Structured Query Language

Dr. L.M. Jenila Livingston
Professor
VIT Chennai

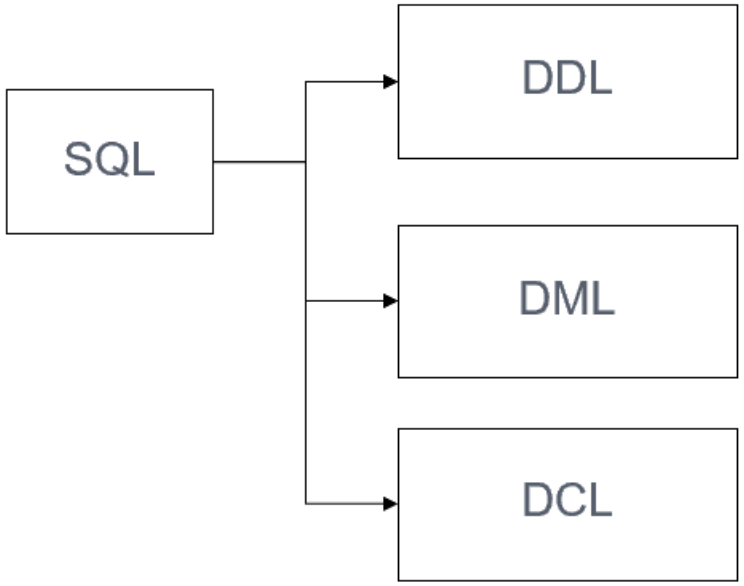
Some Facts on SQL

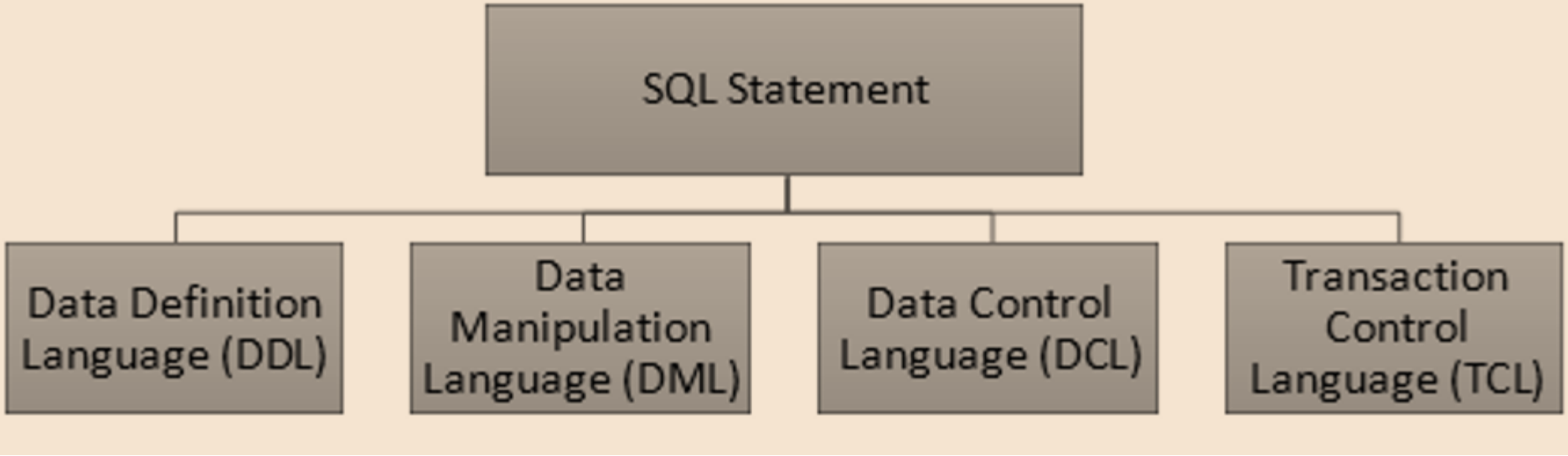
- SQL data is case-sensitive, SQL commands are not.
- First Version was developed at IBM by Donald D. Chamberlin and Raymond F. Boyce. [SQL]
- Developed using Dr. E.F. Codd's paper, "A Relational Model of Data for Large Shared Data Banks."
- Originally called SEQUEL from Structured English QUEry Language

Non-Procedural / Procedural

- SQL: language to access and manipulate data
- PL/SQL: a procedural extension to SQL language

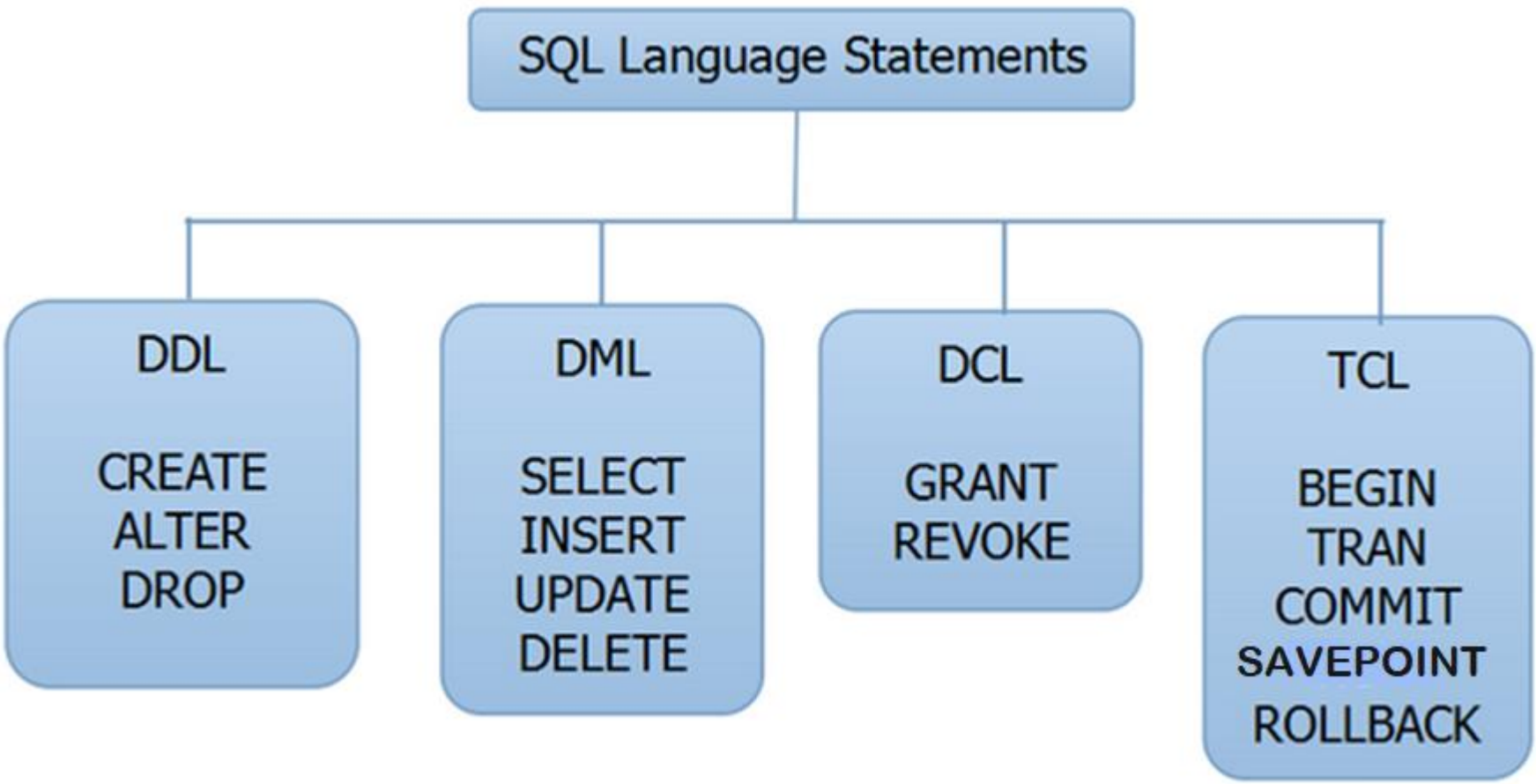
SQL


SQL
DDL
DML
DCL


SQL Statement
Data Definition Language (DDL)
Data Manipulation Language (DML)
Data Control Language (DCL)
Transaction Control Language (TCL)

Introduction to SQL

- SQL functions fit into three broad categories:
  - Data Definition Language (DDL)
    - statements that specify and modify **database schemas.**
    - SQL includes commands to:
      - Create database objects, such as tables, indexes, and views
      - Define access rights to those database objects
  - Data Manipulation Language (DML)
    - statements that manipulate **database content.**
    - Includes commands to insert, update, delete, and retrieve data within database tables
  - Data Control Language (DCL)
    - Commands that control a database, including administering privileges and committing data


SQL Language Statements
DDL
CREATE
ALTER
DROP
DML
SELECT
INSERT
UPDATE
DELETE
DCL
GRANT
REVOKE
TCL
BEGIN
TRAN
COMMIT
SAVEPOINT
ROLLBACK

2. SQL Data Types

SQL Data types (from Oracle 9i)

- String types
  - CHAR(n) – fixed-length character data, n characters long Maximum length = 2000 bytes
  - VARCHAR2(n) – variable length character data, maximum 4000 bytes
  - LONG – variable-length character data, up to 4GB. Maximum 1 per table
- Numeric types
  - NUMBER(p,q) – general purpose numeric data type
  - INTEGER(p) – signed integer, p digits wide
  - FLOAT(p) – floating point in scientific notation with p binary digits precision
- Date/time type
  - DATE – fixed-length date/time in dd-mm-yy form

3. SQL: DDL Commands

- CREATE
- ALTER
- DROP

TABLE

SQL Data Definition Commands

COMMAND OR OPTION	DESCRIPTION
CREATE SCHEMA AUTHORIZATION	Creates a database schema
CREATE TABLE	Creates a new table in the user's database schema
NOT NULL	Ensures that a column will not have null values
UNIQUE	Ensures that a column will not have duplicate values
PRIMARY KEY	Defines a primary key for a table
FOREIGN KEY	Defines a foreign key for a table
DEFAULT	Defines a default value for a column (when no value is given)
CHECK	Constraint used to validate data in an attribute
CREATE INDEX	Creates an index for a table
CREATE VIEW	Creates a dynamic subset of rows/columns from one or more tables
ALTER TABLE	Modifies a table's definition (adds, modifies, or deletes attributes or constraints)
CREATE TABLE AS	Creates a new table based on a query in the user's database schema
DROP TABLE	Permanently deletes a table (and thus its data)
DROP INDEX	Permanently deletes an index
DROP VIEW	Permanently deletes a view

Major CREATE statements

- CREATE TABLE – defines a table and its columns
- CREATE SCHEMA – defines a portion of the database owned by a particular user
- CREATE VIEW – defines a logical table from one or more views

SQL: DDL Commands – Working with tables

- `CREATE TABLE`: used to create a table.
- `ALTER TABLE`: modifies a table after it was created.
- `DROP TABLE`: removes a table from a database.

SQL: CREATE TABLE Statement

- Things to consider before you create your table are:
  - the table name
  - the names of the columns
  - the type of data
  - what column(s) will make up the primary key
- CREATE TABLE statement syntax:

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

Constraints are optional

SQL: ALTER TABLE Statement

- To add or drop columns on existing tables.
- ALTER TABLE statement syntax:

ALTER TABLE <table name>
ADD attr datatype;
Or
MODIFY old COLUMN attr new COLUMN attr ;
Or
DROP COLUMN attr;

SQL: DROP TABLE Statement

Syntax

DROP TABLE statement syntax:
DROP TABLE <table name> [RESTRICT | CASCADE];

Two options:

- CASCADE: Specifies that any foreign key constraint violations that are caused by dropping the table will cause the corresponding rows of the related table to be deleted.

- RESTRICT: blocks the deletion of the table of any foreign key constraint violations would be created.

Example:

```
CREATE TABLE FoodCart (
date varchar(10),
food varchar(20),
profit float
);
```

FoodCart

date	food	profit

```
ALTER TABLE FoodCart (
ADD sold int
);
```

FoodCart

date	food	profit	sold

```
ALTER TABLE FoodCart(
DROP COLUMN profit
);
```

FoodCart

date	food	sold

```
DROP TABLE FoodCart;
```

RENAME Statement

With RENAME statement you can rename a table. Some of the relational database management system (RDBMS) does not support this command, because this is not standardizing statement.

RENAME TABLE {tbl_name} TO {new_tbl_name};

or

ALTER TABLE {tbl_name} RENAME TO {new_tbl_name};

TRUNCATE - Syntax

TRUNCATE operation is used to delete all table records.

Logically it's the same as DELETE command.

Differences between DELETE and TRUNCATE commands are:

- TRUNCATE is really faster
- TRUNCATE cannot be rolled back
- TRUNCATE command does not invoke ON DELETE triggers

Syntax : TRUNCATE TABLE table_name;
Example : TRUNCATE TABLE people;

SQL DOWNLOAD LINK

- https://www.oracle.com/in/database/technologies/xe-downloads.html
- setup.exe
- Open SQL Command Line
  - Type connect
  - Type username and password

  (or)
  - connect / as sysdba
  - create user username identified by password;
  - GRANT ALL PRIVILEGES TO USERNAME;

- /

  to run previous command

- Up and Down **arrow keys**

  to display the **command** history

  (set history on) – if not working

- Open notepad (text editor)

  ed myScript.**sql**

(DEFINE _EDITOR = notepad)- set your preferred text editor)

5. DML Commands

- INSERT: adds new rows to a table.
- UPDATE: modifies one or more attributes.
- DELETE: deletes one or more rows from a table.

- SELECT: Display the contents of a table.

SQL: INSERT Statement

- To insert a row into a table, it is necessary to have a value for each attribute, and order matters.
- INSERT statement syntax:

```
INSERT INTO <table name>
VALUES ('value1', value2,....);
```

Example: INSERT INTO FoodCart
VALUES ('02/26/21','pizza',350);,

FoodCart

date	food	sold
02/25/21	pizza	350
02/26/21	hotdog	500

date	food	sold
02/25/21	pizza	350
02/26/21	hotdog	500
02/26/21	pizza	70

INSERT INTO only the specific columns

```
INSERT
INTO table_name (column1,column2,column3,...)
VALUES (value1,value2,value3,...);
```

```
INSERT
INTO table_name VALUES('&column1',&column2,
&column3,...);
```

SQL: UPDATE Statement

- To update the content of the table:

UPDATE statement syntax:

UPDATE <table name> SET <attr> = <value>
WHERE <selection condition>;

Example: UPDATE FoodCart SET sold = 349
WHERE date = '02/25/20' AND food = 'pizza';

FoodCart

date	food	sold
02/25/20	pizza	350
02/26/20	hotdog	500
02/26/20	pizza	70

date	food	sold
02/25/20	pizza	349
02/26/20	hotdog	500
02/26/20	pizza	70

SQL: DELETE Statement

- To delete rows from the table:

DELETE statement syntax:

DELETE FROM <table name>;

DELETE FROM <table name>
WHERE <condition>;

Example: DELETE FROM FoodCart
WHERE food = 'hotdog';

FoodCart

date	food	sold
02/25/08	pizza	349
02/26/08	hotdog	500
02/26/08	pizza	70

date	food	sold
02/25/08	pizza	349
02/26/08	pizza	70

Note: If the WHERE clause is omitted all rows of data are deleted from the table.

Basic SELECT Statement

- A basic SELECT statement includes 3 clauses

```
SELECT <attribute name> FROM <tables> WHERE <condition>
```

SELECT	FROM	WHERE
Specifies the attributes that are part of the resulting relation	Specifies the tables that serve as the input to the statement	Specifies the selection condition, including the join condition.

Note: that you don't need to use WHERE

```
SELECT * from tablename;

SELECT attributenames from tablename;
```

Simple SQL Query

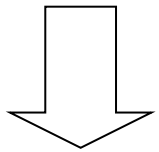
Using a "*" in a select statement indicates that every attribute of the input table is to be selected.

```
SELECT  *
FROM    Product;
```

Product

PName	Price	Category	Manufacturer
Gizmo	$19.99	Gadgets	GizmoWorks
Powergizmo	$29.99	Gadgets	GizmoWorks
SingleTouch	$149.99	Photography	Canon
MultiTouch	$203.99	Household	Hitachi

```
SELECT  *
FROM    Product
WHERE   category='Gadgets'
```



"selection"

PName	Price	Category	Manufacturer
Gizmo	$19.99	Gadgets	GizmoWorks
Powergizmo	$29.99	Gadgets	GizmoWorks

THANK YOU