# Tutorial 4

## CSC 343
## Fall 2019

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# Data Manipulation Language (DML)

- DDL is used to manipulate the schema of our DB (Creating/updating/deleting tables and adding constraints)

- DML is used to manipulate the data in our DB.
  - INSERT (Adding data)
  - UPDATE (Changing existing data)
  - SELECT (Querying for data)
  - DELETE (Removing data)

# DML - INSERT

- Used to insert data into tables
- General form:

```
INSERT INTO TABLE_NAME[(k1, k2, .., kn)] VALUES(v1, v2, .., vn);
```

- Notice that the set of attribute names after **table_name** are optional. This is because not specifying them is the same as specifying all of the attribute names in the table.

- Example:
  - `INSERT INTO Teacher(tid, name, deptId) VALUES(1, 'Abode', 5);`
  - `INSERT INTO Teacher VALUES(1, 'Abode', 5);`

# DML - INSERT

- The two examples above do the same thing, so when is specifying the keys useful?
  - Not inserting data for some columns (which allow NULL)
  - AUTO_INCREMENT columns (which take care of the value for you)
  - Different order of inserting data
  - Depending on reader's knowledge of the table, it might be more clear to specify it

- You can not insert data which violates integrity constraints, some cases:
  - Inserting the wrong type of data
    - INSERT INTO Teacher VALUES('1', 321, true);
  - Inserting a row with a primary key which already exists
    - INSERT INTO Teacher VALUES(1, 'Abode', 5);
    - INSERT INTO Teacher VALUES(1, 'Aidana, 5);
  - Inserting a row with a NULL attribute in the primary key
    - INSERT INTO Teacher VALUES(NULL, 'Raj', 5);
    - INSERT INTO Teacher(Name, DeptId) VALUES( 'Raj', 5);
  - Inserting data into a column which is a foreign key, but where the value you specify does not already exist
    - INSERT INTO Teacher VALUES(1, 'Abode', 0); (Assume that we do not have a row in Department with DeptId 0)

# DML - UPDATE

- Used to update data which already exists in a table
- General form:

```
UPDATE TABLE_NAME SET k1=new_v1,..kn=new_vn [WHERE CONSTRAINTS];
```

- You can update 1 or more values at a time
- Constraints (and the WHERE keyword) are used to target your update
  - Constraints can be used to target 1 specific row, how would you do this? What concept would you use?
- Update statements will fail if you violate constraints (same ones explained on the DML - INSERT slides)

- Example:
  - `UPDATE Teacher SET DeptId = 7 WHERE Name = 'Abode';`
  - `UPDATE Teacher SET DeptId = 9 WHERE DeptId = 5;`

# DML - SELECT

- Used for data querying

SELECT **ATTR_NAMES** FROM **TABLE_NAMES** [WHERE **CONDITIONS**];

- If there is more than one attribute with the same name a table should be specified:

SELECT t.name FROM Teacher t WHERE DeptId = 1;

- Using * in **ATTR_NAMES** selects all attributes
- It is sometimes helpful to rename attributes in your result:

SELECT t.tid AS 'Personnel Number' FROM Teacher t WHERE DeptId = 1;

# DML - WHERE

Condition inside the `WHERE` clause:

- Boolean: `AND, OR, NOT`
- Comparison: =, <>, <, >, <=, >=
- Pattern matching: **attribute** `LIKE/NOT LIKE` **pattern**
    - Any string: %
    - Any character: __

- `NULL` values return `UNKNOWN` on conditions (and are not selected)

- Looking at range: `BETWEEN` **value** `AND` **value**

- Looking at the list: `ANY/ALL/ IN/NOT IN`

- `NOT EXIST`

- `UNION/UNION ALL`

– `SELECT` statements can be used inside `WHERE` clauses

# DML - DELETE

- Used to delete tuples

`DELETE FROM` **`TABLE_NAME`** `WHERE <condition>;`

- To delete all tuples from the relation:
- Just like dropping tables, you can not break foreign key constraints by removing rows. (Unless ON DELETE CASCADE is specified in DDL)

`DELETE FROM` **`TABLE_NAME`**`;`

NOTE: When using `DELETE`, MySql doesn't start deleting until all the tuples are checked (checks the condition on all the tuples in relation and then deletes the ones that satisfy the condition all at once).

# Task: Record the following in your DB

Citizen 1: James Howlett, 183 years old and born in Canada. Weighs about 300 pounds. We know James by a few names, some are; "Wolverine", "Logan", "Weapon X". James was last seen in Boston and as far as we know he has saved (over his long life) about 15000 people.

Citizen 2: German Max Eisenhardt is 85 years old and 200 pounds. Currently imprisoned for having killed 700 people, he is also otherwise known as "Magento" or "Erik Lehnsherr".

Citizen 3: Natalia Romanova, born in Russia in 1988 and weighs about 140 pounds. Known as "Black Widow" or "Black Pearl", Natalia has saved 120 people. Her latest heroism was seen in New York City.

Citizen 4: Born in in 1950 in an unknown location, Stephen Strange is about 82kg. Also known as, "Dr. Strange", "Strange", and of course, "Master of the Mystic Arts", strange has was last seen in London, saving his 200th person.

Citizen 5: Born on Titan, 200 years ago, Thanos who is 600 pounds, is also known as The Mad Titan. Thanos is not imprisoned and has killed about 2030102020 people so far.

**Note**: You will have to have a clean/empty version of the tables from tutorial 3 to do this. Use the sample solution DDL posted on the class site to create the tables for consistency in the solution.

# Task Solution

- Refer to tut4_1.DML (first section)

# Task: Perform the following

1. Every free (non-imprisoned) villain has just killed 5 more people, update the records.
2. We just found out that Stephen Strange was born in Philadelphia, update his record.
3. We discovered a new citizen, Bulgarian Tony Stark is 42 years old and weighs about 175 pounds. Also known as, "Iron Man" "Abode", and "Mr. Stark", he has saved 500 people so far, last seen in New York City. His archenemy is Thanos and his power rating is as follows:
   a.    I: 10, EP: 7, D: 8, S: 7, S:8, FS: 9
4. Actually, "Abode" is not really an Alias for Tony Stark, delete that entry (Make sure you only delete "Abode" as an alias for Stark and not anyone else)
5. Write a statement which would show every Superhero who has saved more than 400 people not more than 1000.
6. Write a statement to show every extraordinary citizen's name which is over 45 years old but under 290 pounds.
7. Delete James Howlett from your records.

# Task Solution

- Refer to tut4_2.DML

# Any Questions?

- Do you have any questions?

  1. Check piazza
  2. Post the question on piazza
     (unless it's a personal question then email one of the TAs)

- If you have any content that you would like to be added in a Tutorial, please let me know by Friday!

- Email requests to:
  - **Saihiel**(saihiel.bakshi@mail.utoronto.ca)
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