

## 61A Lecture 33

## Announcements

## 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;
```

max(legs)
4

(Demo)

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

## 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;
```

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

(Demo)

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:

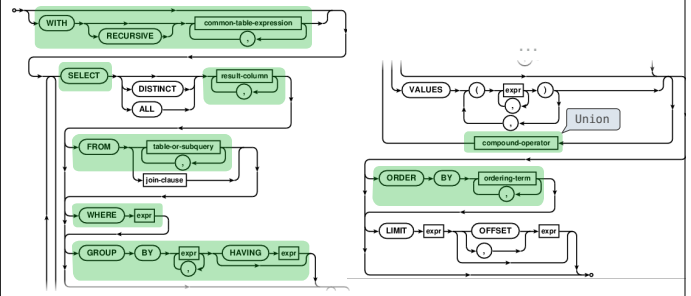
kind	legs	weight
dog	4	20
cat	4	10
ferret	4	10
parrot	2	6
penguin	2	10
t-rex	2	12000

## 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](http://www.sqlite.org/lang_select.html)