DML

MAD 202

What is DML?

- DML is an acronym for Data Manipulation Language
- INSERT- will add new information to a table
- UPDATE- allows you to change the values in an existing record.
- DELETE- removes rows from an existing record

Information we need...

- Know the order of the columns in the table
- Know the column names
- Know the columns data types
- Whether column is a key
- Whether the column requires unique values
- Whether the column allows nulls
- Whether the column has a default value
- Table and column constraints

DML - INSERT

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INSERT

- Similar to the CREATE DDL statement because it creates a new object in the database, but while CREATE creates a new table, the INSERT creates a new row into an existing table.
- Several variations on the INSERT command
  - Insert row by using the column positions
  - Insert row by using column names
  - Insert rows from one table into another table
- It inserts ENTIRE rows.

INSERT statement

```
INSERT INTO tablename
(column1, column2, column3,…)
VALUES
(value1, value2, value3…..)
```

The columns in the row

The values

INSERT STATEMENT

```
INSERT INTO tablename
(column1, column2, column3,…)
VALUES
(value1, value2, value3…..)
```

- The first column will receive the first value.
- The second column will receive the second value….

- There has to be the same number of columns listed in the first list as there are values in the second list, or you will get an error

- Each inserted value MUST have the same data type or must be convertible to the same type as its corresponding column

INSERT STATEMENT

```
INSERT INTO tablename
(column3, column2, column1,…)
VALUES
(value3, value2, value1…..)
```

- Can do this BUT common practice is to list columns in order that they appear in the table.

INSERT STATEMENT

Insert by Column Positions -

```
INSERT INTO tablename
VALUES
(value1,value2,value3)
```

- This format is allowed ONLY when the values listed are in the matching order of the columns AND the number of values equal the number of columns.

- It is recommended that you do not use this format since the table may at some point be changed which can result in this method no longer working

INSERT SELECT

- Insert statements can also be used to insert information that is retrieve from another table
- We will take a closer look at this statement and its use when we start working with SELECT statements

```
INSERT INTO tablename
 SELECT
  Column1,
  Column2,
  Column3
  FROM tablename2
  WHERE column = value;
```

INSERT STATEMENT in action

```
CREATE TABLE teams
(
  team_id INTEGER NOT NULL PRIMARY KEY,
  team_name VARCHAR(30) NOT NULL,
  city  VARCHAR(20) NOT NULL,
  conference VARCHAR(10) NOT NULL
);
```

INSERT

The process of adding information is called populating the table

```
INSERT INTO teams
  (team_id, name, city, conference)
  VALUES
  (1, 'Red Wings', 'Detroit', 'Eastern');
```

INSERT

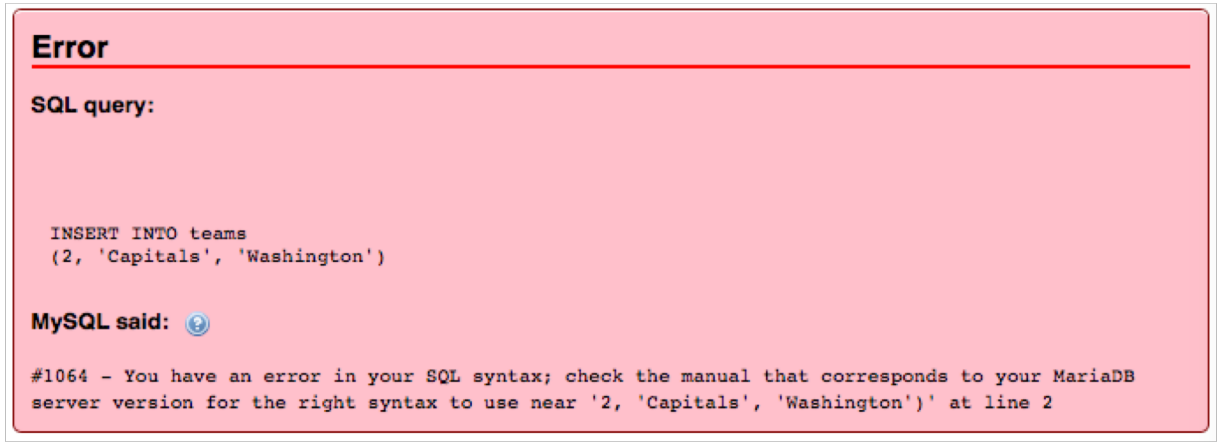
- ```
  INSERT INTO teams
    VALUES
    (2, 'Canadiens', 'Montreal', 'Eastern');
  ```


  ```

INSERT

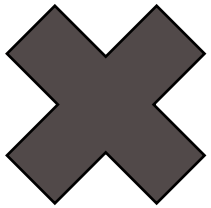
```
INSERT INTO teams
```

- VALUES
- (2, 'Capitals', 'Washington');



INSERT

```
INSERT INTO teams
  (team_name, city, team_id, conference)
  VALUES
  (2, 'Capitals', 'Washington', 'Eastern');
```



```
INSERT INTO teams
  (team_name, city, team_id, conference)
  VALUES
  ('Capitals', 'Washington', '3','Eastern');
```

INSERT multiple

```
INSERT INTO teams
  (team_id, team_name, city, conference)
  VALUES
  (4,'Maple Leafs', 'Toronto', 'Eastern'),
  (5,'Blackhawks', 'Chicago', 'Western');
```

MySQL

```
INSERT INTO teams
(team_id, team_name, city, conference)
VALUES
(4,'Maple Leafs', 'Toronto', 'Eastern')
;
INSERT INTO teams
(team_id, team_name, city, conference)
VALUES
(5,'Blackhawks', 'Chicago', 'Western');
;
```

SQL Server

Additional Examples

```
CREATE TABLE superheroes
(
  hero_id INTEGER NOT NULL PRIMARY KEY,
  hero_name VARCHAR(30) NOT NULL,
  secret_identity VARCHAR(30) NOT NULL,
  sidekick VARCHAR(30) NOT NULL DEFAULT ‘None’,
  age SMALLINT NULL
);
```

Knowing your columns..

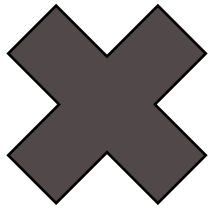
```
INSERT INTO superheroes
  (hero_id, hero_name, secret_identity)
  VALUES
  (1, 'Superman', 'Clark Kent');
```

Shortened insert...

```
INSERT INTO superheroes
  VALUES
  (2,'Batman', 'Bruce Wayne', 'Robin', 35);
```

Will this work?

```
INSERT INTO superheroes
VALUES
(3,'Wonder Woman');
```



???

```
INSERT INTO superheroes
(hero_id, hero_name, secret_identity)
VALUES
(3 ,'Wonder Woman','Linda Carter');
```

Inserting information into primary keys

- When inserting information into our sample tables we provided the primary key values
- These values we obtained by looking into the table to determine what the next available value would be
- In a real world application we would not want to first search every table to insert information
- Assign the surrogate key autonumber to the primary key column
- Value will automatically increase

ID’s and auto incrementing

```
CREATE TABLE counting
(
    id INTEGER AUTO_INCREMENT NOT NULL PRIMARY KEY,
    name VARCHAR(10)
);


INSERT INTO counting
    (name)
    VALUES
    (‘first’);

INSERT INTO counting
    (id, name)
    VALUES
    (3, ‘second’)…….
```

What happens if you delete a record and then add another?

INSERTING into tables with a foreign key relationship

```
CREATE TABLE authors
(
   id INTEGER AUTO_INCREMENT NOT NULL PRIMARY KEY,
   fname VARCHAR(20) NOT NULL,
   lname VARCHAR(25) NOT NULL
);

CREATE TABLE books
(
   id INTEGER AUTO_INCREMENT NOT NULL PRIMARY KEY,
   title VARCHAR(25),
   author_id INTEGER NOT NULL,
   CONSTRAINT author_fk
    FOREIGN KEY (author_id)
    REFERENCES authors(id)
);
```

INSERT some authors

```
INSERT INTO authors
  (fname, lname)
   VALUES
   ('Dean', 'Koontz'),
   ('Jim','Butcher'),
   ('Harlen','Coben'),
   ('Jim','Delaney')

INSERT INTO books
(title, author_id)
VALUES
??????
```

INSERT some books

```
INSERT INTO books
(title, author_id)
VALUES
('Watchers',1);

INSERT INTO books
(title, author_id)
VALUES
('Booky',6);

INSERT INTO books
(title, author_id)
VALUES
('Side Jobs', 2);
```

Preserving referential integrity

- The DBMS will **NOT** allow you to create orphan rows or make existing rows orphans

- When you INSERT, UPDATE, DELETE a row with a FOREIGN KEY column that references a PRIMARY KEY column in a parent table the following are checked:

Foreign-key table changes

- Inserting a row into the foreign-key table
  - The system checks that the new FOREIGN KEY value matches a PRIMARY KEY value in the parent table. If no match exists, the INSERT will not be allowed

```
INSERT INTO books
(title, author_id)
VALUES
('Booky',6)
```

- Updating a row in the foreign-key table
  - The system checks that the updated FOREIGN KEY value matches a PRIMARY KEY value in the parent table. If no match exists, the UPDATE will not be allowed

```
UPDATE books
SET title='New Book', author_id='6'
WHERE id=1;
```

- Deleting a row in the foreign-key table.
  - No check is required

Parent table changes

- Inserting a row into the parent table
  - No check is required

- Updating a row in the parent table.
  - The system checks that none of the FOREIGN KEY values matches the PRIMARY KEY value to be updated. If a match exists, the UPDATE is not allowed

```
UPDATE authors
SET id=6
WHERE fname='Dean';
```

- Deleting a row from the parent table
  - The system checks that none of the FOREIGN KEY values matches the PRIMARY KEY values to be deleted. If a match exists, the DBMS is not allowed.

```
DELETE FROM authors
WHERE id=1;
```

Drop tables with relationships

To remove a table – have to remove the primary relationship

DROP TABLE authors;

DROP TABLE books;

DROP TABLE authors;

DML - UPDATE

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UPDATE Statement

- UPDATE is similar to the ALTER DDL statement, but instead of changing the structure of a table, we are changing the data that is contained within the table.
- We can update all rows in a table or we can update specific rows in a table

```
UPDATE table
SET column = value
```

This would update all values in that column, not just the record we want

```
UPDATE table
SET column = value
WHERE
column = value
```

UPDATE statement

- Each value must have the same data type or must be implicitly convertible to the same type as its column
- Order of rows is unimportant

The WHERE clause

- The WHERE clause limits the change to the areas that we specifically wanted.
- It acts as a filter
- It is optional (without it all values will be updated)
- It is all about true conditions

UPDATE ALL

```
ALTER TABLE superheroes
ADD COLUMN jl_member CHAR(3) NULL;
```

```
UPDATE superheroes
SET jl_member= 'YES';
```

Updates all current records to YES

Where condition is true

```
UPDATE superheroes
SET secret_identity = 'Diana Prince'
WHERE hero_id=3;
```

Filter

```
ALTER TABLE superheroes
ADD COLUMN gender CHAR(6);
```

```
UPDATE superheroes
SET gender =‘male’
WHERE hero_name <>’Wonder Woman’;
```

The <> means ***NOT.*** This is a comparison operator

Comparison operators

=	means equal to
<>	means not equal to
<	means less than
>	means greater than
<=	means less than or equal to
>=	means greater than or equal to

EXAMPLE:

```
UPDATE   personnel
  SET  salary = salary * 1.07
  WHERE  jobgrade <=4;
```

Would increase the salary by 7% where the jobgrade is 4 and under.

LIKE

- The LIKE operator implements pattern matching
- If we wanted to update the wonder woman gender column to female, we could:

```
UPDATE superheroes
SET gender='female'
WHERE hero_name LIKE '%Woman';
```

WILDCARDS

- The % looks for one or more characters before
- The _ looks for one character

BETWEEN

- Enables a range test

```
UPDATE superheroes
SET age = 37
WHERE age BETWEEN 35 AND 38;
```

The values being checked are included in the between range test (so anyone that was 35 would be updated as would anyone who is 38)

COMPOUND CONDITIONS

- AND ----- OR

- The AND condition

```
UPDATE superheroes
SET age = 33
WHERE hero_name =‘Superman’ AND secret_identity=‘Clark Kent’;
```

The OR condition

```
UPDATE superheroes
SET age = 32
WHERE hero_name ='Superman' OR hero_name='Wonder Woman’;
```

DML - DELETE

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DELETE

- Unlike INSERT and UPDATE you do not need to specify any column names because it removes entire rows
- Only deletes the rows – you can remove all rows from a table, but cannot delete the table itself

- `DELETE FROM superheroes;`

- This statement will remove all information. It is very important that you implement the WHERE clause to delete only the records that you desire!

DELETE

```
INSERT INTO superheroes
(hero_id, hero_name, secret_identity)
VALUES
(4, 'No One', 'Somebody');
```

If we wanted to delete just this record there are a number of ways:

DELETE

```
DELETE FROM superheroes
WHERE hero_id >3;
```

```
(4, 'No One', 'Somebody')
```

```
DELETE FROM superheroes
WHERE hero_name LIKE 'no%';
```

And others…. It is important to provide as much detail as possible to ensure that the correct records are removed.