61A Lecture 34

Integer Examples (continued)

A Very Interesting Number

The mathematician G. H. Hardy once remarked to the mathematician Srinivasa Ramanujan...

(Demo)

Aggregation

Aggregate Functions

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

```
[expression] as [name], [expression] as [name], ...
```

```
select [columns] from [table] where [expression] order by [expression];
```

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

```
create table animals as
  select "dog" as kind, 4 as legs, 20 as weight union
  select "cat"       , 4        , 10        union
  select "ferret"    , 4        , 10        union
  select "parrot"    , 2        , 6         union
  select "penguin"   , 2        , 10        union
  select "t-rex"     , 2        , 12000;

  select max(legs) from animals;
```

animals:

kind	legs	weight
dog	4	20
cat	4	10
ferret	4	10
parrot	2	6
penguin	2	10
t-rex	2	12000

max(legs)
4

(Demo)

Mixing Aggregate Functions and Single Values

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

```
select max(weight), kind from animals;        select max(legs), kind from animals;

select min(kind), kind from animals;          select avg(weight), kind from animals;
```

(Demo)

```
create table animals as
  select "dog" as kind, 4 as legs, 20 as weight union
  select "cat"       , 4        , 10        union
  select "ferret"    , 4        , 10        union
  select "parrot"    , 2        , 6         union
  select "penguin"   , 2        , 10        union
  select "t-rex"     , 2        , 12000;
```

animals:

kind	legs	weight
dog	4	20
cat	4	10
ferret	4	10
parrot	2	6
penguin	2	10
t-rex	2	12000

Groups

Grouping Rows

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

`[expression] as [name], [expression] as [name], ...`

`select [columns] from [table] group by [expression] having [expression];`

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

`select legs, max(weight) from animals group by legs;`

legs	max(weight)
4	20
2	12000

legs=4 ⇠

legs=2 ⇠

(Demo)

animals:

kind	legs	weight
dog	4	20
cat	4	10
ferret	4	10
parrot	2	6
penguin	2	10
t-rex	2	12000

Selecting Groups

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

`[expression] as [name], [expression] as [name], ...`

`select [columns] from [table] group by [expression] having [expression];`

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

`select weight/legs, count(*) from animals group by weight/legs having count(*)>1;`
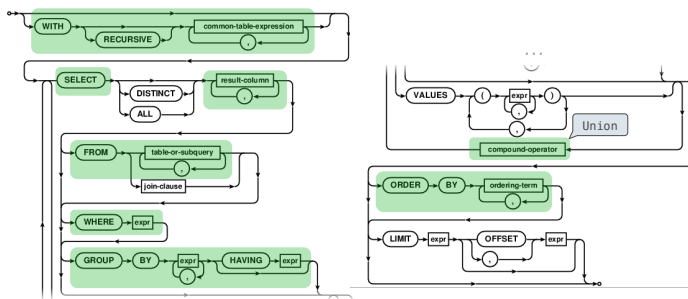
weight/legs	count(*)
5	2
2	2

weight/legs=5
weight/legs=2
weight/legs=2
weight/legs=3
weight/legs=5
weight/legs=6000

animals:

kind	legs	weight
dog	4	20
cat	4	10
ferret	4	10
parrot	2	6
penguin	2	10
t-rex	2	12000

Discussion Question

What's the maximum difference between leg count for two animals with the same weight?

Select Grammar

SQL Select Statements

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