SQL

INTRODUCTION

LECTURE 9

Contents to be covered:

- Introduction to SQL
- Concept of SQL
- Basics of SQL: Relation, Attribute, Tuple, Cardinality, Domain
- Components of SQL: DDL,DML,DCL
- DDL Commands: Create, Alter, Drop

Structured Query Language

- Structured Query Language (SQL) is the language standardized by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) for use on relational databases.

- It is a *declarative* rather than *procedural* language, which means that users declare what they want without having to write a step-by-step procedure.

- The SQL language was first implemented by the Oracle Corporation in 1979, with various versions of SQL being released since then.

Structured Query Language

- SQL is a standard language for querying and manipulating data.
- SQL is a very high-level programming language
- User issues a query whenever he wants to get information from the database.

Concept of SQL

- The user specifies a certain condition.
- The program will go through all the records in the database file and select those records that satisfy the condition(searching).
- Statistical information of the data
- The result of the query will then be stored in form of a table.

SQL : Relations

Relation Name: Employee

Employee_id	Employee_Name	Employee_City
E001	David	Delhi
E002	Peter	Delhi
E003	Jane	Mumbai
E004	Nammy	Patna
E005	John	Chennai

A **relation**, defined by E. F. Codd is a set of tuples (d_1, d_2, ..., d_n), where each element d_j is a member of D_j, a data domain.

SQL : Relations

Relation Name: Employee

Employee_id	Employee_Name	Employee_Department
E001	David	Delhi
E002	Peter	Delhi
E003	Jane	Mumbai
E004	Nammy	Patna
E005	John	Chennai

Cardinality

Tuple

Tuple : Records in the relation is known as tuple
Cardinality : The number of tuples in a relation is called cardinality

SQL : Relations

Relation Name: Employee

Employee_id	Employee_Name	Employee_Department
E001	David	Delhi
E002	Peter	Delhi
E003	Jane	Mumbai
E004	Nammy	Patna
E005	John	Chennai

Attributes

Attributes: Attributes are the columns that describes the characteristics of each tuple.

Table Schema

Table Schema **is table name, its attributes and its types**

For example: **Employee(Employee_id, Employee_name, Employee_city)**

A *key attribute* is an attributes that uniquely identifies the tuple. It is represented with underline in the table schema.

For example: **Employee (<u>Employee_id</u>, Employee_name, Employee_city)**

Data Types in SQL

Components of SQL

Components of SQL

- **Data Definition Language (DDL)**: DDL defines the schema of the database.
- **Data Manipulation Language(DML)**: DML consists of commands to manipulate the database. (query, insert, update, delete).
- **Data Control Language (DCL)**: DCL consists of Commands that control a database, including administering privileges and committing data

SQL Commands

DDL

- **Create :** Creates a new database table
- **Alter :** Modifications in the database table
- **Drop:** Deletes the database table

DML

- **Select :** Extracts data from a database table
- **Insert into:** Inserts data into database table
- **Update:** Updates data in a database table
- **Delete:** Deletes data from a database table

DCL

- **Grant**
- **Revoke**

Data Definition Commands

DDL Command: Create

DDL Command: Create

- Create Table is a command that is used for creation of the table in the database.
- While creation we need to define its attributes and their data types.
- We need to define a primary key if any
- We need to define all the constraints if applicable.

DDL Command: Create

Syntax: Create Table

```
CREATE TABLE <table name>
                ( field1 datatype constraints(optional) ),
                  field2 datatype constraints(optional) );
```

Examples: Create Table

Consider the relation Employee

Employee_id	Employee_Name	Employee_city

```
CREATE TABLE Employee (
Employee_id Integer ,
Employee_Name varchar(20),
Employee_city varchar(20)
);
```

DDL Command: Alter

DDL Command: Alter

Alter Command is used to add or drop columns on existing tables.

Syntax: ALTER TABLE

```
Alter Table <Table-Name>
Add <Col Name> <Type> (width);
```

```
Alter table <Table-Name>
Drop <Col Name>
```

Example: Alter Command

```
CREATE TABLE shoppingcart
(
        date DATE,
        articleid varchar(20),
        price float );
```

ShoppingFoodCart

date	Articleid	price

```
ALTER TABLE shoppingcart

Add Qty INT;
```

ShoppingFoodCart

date		Price	Qty

```
ALTER TABLE shoppingcart

DROP COLUMN Qty;
```

ShoppingFoodCart

date	Articleid	price

DDL Command: Drop

DDL Command: Drop

This command is use to delete the table along with its contents from the database

Syntax:

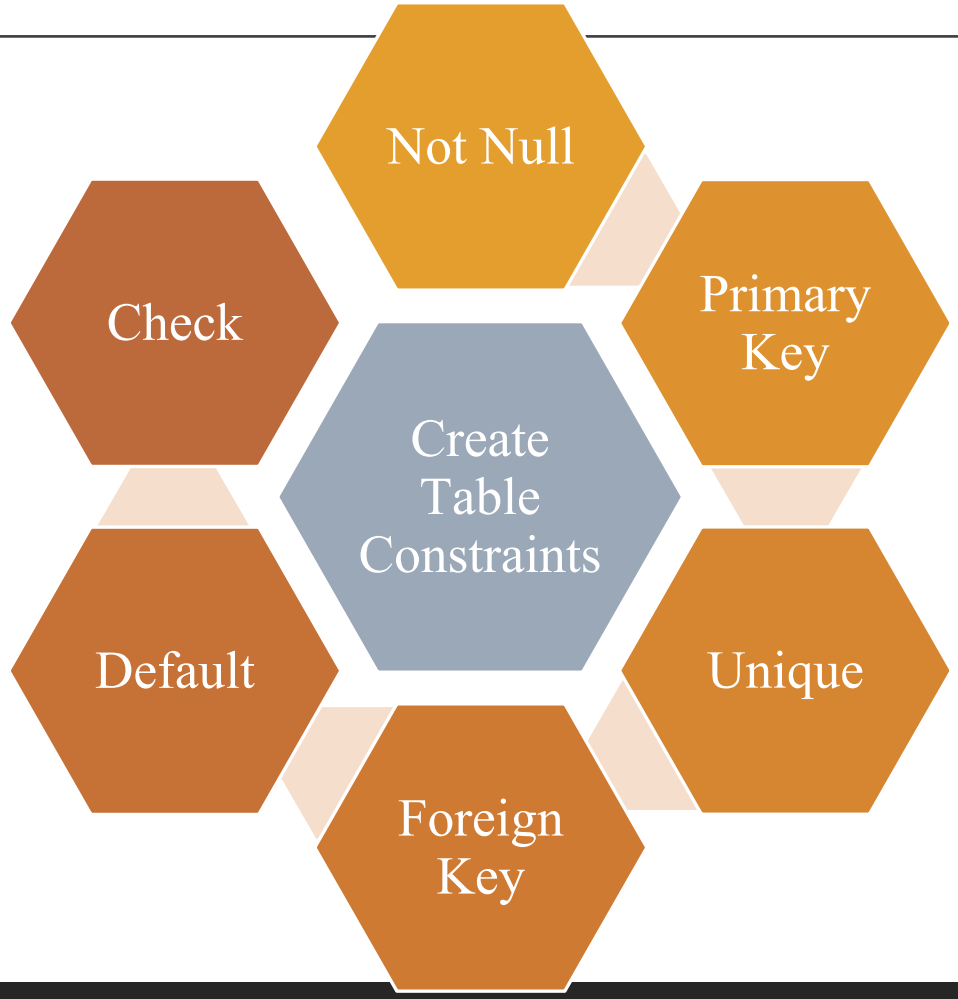
```
Drop Table <Table-Name>;
```

Example: If we wish to delete the employee table:

```
Drop Table Employee;
```

Create Table Constraints

Create Table Constraints



Note : Adding constraints to a table enables the database system to enforce data integrity.

Primary Key Constraint

```
CREATE TABLE Employee (
    Employee_Id    Integer PRIMARY KEY,
    Employee_Name  VARCHAR(20) NOT NULL,
    Employee_Address    VARCHAR(20) NOT NULL,
);
```

Primary Key implies: * NOT NULL * UNIQUE.
There can only be one primary key.

Primary Key Constraint (Syntax 2)

```
CREATE TABLE Employee (
    Employee_Id   Integer,
    Employee_Name  VARCHAR(20) NOT NULL,
    Employee_ Address VARCHAR(20) NOT NULL,
    PRIMARY KEY(Employee_Id)
);
```

Needed when the primary key is made up of two or more fields

Another Table : EmpWorks

```
CREATE TABLE EmpWorks(
    Emp_dept    INT,
    Emp_id      INT);
```

What should be the primary key?

What additional constraint do we need here?

Foreign Key Constraint

```
CREATE TABLE EmpWorks(
    Emp_dept    INT,
    Emp_id      INT,
    FOREIGN KEY (Emp_id) REFERENCES
        Employee(Employee_id)
);
```

NOTE: ID must be unique (or primary key) in Student