Tuesday 24/3/2015 SQL OML

Lecture Topics
- Multisets
- Nulls
- Typical queries
- Aggregates
- Duplicates
- Subqueries
- Insertion
- Deletion
- Update
- Division

SQL
- SQL is a standard language for databases.
- It allows for querying and manipulating data in a database.
- SQL is used in various applications, including business intelligence, data warehousing, and data mining.

Multisets
Note that the followings are not equal:

<table>
<thead>
<tr>
<th>R</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

In sets, and Relational Algebra, the would be:

- **SEE SQL Examples for UNION vs. UNION ALL, etc.**

Sample DB

<table>
<thead>
<tr>
<th>PLANT</th>
<th>CUSTOMER</th>
<th>INVOICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK F</td>
<td>PK C</td>
<td>PK C</td>
</tr>
<tr>
<td>Name</td>
<td>Party</td>
<td>Supplier</td>
</tr>
<tr>
<td>Phone</td>
<td>City</td>
<td>Ship Date</td>
</tr>
<tr>
<td>PK1 F1</td>
<td>PK1 C</td>
<td>PK1 C</td>
</tr>
</tbody>
</table>

Modelling a company that manufactures a single product that is supplied to customers by plants.

- Each customer is assigned to a plant.
- Each order (invoice) is placed by a customer.
Dealing with NULLs

- Different for DML vs. DDL
  - NULL can mean different things
    - Value unknown
    - Value not permitted
    - Value not applicable
- Select ...
  FROM ...
  WHERE condition

- x=5, what if x is a column name, and value is NULL?
- x=5 or x<>5, should this always be true?

Need 3 valued logic:

<table>
<thead>
<tr>
<th></th>
<th>NOT</th>
<th>OR</th>
<th>AND</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>False</td>
<td>F</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>Unknown</td>
<td>U</td>
<td>U</td>
<td>U</td>
</tr>
</tbody>
</table>

ORDER OF EXECUTION

- WHERE
  - FROM
  - SELECT
  - If condition is true, tuple passed to select.
  - Otherwise, not.
  - Any comparison in which one side is NULL is unknown.
  - Arithmetic: if operand is NULL, result is NULL.

See SQL examples for other topics.