61A Lecture 34

Wednesday, April 22

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

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)

animals:

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 min(kind), kind from animals;
```

```
select max(legs), 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;
```

animals:

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

legs	max(weight)
4	20
2	12000

legs=4

legs=2

(Demo)

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;
```

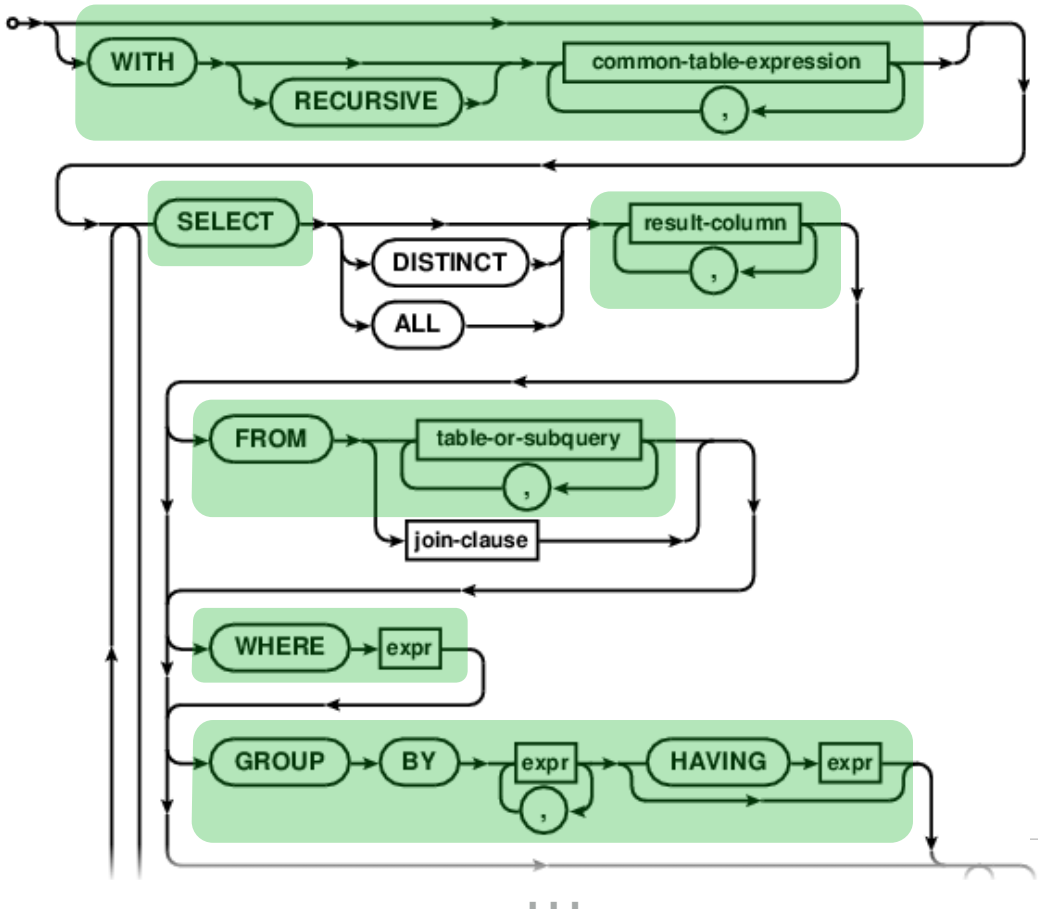
weight/legs	count(*)
5	2
2	2

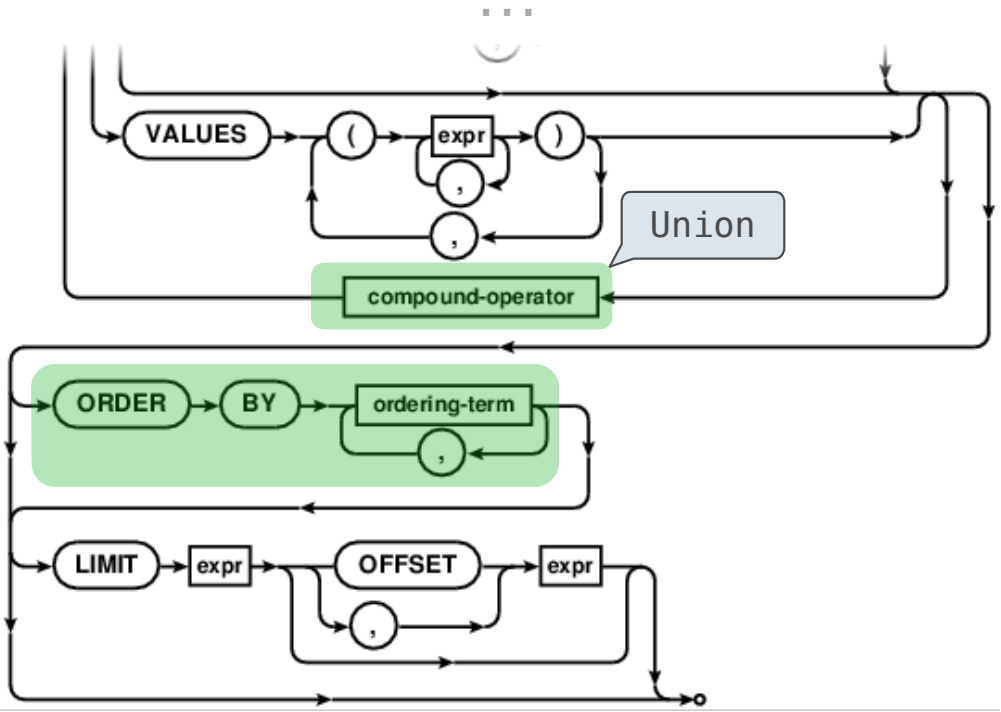
animals:

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

Select Grammar

SQL Select Statements





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