Tables

Announcements

Joining Tables

Reminder: John the Patriotic Dog Breeder

```
CREATE TABLE parents AS
SELECT "abraham" AS parent, "barack" AS child UNION
SELECT "abraham"          , "clinton"         UNION
SELECT "delano"           , "herbert"         UNION
SELECT "fillmore"         , "abraham"         UNION
SELECT "fillmore"         , "delano"          UNION
SELECT "fillmore"         , "grover"          UNION
SELECT "eisenhower"       , "fillmore";
```

Parents:

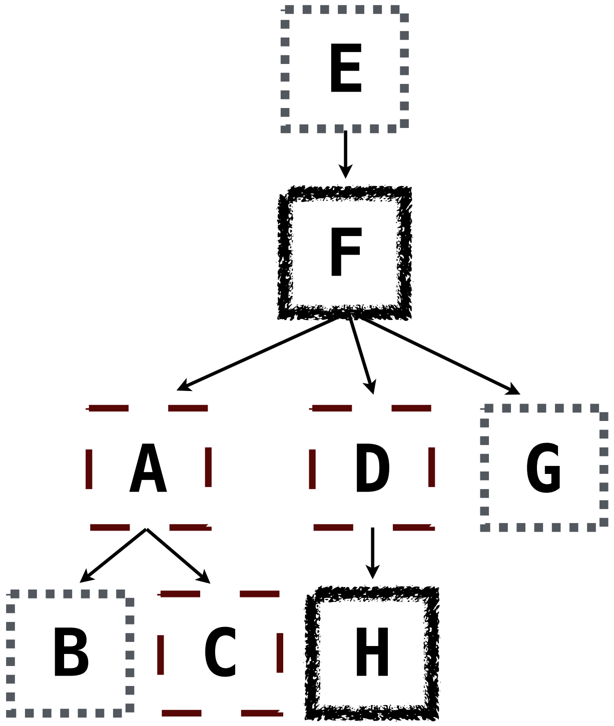
Parent	Child
abraham	barack
abraham	clinton
delano	herbert
fillmore	abraham
fillmore	delano
fillmore	grover
eisenhower	fillmore

Joining Two Tables

Two tables **A** & **B** are joined by a comma to yield all combos of a row from **A** & a row from **B**

```
CREATE TABLE dogs AS
  SELECT "abraham" AS name, "long" AS fur UNION
  SELECT "barack"         , "short"       UNION
  SELECT "clinton"        , "long"        UNION
  SELECT "delano"         , "long"        UNION
  SELECT "eisenhower"     , "short"       UNION
  SELECT "fillmore"       , "curly"       UNION
  SELECT "grover"         , "short"       UNION
  SELECT "herbert"        , "curly";

CREATE TABLE parents AS
  SELECT "abraham" AS parent, "barack" AS child UNION
  SELECT "abraham"          , "clinton"         UNION
  ...;
```



Select the parents of curly-furred dogs

```
SELECT parent FROM parents, dogs
              WHERE child = name AND fur = "curly";
```

(Demo)

Aliases and Dot Expressions

Joining a Table with Itself

Two tables may share a column name; dot expressions and aliases disambiguate column values

```
   SELECT [columns] FROM [table] WHERE [condition] ORDER BY [order];
```

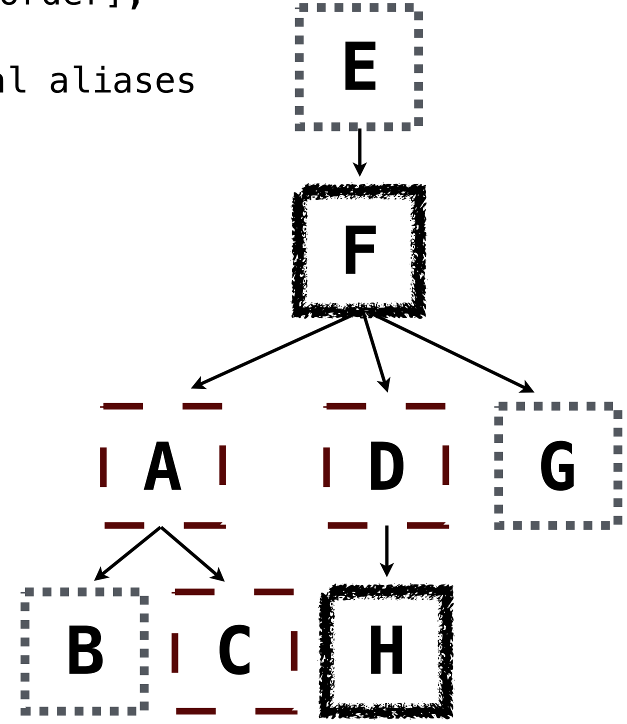
[table] is a comma-separated list of table names with optional aliases

Select all pairs of siblings

```
   SELECT a.child AS first, b.child AS second
     FROM parents AS a, parents AS b
     WHERE a.parent = b.parent AND a.child < b.child;
```

as alias

First	Second
barack	clinton
abraham	delano
abraham	grover
delano	grover



Example: Grandparents

Which select statement evaluates to all grandparent, grandchild pairs?

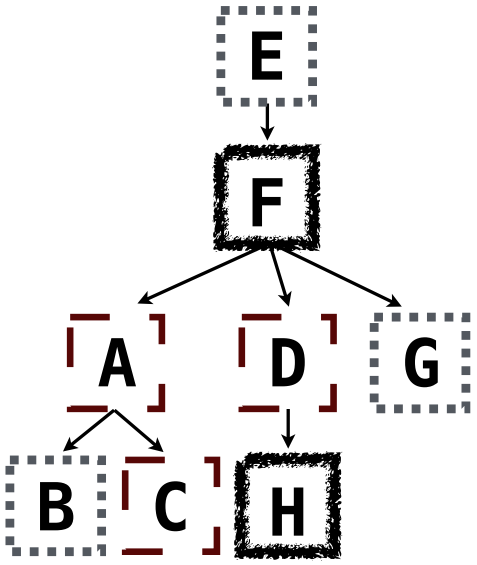
1
```
SELECT a.grandparent, b.child FROM parents AS a, parents AS b
                                  WHERE b.parent = a.child;
```

2
```
SELECT a.parent, b.child FROM parents AS a, parents AS b
                             WHERE a.parent = b.child;
```

3
```
SELECT a.parent, b.child FROM parents AS a, parents AS b
                             WHERE b.parent = a.child;
```

4
```
SELECT a.grandparent, b.child FROM parents AS a, parents AS b
                                  WHERE a.parent = b.child;
```

5 None of the above



Joining Multiple Tables

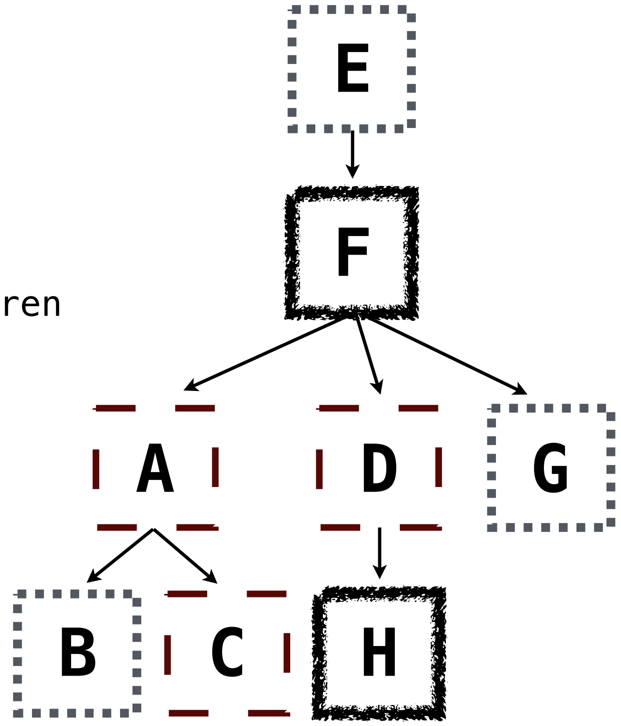
Multiple tables can be joined to yield all combinations of rows from each

```
CREATE TABLE grandparents AS
  SELECT a.parent AS grandog, b.child AS granpup
    FROM parents AS a, parents AS b
    WHERE b.parent = a.child;
```

Select all grandparents with the same fur as their grandchildren

Which tables need to be joined together?

```
SELECT grandog FROM grandparents, dogs AS c, dogs AS d
               WHERE grandog = c.name AND
                     granpup = d.name AND
                     c.fur = d.fur;
```



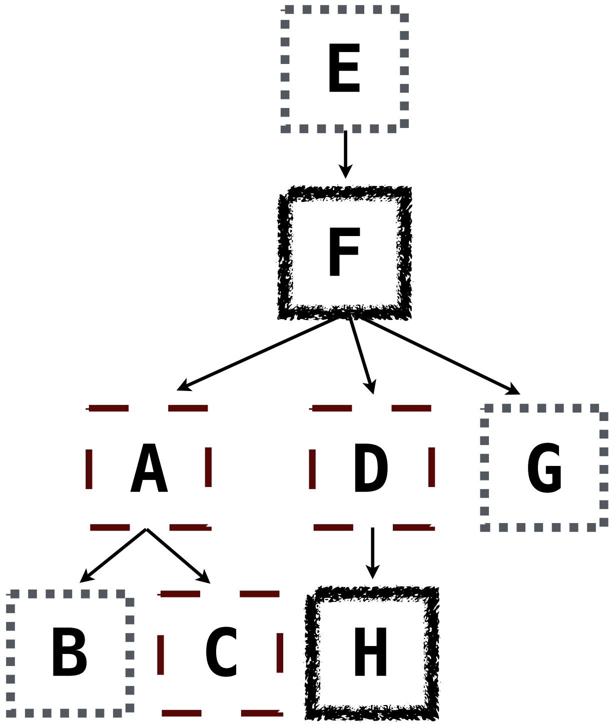
Example: Dog Triples

Fall 2014 Quiz Question (Slightly Modified)

Write a SQL query that selects all possible combinations of three different dogs with the same fur and lists each triple in *inverse* alphabetical order

```
CREATE TABLE dogs AS
  SELECT "abraham" AS name, "long" AS fur UNION
  SELECT "barack"          , "short"       UNION
  ...;

CREATE TABLE parents AS
  SELECT "abraham" AS parent, "barack" AS child UNION
  SELECT "abraham"           , "clinton"        UNION
  ...;
```



Expected output:

```
delano|clinton|abraham
grover|eisenhower|barack
```

(Demo)

Numerical Expressions

Numerical Expressions

Expressions can contain function calls and arithmetic operators

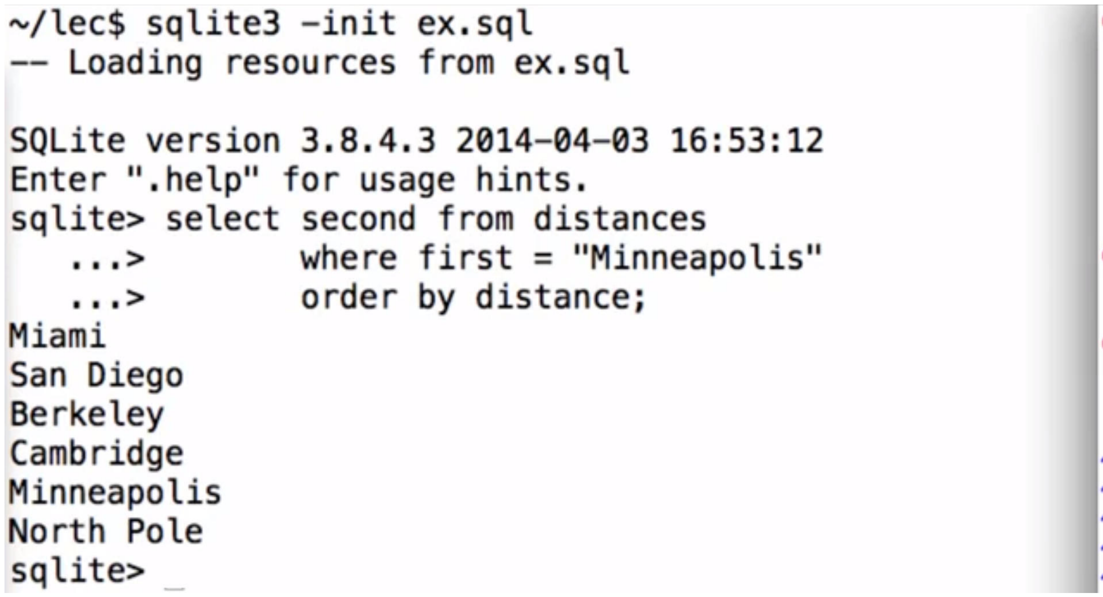
```
[expression] AS [name], [expression] AS [name], ...
```

```
SELECT [columns] FROM [table] WHERE [expression] ORDER BY [expression];
```

Combine values: +, -, *, /, %, and, or

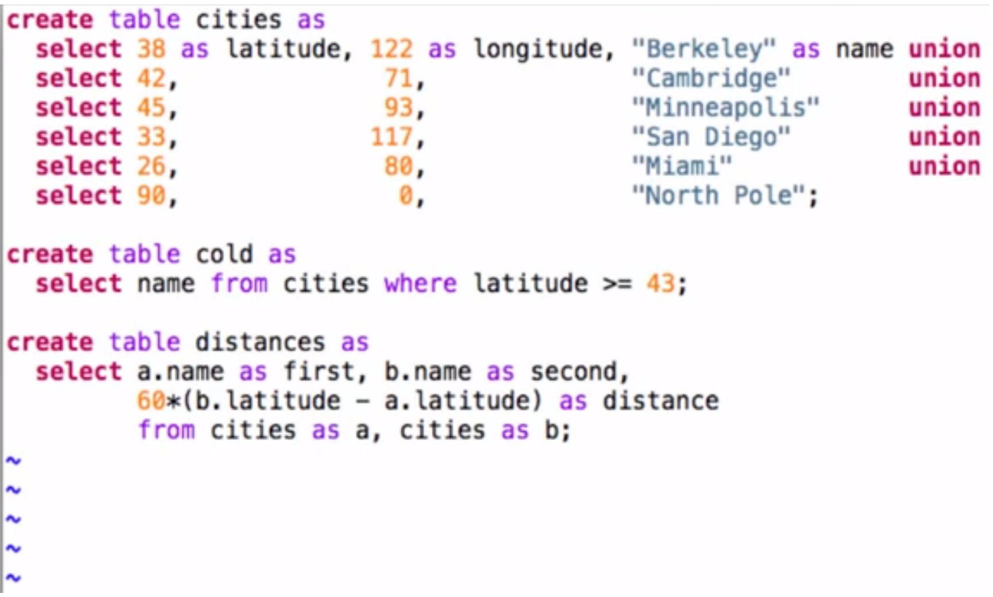
Transform values: abs, round, not, -

Compare values: <, <=, >, >=, <>, !=, =



```
~/lec$ sqlite3 -init ex.sql
-- Loading resources from ex.sql

SQLite version 3.8.4.3 2014-04-03 16:53:12
Enter ".help" for usage hints.
sqlite> select second from distances
   ...>         where first = "Minneapolis"
   ...>         order by distance;
Miami
San Diego
Berkeley
Cambridge
Minneapolis
North Pole
sqlite> _
```



```
create table cities as
  select 38 as latitude, 122 as longitude, "Berkeley" as name union
  select 42,              71,              "Cambridge"        union
  select 45,              93,              "Minneapolis"      union
  select 33,             117,              "San Diego"        union
  select 26,              80,              "Miami"            union
  select 90,               0,              "North Pole";

create table cold as
  select name from cities where latitude >= 43;

create table distances as
  select a.name as first, b.name as second,
         60*(b.latitude - a.latitude) as distance
         from cities as a, cities as b;
~
~
~
~
~
```

String Expressions

String Expressions

String values can be combined to form longer strings

```
sqlite> SELECT "hello," || " world";
hello, world
```

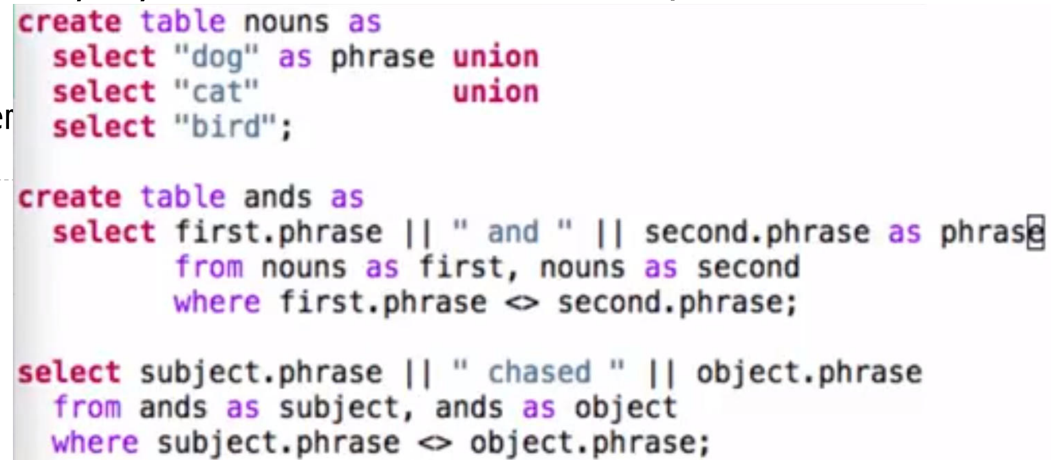
Basic string manipulation is built into SQL, but differs from Python

```
sqlite> CREATE TABLE phrase AS SELECT "hello, world" AS s;
sqlite> SELECT substr(s, 4, 2) || substr(s, instr(s, " ")+1, 1) FROM phrase;
low
```

Strings can be used to represent structured values, but doing so is rarely a good idea

```
sqlite> CREATE TABLE lists AS SELECT "one" AS car, "two,three,four" AS cdr;
sqlite> SELECT substr(cdr, 1, instr(cdr, ",")-1) AS cadr FROM lists;
two
```

(Der



```
create table nouns as
  select "dog" as phrase union
  select "cat"           union
  select "bird";

create table ands as
  select first.phrase || " and " || second.phrase as phrase
         from nouns as first, nouns as second
         where first.phrase <> second.phrase;

select subject.phrase || " chased " || object.phrase
  from ands as subject, ands as object
  where subject.phrase <> object.phrase;
```