Lecture #16: JOIN, SELECT, UPDATE DELETE
Administrivia

- Midterm - End of Class
- Readings:
  - Read through chapter 10 if you haven’t already
- Homework
  - Homework 6 goes out today - review at end.
On The Menu

- JOINS
- SELECT
- UPDATE
- DELETE
- Homework 6
- Midterm
JOIN

- A SELECT against a table generates a “virtual” table containing the matching rows.
  - E.G. `SELECT * FROM t1;`
- A SELECT against multiple tables generates a “virtual” table containing combined rows from both tables.
  - E.G. `SELECT * FROM t1 JOIN t2;`
- JOINS allow us to specify how we want rows from different to be combined in a SELECT over multiple tables.
World’s Simplest Database

professor
- professor_id INT(11)
- first_name VARCHAR(255)
- last_name VARCHAR(255)

Indexes

class
- class_id INT(11)
- class_name VARCHAR(255)
- professor_id INT(11)

Indexes
JOIN

- SELECT * FROM professor;
- SELECT * FROM class;
- SELECT * FROM professor JOIN class;

  • Returns ALL POSSIBLE combinations of rows in the professor and class tables.
  • If we only want to see the combination of rows that reflect which professor is teaching which class, we must specify some type of join.
INNER JOIN

- When SELECTING an inner join between tables $t_1$ and $t_2$ on key $k$ the only rows that are returned are those rows in which $t_1.k = t_2.k$.

  - SELECT * FROM professor JOIN CLASS ON professor.professor_id = class.professor_id;
INNER JOIN - Visualized

INNER JOIN

Table1

SELECT *
FROM Table1 t1
INNER JOIN Table2 t2
ON t1.Col1 = t2.Col1

(C) http://blog.SQLAuthority.com
INNER JOIN

- Lots of different ways of expressing - the following are equivalent in MySQL
  - SELECT * FROM t1 INNER JOIN t2 ON t1.k = t2.k;
  - SELECT * FROM t1 JOIN t2 ON t1.k = t2.k;
  - SELECT * FROM t1, t2 WHERE t1.k = t2.k;
OUTER JOIN

- Outer joins come in three flavors.
  - LEFT
  - RIGHT
  - FULL
LEFT OUTER JOIN

- When SELECTING a LEFT OUTER JOIN from tables t1 and t2 on key k the result contains:
  - All rows from t1
  - All rows from t2 that match t1 on k or NULL if no match exists.
- SELECT * FROM t1 LEFT OUTER JOIN t2 ON t1.k=t2.k;
LEFT OUTER JOIN

SELECT *
FROM Table1 t1
LEFT OUTER JOIN Table2 t2
ON t1.Col1 = t2.Col1

(C) http://blog.SQLAuthority.com
RIGHT OUTER JOIN

- When SELECTING a RIGHT OUTER JOIN from tables t1 and t2 on key k the result contains:
  - All rows from t2
  - All rows from t1 that match t2 on k or NULL if no match exists.

- SELECT * FROM t1 RIGHT OUTER JOIN t2 ON t1.k=t2.k;
RIGHT OUTER JOIN

SELECT *
FROM Table1 t1
RIGHT OUTER JOIN Table2 t2
ON t1.Col1 = t2.Col1

(C) http://blog.SQLAuthority.com
FULL OUTER JOIN

- When SELECTING a FULL OUTER JOIN from tables t1 and t2 on key k the result contains:
  - All rows from t2
  - All rows from t1
  - NULL values for t1 and t2 rows where there exists no match on key k.

- No straightforward way of typing this in MySQL
  - will cover in next lecture
FULL OUTER JOIN

SELECT *
FROM Table1 t1
FULL OUTER JOIN Table2 t2
ON t1.Col1 = t2.Col1

(C) http://blog.SQLAuthority.com
OUTER JOIN - Syntax

The following are equivalent

- `SELECT * FROM t1 LEFT OUTER JOIN t2 ON t1.k = t2.k`
- `SELECT * FROM t1 LEFT JOIN t2 ON t1.k = t2.k`
Inner Joins with Multiple Tables

SELECT *
FROM t1 INNER JOIN (t2, t3) ON t1.k1 = t2.k1 AND t1.k2 = t3.k2;
Inner Joins with Multiple Tables

SELECT
    *
FROM
    t1,
    t2,
    t3
WHERE
    t1.k1 = t2.k1 AND
    t1.k2 = t3.k2;
Aggregate Queries

SELECT
    SUM(numeric_column_1),
    MIN(numeric_column_2),
    MAX(numeric_column_3),
    AVG(numeric_column_4),
    COUNT(any_column),
    COUNT(DISTINCT any_column),
FROM
    table_1
...
Aggregate Queries With Group By

SELECT
    SUM(numeric_column_1),
    other_column_1,
FROM
    table_1
GROUP BY
    other_column_1
Select CONCAT

SELECT
  CONCAT(column_1, glue_1, column_2)
FROM
  table_1;
Select Subselect

SELECT
  column_1
FROM
  table_1;
WHERE
  column_n < (SELECT FUNC(*) FROM table);
Query Me This

- How many tags are there of each type?
- How many authors are there of each type?
- Find the article with the most images?
- Find the article with the most tags?
- Find the most commonly applied tag?
- How many articles are authored by more than one author?
- How many articles are authored by organizations services?
UPDATE Syntax

UPDATE [table_name]
SET
  [column_1] = [value_1]
  [column_2] = [value_2]
WHERE
  [condition_1]
  [(AND|OR) condition_2]
  [(AND|OR) condition_3]
  ...
  [(AND|OR) condition_n]
DELETE Syntax

DELETE FROM [table_name]
WHERE
    [condition_1]
    [(AND|OR) condition_2]
    [(AND|OR) condition_3]
    ...
    [(AND|OR) condition_n]
Midterm

- Grades - Exam was graded two ways - you got the better of two scores:
  - Method 1:
    - Question 1 - 40pts
    - Question 2 - 30pts
    - Question 3 - 10pts
    - Curve - 7%
  - Method 2:
    - Question 1 - 20pts
    - Question 2 - 30pts
    - Question 3 - 30pts
    - Curve 5%