**Aggregation**

Rows in a table can be grouped, and aggregation is performed on each group.

\[
\text{select} \quad \text{[columns]} \quad \text{from} \quad \text{[table]} \quad \text{where} \quad \text{[expression]} \quad \text{having} \quad \text{[expression]};
\]

An aggregate function in the [columns] clause computes a value from a group of rows.

**Groups**

The number of groups is the number of unique values of an expression.

**Mixing Aggregate Functions and Single Values**

An aggregate function also selects a row in the table, which may be meaningful.

\[
\text{select} \quad \text{max(legs), kind from animals};
\]

**Grouping Rows**

Rows in a table can be grouped, and aggregation is performed on each group.

\[
\text{select} \quad \text{[columns]} \quad \text{from} \quad \text{[table]} \quad \text{group by} \quad \text{[expression]} \quad \text{having} \quad \text{[expression]};
\]

The number of groups is the number of unique values of an expression.

**Announcements**

- Project 4 due Thursday 4/23 @ 11:59pm
- Early point #2: All questions (including Extra Credit) by Wednesday 4/22 @ 11:59pm
- Recursive Art Contest Entries due Monday 4/27 @ 11:59pm
- Homework 9 merged with Homework 10; both are due Wednesday 4/29 @ 11:59pm
- Quiz 4 (SQL) released on Tuesday 4/28 is due Thursday 4/30 @ 11:59pm

Email your code & a screenshot of your art to cs61a-tae@imaile.eecs.berkeley.edu (Albert)

Email Early point #1: All questions (including Extra Credit) by Wednesday 4/22 @ 11:59pm

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**Aggregate Functions**

So far, all SQL expressions have referred to the values in a single row at a time.

\[
\text{select} \quad \text{[columns]} \quad \text{from} \quad \text{[table]} \quad \text{where} \quad \text{[expression]} \quad \text{order by} \quad \text{[expression]};
\]

**Selecting Groups**

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\[
\text{select} \quad \text{[columns]} \quad \text{from} \quad \text{[table]} \quad \text{group by} \quad \text{[expression]} \quad \text{having} \quad \text{[expression]};
\]

A having clause filters the set of groups that are aggregated.

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Select Grammar

SQL Select Statements

http://www.sqlite.org/lang_select.html