

LAB2: DATA MANIPULATION LANGUAGE

I. MODIFY TABLE STRUCTURE

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table.

The ALTER TABLE statement is also used to add and drop various constraints on an existing table.

ALTER TABLE - ADD Column

To add a column in a table, use the following syntax:

```
ALTER TABLE table_name  
ADD column_name datatype;
```

ALTER TABLE - DROP COLUMN

To delete a column in a table, use the following syntax (notice that some database systems don't allow deleting a column):

```
ALTER TABLE table_name  
DROP COLUMN column_name;
```

ALTER TABLE - ALTER/MODIFY COLUMN

To change the data type of a column in a table, use the following syntax:

```
ALTER TABLE table_name  
ALTER COLUMN column_name datatype;
```

II. CREATE CONSTRAINTS

Constraints can be specified when the table is created with the CREATE TABLE statement, or after the table is created with the ALTER TABLE statement.

Syntax

```
CREATE TABLE table_name (  
    column1                datatype constraint,  
    column2                datatype constraint,  
    column3                datatype constraint,  
    ....  
);
```

SQL constraints are used to specify rules for the data in a table.

Constraints are used to limit the type of data that can go into a table. This ensures the accuracy and reliability of the data in the table. If there is any violation between the constraint and the data action, the action is aborted.

Constraints can be column level or table level. Column level constraints apply to a column, and table level constraints apply to the whole table.

The following constraints are commonly used in SQL:

- **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 a NOT NULL and UNIQUE. Uniquely identifies each row in a table
- **FOREIGN KEY** - Uniquely identifies a row/record in another table
- **CHECK** - Ensures that all values in a column satisfies a specific condition
- **DEFAULT** - Sets a default value for a column when no value is specified
- **INDEX** - Used to create and retrieve data from the database very quickly

III. DATA OPERATION

1. The SQL INSERT INTO Statement

The INSERT INTO statement is used to insert new records in a table.

Syntax

It is possible to write the INSERT INTO statement in two ways.

The first way specifies both the column names and the values to be inserted:

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

If you are adding values for all the columns of the table, you do not need to specify the column names in the SQL query. However, make sure the order of the values is in the same order as the columns in the table. The INSERT INTO syntax would be as follows:

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

2. The SQL UPDATE Statement

The UPDATE statement is used to modify the existing records in a table.

Syntax

```
UPDATE table_name
SET column1 = value1, column2 = value2, ...
WHERE condition;
```

The DELETE statement is used to delete existing records in a table.

3. SQL DELETE Statement

The DELETE statement is used to delete existing records in a table.

Syntax

```
DELETE FROM table_name
WHERE condition;
```

PRACTICE EXERCISE

Exercise 1 SQL / Tuple Relational Calculus

The 'MovieDB' database contains information about actors and the movies they play in.

Films	<u>film_id</u>	title	year	duration
	1	Minority Report	2002	145
	2	About A Boy	2002	101
	3	Bourne Identity, The	2002	118
	4	Notting Hill	1999	124
	5	Nine Months	1995	103
	6	Lola Rennt	1998	81

Actors	<u>actor_id</u>	name	sex
	1	Damon, Matt	<i>m</i>
	2	Potente, Franka	<i>f</i>
	3	Cruise, Tom	<i>m</i>
	4	Grant, Hugh	<i>m</i>
	5	Roberts, Julia	<i>f</i>
	6	Moore, Julianne	<i>f</i>
	7	Bleibtreu, Moritz	<i>m</i>

Act.Film	<u>actor_id</u>	<u>film_id</u>	role
	3	1	Detective John Anderton
	4	2	Will
	2	3	Marie Kreutz
	1	3	Jason Bourne
	4	4	William Thacker
	5	4	Anna Scott
	4	5	Samuel 'Sam' Faulkner, M.D., P.C.
	2	6	Lola
	7	6	Manni

Please create the MovieDB database and input its data according to the above tables.

Exercise 2: Express the following queries in SQL:

1. List the titles of all films
2. List the names of all female actresses.
3. Which actors/actresses starred in 'Bourne Identity, The'? List their names.
4. List the titles of all films with female roles.
5. List the titles of all films with no female roles.