Practical Sheet 02

1. Constraints

SQL constraints are used to specify rules for the data in a table. Some of the constraints used in MySQL are as follows.

- NOT NULL - Ensures that a column cannot have a NULL value
- UNIQUE - Ensures that all values in a column are different
- PRIMARY KEY - A combination of NOT NULL and UNIQUE. Uniquely identifies each row in a table
- FOREIGN KEY - Prevents actions that would destroy links between tables
- CHECK - Ensures that the values in a column satisfies a specific condition
- DEFAULT - Sets a default value for a column if no value is specified

Example of Constraints

Create a database named Company, use it and create the tables below.

NOT NULL, PRIMARY KEY,CHECK, DEFAULT

CREATE TABLE EMPLOYEE(

Fname VARCHAR(15) NOT NULL,

Minit CHAR,

Lname VARCHAR(15) NOT NULL,

Ssn CHAR(9) NOT NULL,

Bdate DATE,

Address VARCHAR(30) DEFAULT 'Colombo',

Sex CHAR,

Age INT,

Salary DECIMAL(10,2),

Super_ssn CHAR(9),

Dno INT NOT NULL,

PRIMARY KEY (Ssn),

CHECK (Age>=18));

FOREIGN KEY, UNIQUE

CREATE TABLE DEPARTMENT

(Dname VARCHAR(15) NOT NULL,

Dnumber INT NOT NULL,

Mgr_ssn CHAR(9) NOT NULL,

Mgr_start_date DATE,

PRIMARY KEY (Dnumber),

UNIQUE (Dname),

FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn));

Query 1 to Validate Examples

INSERT INTO EMPLOYEE(

Fname, Minit, Lname, Ssn, Bdate, Address, Sex,Age,Salary, Super_ssn, Dno)

VALUES

('Jennifer','S','Wallace','987654321','1941-06-29','291 Berry, Bellaire, TX','F',17,43000,'888665555',4);

Query 2 to Validate Examples

INSERT INTO EMPLOYEE(

Fname, Minit, Lname, Ssn, Bdate, Sex,Age,Salary, Super_ssn, Dno)

VALUES

('Jennifer','S','Wallace','987654321','1941-06-29','F',20,43000,'888665555',4);

Activity

Create the below tables and insert data to the respective tables.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1955-01-09	731 Fondren, Houston, TX	M	30000	33344555	5
Franklin	T	Wong	33344555	1955-12-08	638 Voss, TX	M	40000	88866555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Houston, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-29	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabber	987987987	1969-03-29	980 Dallas, Houston, TX	F	25000	987654321	4

James	E	Borg	88866 555	1937-11-10	450 Stone, Houston, TX	M	55000	987987987	1

PROJECTS

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland'	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

2. Select

The SQL SELECT statement returns a result set of records, from one or more tables.

The SELECT-FROM-WHERE Structure of Basic SQL Queries

SELECT <attribute list>

FROM <table list>

WHERE <condition>;

where

- <attribute list> is a list of attribute names whose values are to be retrieved by the query.
- <table list> is a list of the relation names required to process the query.
- <condition> is a conditional (Boolean) expression that identifies the tuples to be retrieved by the query.

SELECT * Example

SELECT ***** FROM EMPLOYEE;

SELECT Column Example

SELECT Fname, Address FROM EMPLOYEE;

SELECT Distinct Example

SELECT DISTINCT Address FROM EMPLOYEE;

WHERE Clause Example

SELECT * FROM EMPLOYEE

WHERE Address = 'Kandy';

Operators in the WHERE clause

The following operators can be used in the WHERE clause:

=	Equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal

<>	Not equal. Note: In some versions of SQL this operator may be written as !=
BETWEEN	Between a certain range
LIKE	Search for a pattern

1. Retrieve the birth date and address of the employee(s) whose name is ‘John B. Smith’.

SELECT Bdate, Address

FROM EMPLOYEE

WHERE Fname = 'John' AND Minit = 'B' AND Lname = 'Smith';

Retrieve data from multiple tables

2. Retrieve the name and address of all employees who work for the ‘Research’ department.

Q1

SELECT Fname, Lname, Address

FROM EMPLOYEE, DEPARTMENT

WHERE Dname = ‘Research’ AND Dnumber = Dno;

Ambiguous Attribute Names, Aliasing, Renaming, and Tuple Variables

In SQL, the same name can be used for two (or more) attributes as long as the attributes are in different tables.

If this is the case, and a multi-table query refers to two or more attributes with the same name, we must qualify the attribute name with the relation name to prevent ambiguity.

This is done by prefixing the relation name to the attribute name and separating the two by a period.

To prevent ambiguity, Q1 should be rephrased as below.

SELECT Fname, EMPLOYEE.Name, Address

FROM EMPLOYEE, DEPARTMENT

WHERE DEPARTMENT.Name = 'Research'

AND DEPARTMENT.Dnumber = EMPLOYEE.Dnumber;

Fully qualified attribute names can be used for clarity even if there is no ambiguity in attribute names.

Q1 can be rewritten as below with fully qualified attribute names.

SELECT EMPLOYEE.Fname, EMPLOYEE.LName, EMPLOYEE.Address

FROM EMPLOYEE, DEPARTMENT

WHERE DEPARTMENT.DName = 'Research'

AND DEPARTMENT.Dnumber = EMPLOYEE.Dno;

We can also rename the table names to shorter names by creating an alias for each table name to avoid repeated typing of long table names.

SELECT E.Fname, E.LName, E.Address

FROM EMPLOYEE AS E, DEPARTMENT AS D

WHERE DEPARTMENT.DName = 'Research'

AND D.Dnumber = E.Dno;

Unspecified WHERE Clause and Use of the Asterisk

2. Select all EMPLOYEE Ssns (Q2) and all combinations of EMPLOYEE Ssn and DEPARTMENT Dname (Q3) in the database.

Q2: SELECT Ssn FROM EMPLOYEE;

Q3: SELECT Ssn, Dname FROM EMPLOYEE, DEPARTMENT;

SELECT EMPLOYEE.Fname, EMPLOYEE.LName,

EMPLOYEE.Address

FROM EMPLOYEE, DEPARTMENT

WHERE DEPARTMENT.DName = 'Research' AND

DEPARTMENT.Dnumber = EMPLOYEE.Dno;

Query 2

SELECT E.Fname, E.LName, E.Address

FROM EMPLOYEE AS E, DEPARTMENT AS D

WHERE D.DName = 'Research' AND D.Dnumber = E.Dno;

3. For every project located in ‘Stafford’, list the project number, the controlling department number, and the department manager’s last name, address, and birth date.

SELECT Pnumber, Dnum, Lname, Address, Bdate

FROM PROJECT, DEPARTMENT, EMPLOYEE

WHERE Dnum = Dnumber AND Mgr_ssn = Ssn AND

Plocation = 'Stafford'

```
CREATE TABLE DEPARTMENT(
Dname VARCHAR(15) NOT NULL,
Dnumber INT NOT NULL,
Mgr_ssn CHAR(9) NOT NULL,
Mgr_start_date DATE,
PRIMARY KEY (Dnumber),
UNIQUE (Dname),
FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn) );

INSERT INTO EMPLOYEE(
Fname, Minit, Lname, Ssn, Bdate, Address, Sex,Salary, Super_ssn, Dno)
VALUES ('John','B','Smith','12345789','1965-01-09','731 Fondren, Houston,
TX','M',30000,'33344555',5);

INSERT INTO EMPLOYEE(
Fname, Minit, Lname, Ssn, Bdate, Address, Sex,Salary, Super_ssn, Dno)
VALUES ('Franklin','T','Wong','33344555','1955-12-08','638 Voss, TX','M',40000,'88866555',5);
```