

UNIT - 4 Introduction to SQL

SQL → Structured Query Language

- * It is the standard language for making queries in relation DataBase Management packages such as:-
 - (1) SQL Server
 - (2) Ingres
 - (3) Sybase
 - (4) Oracle
- * It was firstly ~~commercially~~ commenced implemented by Oracle Corporation in 1979.
- * In 1986, SQL was jointly published by
 - (i) ANSI [American National Standard Institute]
 - (ii) ISO [International Standard Organization].

Characteristics of SQL

- (i) SQL is oriented around relational DataBase.
- (ii) SQL command can operate on several group of tables as single object.
- (iii) It allow use of temporary tables.
- (iv) It is well suited for ~~client-server~~ environment.
- (v) Provides a flexible Transaction Management
- (vi) SQL allow to specify Constraints [Limitations]
- (vii) Privileges can be granted or denied.

Advantages of SQL

- (i) SQL commands
 - Create
 - Deleting
 - Modifying } table structure
- (ii) Inserting data into tables.
- (iii) Updating data
- (iv) Controlling a Database

CREATE TABLE COMMAND

```
Create Table <table-name>
(
    <column name1> <data type>
    [column constraints],
    <column name2> <data type>
    [column constraints]
);
```

For Ex → Create table Department

```
(  

    Dept-code Number(2) PRIMARY KEY,  

    Dept-name Varchar(10) Not Null  

);
```

Types of SQL

- ① Interactive SQL → Used to operate directly on DB to produce output for desired purpose.

② Embedded SQL → It consists of SQL commands put inside the programs which are written in other high level language [COBOL, C, C++, Pascal, etc].

SQL Data Types

① Char(size) → Uppercase letters, lowercase letters, special characters, numbers [numericals]. Default size is 1 and maximum size is 255.

② Varchar2(size) → Maximum size is 2000 characters.

③ Number (P,s) → Variable length numeric data.

P → digits to left side of the decimal point

s → digits to right side of the decimal point

④ DATE → DD-MM-YY

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⑤ LONG → Variable length character string containing upto 2GB.

Rules to use Long

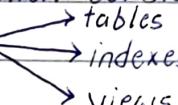
1. A table cannot have more than one long
2. It cannot be indexed.
3. Cannot be used with SQL functions.
4. Cannot appear in where, group by, order by clause.

SQL Commands

Types of SQL Commands

- (1) DDL
- (2) DML
- (3) DCL

(1) Data Definition Language [DDL]

* It is a part of SQL which consists of those commands that create the objects  in Database.

- * CREATE
- * DROP
- * ALTER

(2) Data Manipulation Language [DML]

* It is that part of SQL which consist of a set of command that determines which values were present in the tables at any given time.

- * It is divided into 3 categories:-
 - (a) Retrieving Data
 - (b) Manipulating Data
 - (c) Updating Data

- * UPDATE
- * INSERT
- * DELETE

③ Data Control Language (DCL)

- * It allows definition of a security mechanism over schema for protecting data from unauthorized access.
- * GRANT
- * REVOKE

SQL Operators & their Precedence

- * Operators are classified as :-
- ① Arithmetic Operators → (a) Addition (+)
 (b) Subtraction (-)
 (c) Multiplication (*)
 (d) Division (/)
 - ② Relational Operators → (a) Equals (=)
 (b) less than (<)
 (c) greater than (>)
 (d) less than or equals to (\leq)
 (e) greater than or equals to (\geq)
 (f) Comparison Operators →
 - ① Like
 - ② In
 - ③ Between

Precedence of Operators

Operator	Precedence
()	Highest
*	
/	
+	
-	
<, <=, >, >=	
LIKE	
IN	
BETWEEN	
AND	
OR	
	Lowest

INTEGRITY CONSTRAINTS

- * While creating a table, we can place certain limitations on the value stored in the table.
- * Types of Integrity Constraints are:-
 1. NOT NULL → NOT NULL Constraints prevent a column from accepting null values. If you try to insert a null values in a such column, it will be rejected. NOT NULL means absence of any data.
 2. UNIQUE → UNIQUE ensures that values entered into a column are all different, i.e. UNIQUE. A column with this constraints will not accept any duplicate values.
 3. PRIMARY KEY → In order to declare a column as primary key of the table, use the Primary Key constraints. There can only be one Primary Key in the table.
 4. CHECK → It is used to control the values entered into the field. A condition is specified along with check constraint which must be satisfied by all the values being entered into columns. Otherwise, the values will be rejected.
For e.x. → CHECK (Salary > 50000)
 5. DEFAULT → It is used to assign default values to columns before any values assign to it.

For ex → Salary DEFAULT 0.0

It will assign default values of Salary 0.0. Even if user doesn't enter any value into salary column.

REFERENCES → A foreign key values which form the primary key in another table.

The two table get related by using the foreign key; which are chosen as foreign key should not have values other than that present in the Primary key of a related table. This referencing integrity is implemented by using the references constraints.

References Constraint is followed by the name of related table and its primary key.

For Ex → Dept_Code REFERENCES Dept[Dept No].

ALTER TABLE Command

- * It is used to change the definition of a table even after creating it.
- * It is used to add columns to the table.
- * It is used to change their size.
- * It is used to change their datatypes.
- * It is used to Add or delete Constraints.

SYNTAX → ALTER TABLE <table name>
[Options];

- (a) ADD Option → add columns
 → add constraints to table.

ALTER TABLE EMPLOYEE
ADD PHONE CHAR(10);

- (b) MODIFY OPTION → Data type
 column width } of an existing ~~column~~ column.
 Constraints

ALTER TABLE EMPLOYEE
MODIFY EMP-NAME VARCHAR2(30);

- (c) DROP OPTION → To remove constraints imposed on the table.

ALTER TABLE EMPLOYEE
DROP CONSTRAINT CHK-CODE;

INSERT OPERATION

INSERT INTO <table name>
VALUES (<value>, <value>, -----);

For ex → Insert into Employee values (101, 'Vana', 'Manager', NULL,
 '17-DEC-21', 6000.00, 20);

* → All the Attributes and all the fields.

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Date: | |

QUERIES

- * Using some form of SQL Constructs, we can extract data from tables.

SQL Construct (SELECT ---- FROM ---- WHERE ---- GROUP BY
----- HAVING)

- * SQL Command retrieves data from a table.

SELECT * from Employee

(a) FROM in SELECT Query Command

FROM is the keyword in SQL, which must be present in every SELECT Query.

SELECT <columns> FROM <tablename>

For eg → Select Emp-code, Emp-Name from Employee;

(b) WHERE → When we want to see only a certain no. of rows that contain specific values.

Select <columns> From <tablename>

where <column><operator><value>;

For eg → Select Emp-code, Emp-Name, design,

From Employee where Design = 'salesman';

- * All the comparison operators namely $>$, $<$, $=$, \geq , \leq and Boolean Operators NOT, AND and OR are supported by SQL.

For eg → Select Emp-Code, Emp-Name, Design, Basic from employee
where basic \leq 2000 AND Design = 'Salesman';

- * Special Operators like IN, NOT IN, BETWEEN and NOT BETWEEN can also be used in place of Relational Operators & Logical Operators.

For eg → Select Emp-Name from Employee
where emp-code IN (103, 105, 106, 107);

For eg → Select emp-name from employee
where DOJ Between '01-JAN-90' AND '31-DEC-90';

Q= Create a table named as 'Employee' which have following attributes -

Column- Name	Type	Description
Emp- Code	Number[4]	Unique no. assigned to each
Emp- Name	Varchar[25]	Name of the Emp
Design.	Char[10]	Design. of the Emp
Head	Number[4]	Emp code of manager under whom the emp is working
DOJ	DATE DEFAULT 0	DOJ of the emp
Basic	Number[7,2]	Salary of the emp
Dept- Code	Number[2]	Code of the dept. in the emp is working

Create table Employee

(

Emp-Code Number(4) Primary key,

Emp-Name Varchar(25) NOT NULL,

Desig. Char(10) NOT NULL,

Head Number(4)

DOJ Date NOT NULL,

Basic Number(7,2) Default 0,

Dept- Code Number(2) References,

Dept (Dept- code)

);

(A) Insert 10 Records.

EMP-CODE	EMP-NAME	DESIGN	HEAD	DOJ	BASIC	DEPT-CODE
101	Raju	Manager	-	17-DEC-90	6000	20
102	Amaresh Roy	Salesman	105	20-FEB-91	2000	30
103	Raj	Assistant	101	22-FEB-93	2500	20
104	Rajiv Kumar	As. Engineer	107	02-APR-91	4200	10
105	Surej Patel	Area Manager	-	28-SEP-91	5500	30
106	Binay Kumar	Salesman	105	01-MAY-91	2270	30
107	Ramaswamy	Engineer	-	09-JUN-91	4500	10
108	Jog Iyer	Assistant	105	09-DEC-92	2250	30
109	Imran Khan	Steno	105	17-NOV-91	2500	30
110	Tinu Anand	As. Engineer	107	12-JAN-93	4000	10

THE EMPLOYEE TABLE

insert into employee values(101, 'Raju', 'Manager', "", "17-DEC-90", 6000.00, 20);

insert into employee values(102, 'Amaresh Roy', 'Salesman', '105', "20-FEB-91", 2000.00, 30);

insert into employee values(103, 'Raj', 'Assistant', '101', "22-FEB-93", 2500.00, 20);

```

    insert into employee values(104, 'Rajiv Kumar', 'As. Engineer',
    107, '02-APR-91', 4200.00, 10);
    insert into employee values(105, 'Suraj Patel', 'Area Manager',
    28-SEP-91, 5500.00, 30);
    insert into employee values(106, 'Binay Kumar', 'Salesman', '105',
    01-MAY-91, 2270.00, 30);
    insert into employee values(107, 'Ramaswamy', 'Engineer',
    09-JUN-91, 4500.00, 10);
    insert into employee values(108, 'Jog Iyer', 'Assistant', '105',
    09-DEC-92, 2250.00, 30);
    insert into employee values(109, 'Imran Khan', 'Steno', '105',
    17-NOV-91, 2500.00, 30);
    insert into employee values(110, 'Tinu Anand', 'As. Engineer', '107',
    12-JAN-93, 4000.00, 10);

```

SELECT * FROM EMPLOYEE;

(B) Write SQL Command to display the name of a employee
 not belonging to the department 10 and 40.

SELECT EMP_NAME FROM EMPLOYEE WHERE DEPT_CODE NOT IN(10, 40)

EMP_NAME
Raju
Amal Roy
Raj
Suraj Patel
Binay Kumar
Jog Iyer
Imran Khan

- (C) Write SQL Command to display the name of those employees whose name either starts or ends with 'R'.

SELECT ~~EMPLOYEE~~ EMP-NAME FROM EMPLOYEE
 WHERE EMP-NAME LIKE 'R%' OR EMP-NAME LIKE '%R';

EMP- NAME
Raju
Raj
Rajik Kumar
Ramaswamy

- (D) Write SQL Command to display the different position i.e. Designation, available in the employee table.

SELECT DISTINCT DESIGN FROM EMPLOYEE;

DESIGN
Asst. Manager
As Engineer
Assistant
Engineer
Manager
Salesman
Steno

- (E) Write SQL Command to display the name, salary and provident fund of all the employees in the employee table.
 PF is calculated as 10% of the Basic Salary.

SELECT EMP-NAME, BASIC, BASIC * 0.1 "PF" FROM EMPLOYEE;

EMP-NAME	BASIC	PF	DA
Raju	6000	600	
Amara Roy	2000	200	
Raj	2500	250	
Rajiv Kumar	4200	420	
Suraj Patel	5500	550	
Binay Kumar	2270	227	
Ramaswamy	4500	450	
Jog Iyer	2250	225	
Imran Khan	2500	250	
Tinu Anand	4000	400	

(F) Write SQL Command to display the name, salary, PF, HRA, DA and GROSS of all the employees in the employee table. HRA is 30% of Salary, and DA is 15% of Salary. PF is calculated as 10% of Basic Salary. The result should be in desc. order of GROSS.

SELECT EMP-NAME, BASIC, BASIC * 0.1 "PF", BASIC * 0.3 "HRA",
 BASIC * 0.15 "DA", BASIC + BASIC * 0.3 + BASIC * 0.15 - BASIC * 0.1
 "GROSS" from EMPLOYEE ORDER BY GROSS desc;

EMP- NAME	BASIC	PF	HRA	DA	GROSS
Raju	6000	600	1800	900	8100
Suraj Patel	5500	550	1650	825	7425
Ramaswamy	4500	450	1350	675	6075
Rajiv Kumar	4200	420	1260	630	5670

EMP-NAME	BASIC	PF	HRA	DA	GROSS
Tinu Anand	4000	400	1200	600	5400
Raj	2500	250	750	375	3375
Imran Khan	2500	250	750	375	3375
Binay Kumar	2270	227	681	340.5	3064.5
Jog Iyer	2250	225	675	337.5	3037.5
Aman Roy	2000	200	600	300	2700

- (G) Write SQL Command to display the name of the assistant working in department 30.

SELECT EMP-NAME from EMPLOYEE
where DESIG = 'ASSISTANT' AND DEPT-CODE = 30;

EMP-NAME
Jog Iyer

- (H) Write SQL Command to display the average salary and number of employees working in each department

SELECT DEPT-CODE, COUNT(EMP-CODE), AVG(BASIC) from EMPLOYEE
GROUP BY DEPT-CODE;

DEPT-CODE	COUNT(EMP-CODE)	AVG(BASIC)
30	5	2904
10	3	4233.333333
20	2	4250

(I) Write SQL Command to calculate the sum, avg, max and min of employee table.

Select sum(BASIC) from Employee;

Select AVG(BASIC) from Employee;

Select MAX(BASIC) from Employee;

Select MIN(BASIC) from Employee;

Sum(BASIC)
35720

Avg(BASIC)
3572

Max(BASIC)
6000

Min(BASIC)
2000

(J) Write SQL Command to increase the Basic Salary of Employee