Manipulating Date Fields and An Introduction to Joins

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- SQL and its `JOIN` Operations

When working with data, time is typically an important variable. It's common to restrict one's analysis to a certain date range, or summarize data by some date field (*e.g.*, month, year, day of week, or quarter). Knowing how to manipulate dates is important.

The SQL functions we will use to manipulate date fields are `BETWEEN`, `EXTRACT`, `DATE_FORMAT`, `DATE_ADD`, and `INTERVAL`

Intersection

$$A = \{1, 3, 5, 7, 9\}$$
$$B = \{2, 4, 6, 8, 10\}$$
$$A \cap B = \varnothing$$

$$A = \{1, 2, 3, 4\}$$
$$B = \{3, 4, 5, 6\}$$
$$A \cap B = \{3, 4\}$$

The notion of intersection translates to joins, in that the x tables being joined only return rows and columns in which there is a shared id or joining variable. In SQL, this is the `INNER JOIN` operation. Let's see this with Facebook users and status updates.

Union

$$A = \{1, 3, 5, 7, 9\}$$
$$B = \{2, 4, 6, 8, 10\}$$
$$A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$A = \{1, 2, 3, 4\}$$
$$B = \{3, 4, 5, 6\}$$
$$A \cup B = \{1, 2, 3, 4, 5, 6\}$$

Compliment

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$
$$A = \{1, 3, 5, 7, 9\}$$
$$A' = \{2, 4, 6, 8, 10\}$$

The notion of compliment and intersection translate into joins in SQL with `FULL OUTER JOIN`, `LEFT OUTER JOIN`, and `RIGHT OUTER JOIN`