

VALUES (NODE\_ID\_FROM\_PARTS(@table1, 1),

NODE\_ID\_FROM\_PARTS(@table2, 2));

**-- Example 31.27**

USE graph\_db;

CREATE TABLE dbo.Employee1 (

ID int NOT NULL PRIMARY KEY,

name varchar (100) NULL, sex char (10) NULL);

INSERT INTO Employee1 VALUES (1,'Matthew Smith','Male');

INSERT INTO Employee1 VALUES (2,'Ann Jones','FeMale');

INSERT INTO Employee1 VALUES (3,'John Barrimore','Male');

INSERT INTO Employee1 VALUES (4,'James James','Male');

INSERT INTO Employee1 VALUES (5,'Elsa Bertoni','FeMale');

INSERT INTO Employee1 VALUES (6,'Elke Hansel','FeMale');

**-- Example 31.28**

USE graph\_db;

CREATE TABLE Employee1\_Friend

(EmployeeID INT NOT NULL, FriendID INT);

INSERT INTO Employee1\_Friend values (1,2)

INSERT INTO Employee1\_Friend values (1,3)

INSERT INTO Employee1\_Friend values (1,4)

INSERT INTO Employee1\_Friend values (2,3)

INSERT INTO Employee1\_Friend values (2,5)

INSERT INTO Employee1\_Friend values (2,6)

INSERT INTO Employee1\_Friend values (3,4)

INSERT INTO Employee1\_Friend values (4,5)

INSERT INTO Employee1\_Friend values (4,6)

INSERT INTO Employee1\_Friend values (5,6)

**-- Example 31.29**

USE graph\_db;

SELECT e1.name

FROM employee1 e1 JOIN Employee1\_Friend

ON Employee1\_Friend.FriendID = e1.ID JOIN employee1 e2

ON Employee1\_Friend.EmployeeID = e2.ID

WHERE e2.name = 'Matthew Smith';

**-- Example 31.30**

USE graph\_db;

SELECT e1.name

FROM employee1 e1 JOIN Employee1\_Friend

ON Employee1\_Friend.EmployeeID = e1.ID

JOIN employee1 e2

ON Employee1\_Friend.FriendID = e2.ID

WHERE e2.name = 'Matthew Smith';

**-- Example 31.31**

USE graph\_db;

SELECT e1.name AS EMP\_Name, e2.name AS FriendOfFriend

FROM Employee1\_Friend ef1 JOIN employee1 e1

ON ef1.EmployeeID = e1.ID

JOIN Employee1\_Friend ef2 ON ef2.EmployeeID = ef1.FriendID

JOIN employee1 e2 ON ef2.FriendID = e2.ID

WHERE e1.name = 'Ann Jones' AND ef2.FriendID <> e1.ID;