

Declarative Programming

Announcements

Declarative Languages

Database Management Systems

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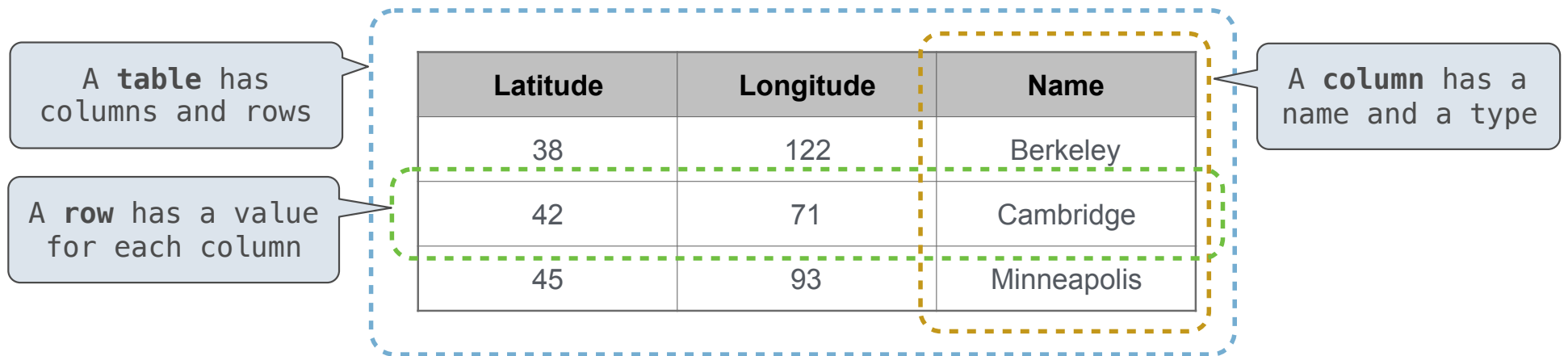
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A **column** has a name and a type

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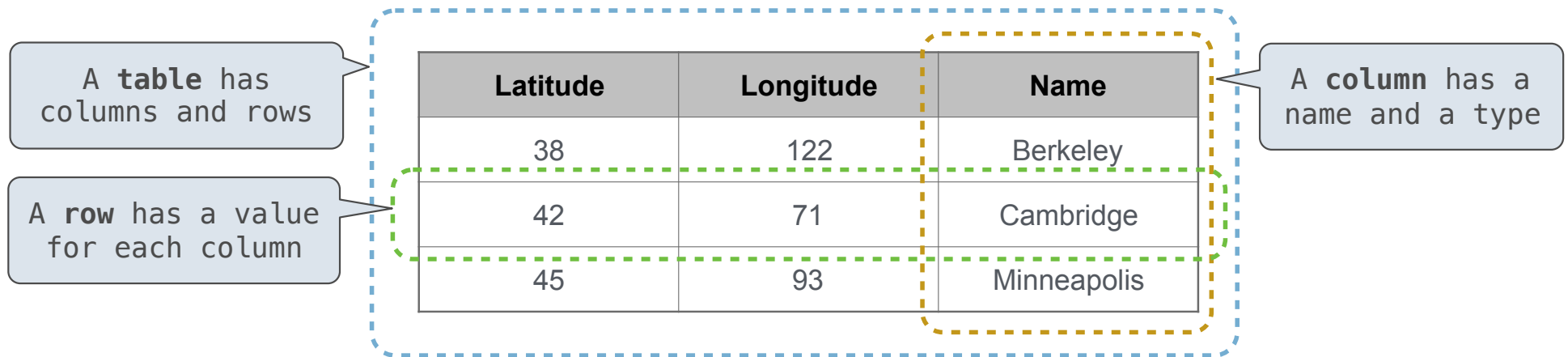
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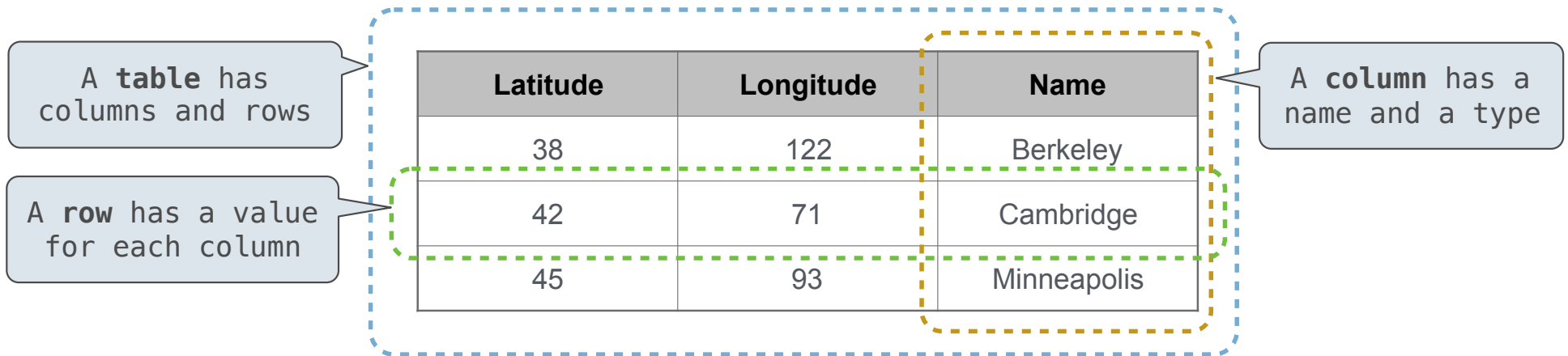


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SQL is a *declarative* programming language

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Cities:

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create table cities as
```

```
  select 38 as latitude, 122 as longitude, "Berkeley" as name union
```

Cities:

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region	name
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other	Minneapolis
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Structured Query Language (SQL)

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Today's theme:

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- Most of the important action is in the **select** statement

Today's theme:



Getting Started with SQL

Install sqlite (version 3.8.3 or later): <http://sqlite.org/download.html>

Use sqlite online: <http://kripken.github.io/sql.js/GUI/>

Selecting Value Literals

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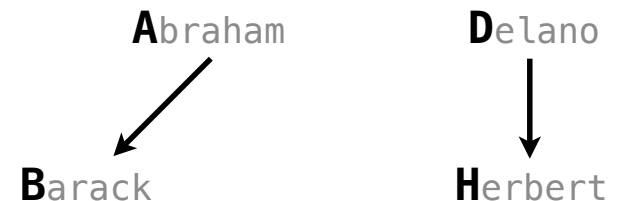
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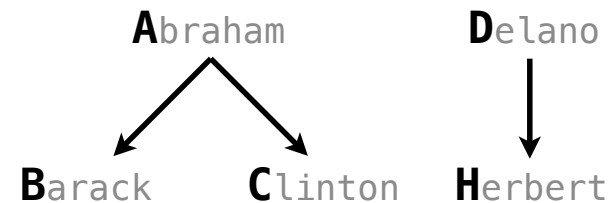
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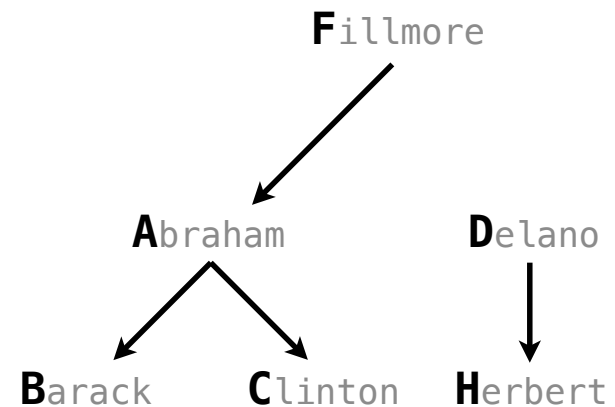
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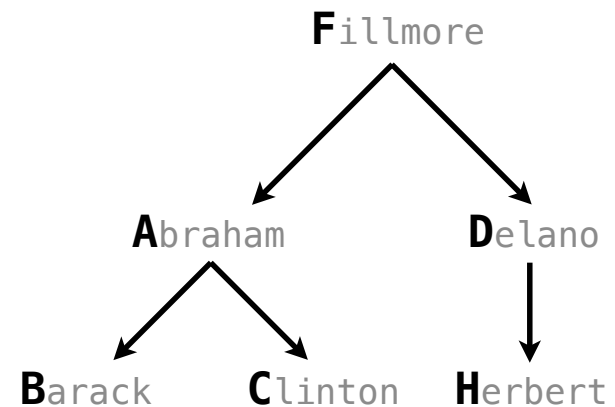
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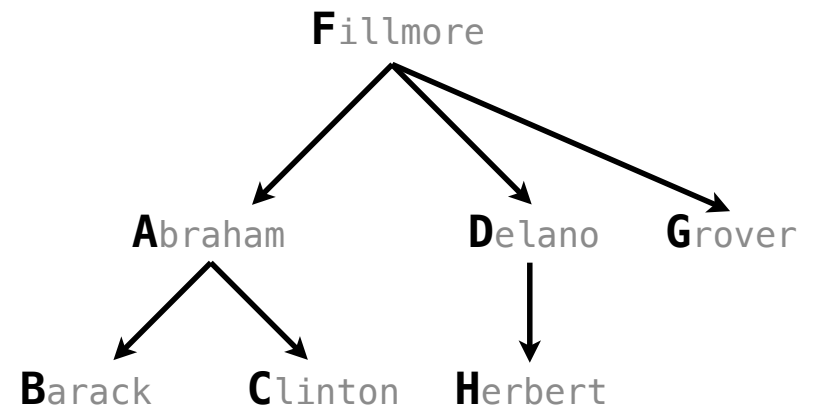
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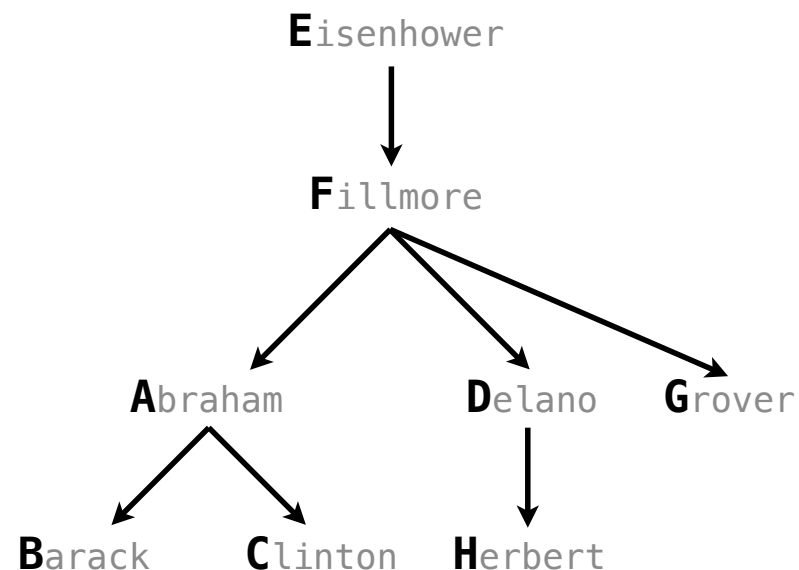
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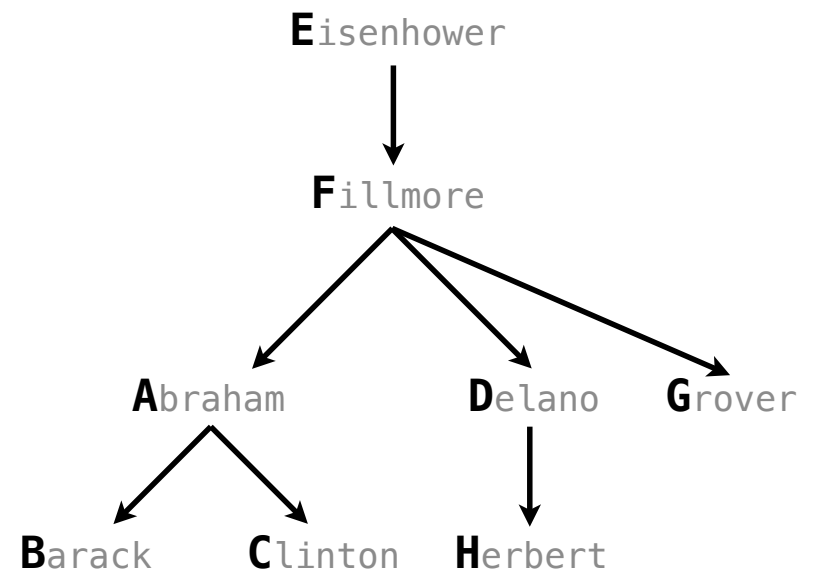
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Naming Tables

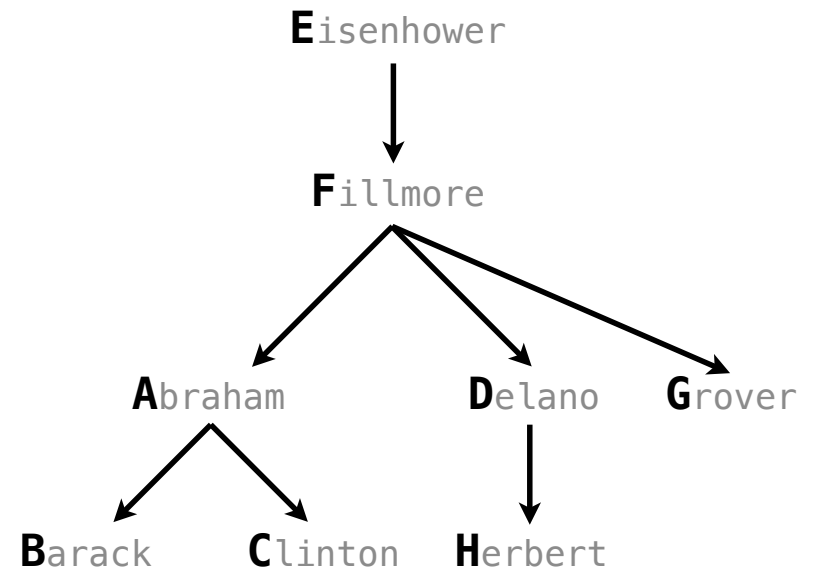
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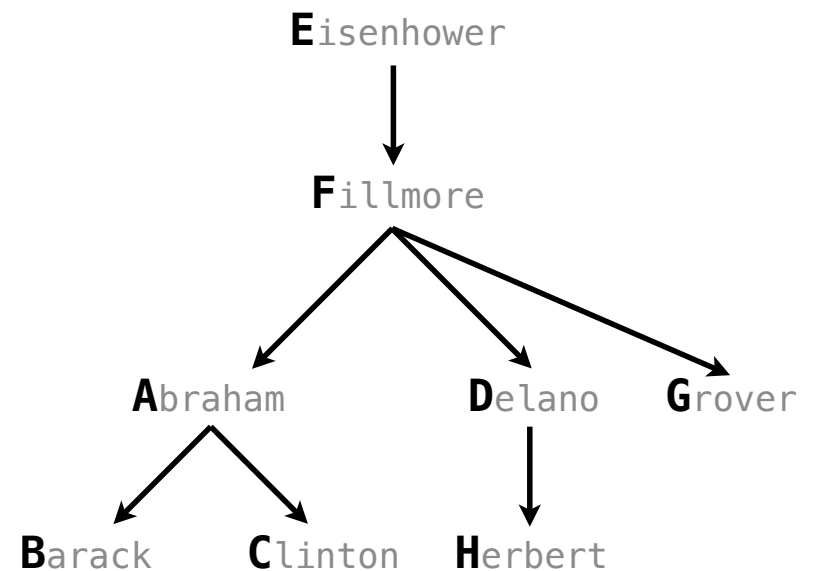


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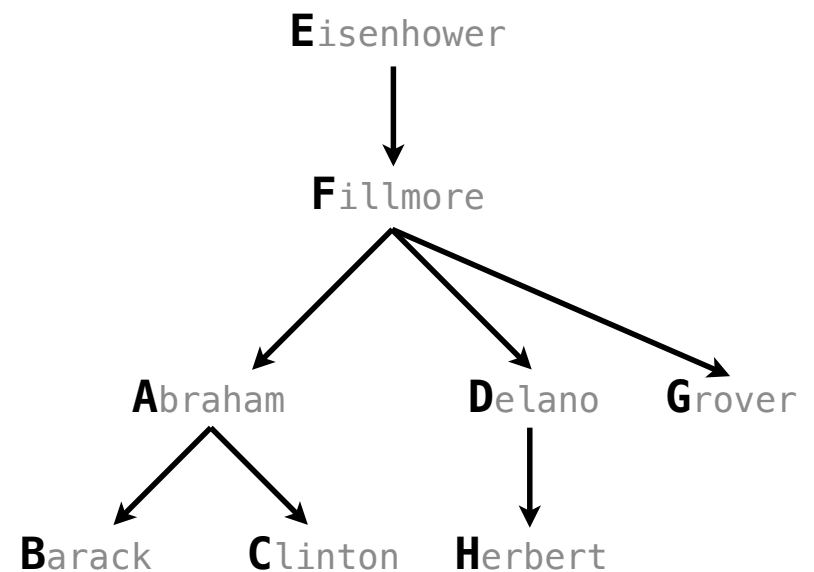
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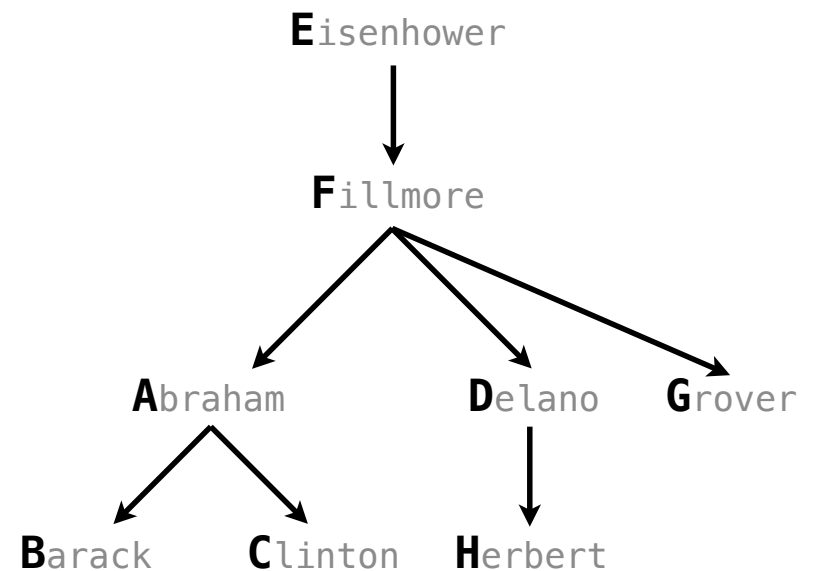
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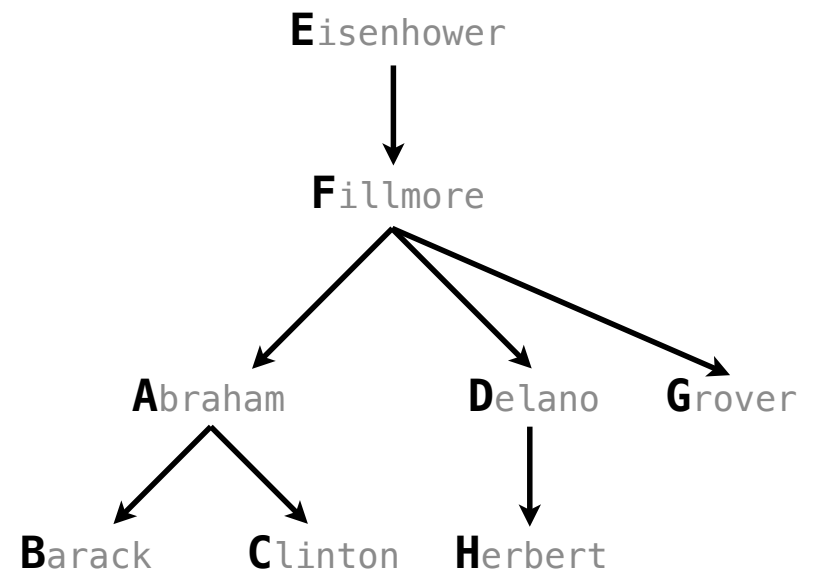
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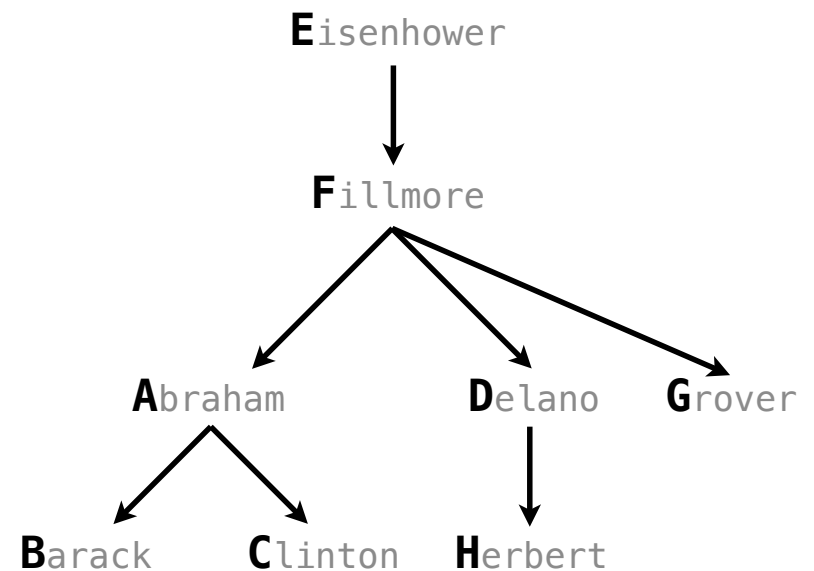
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Parents:

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

Projecting Tables

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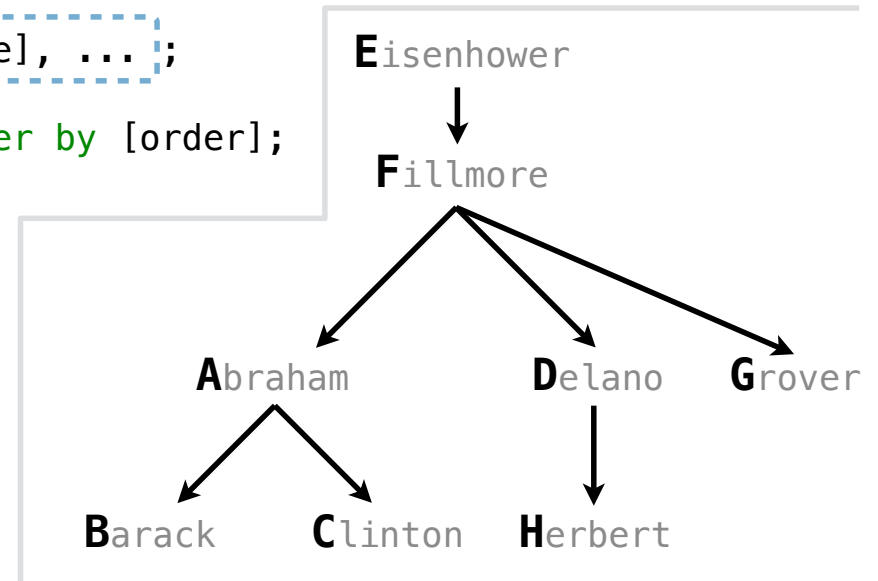
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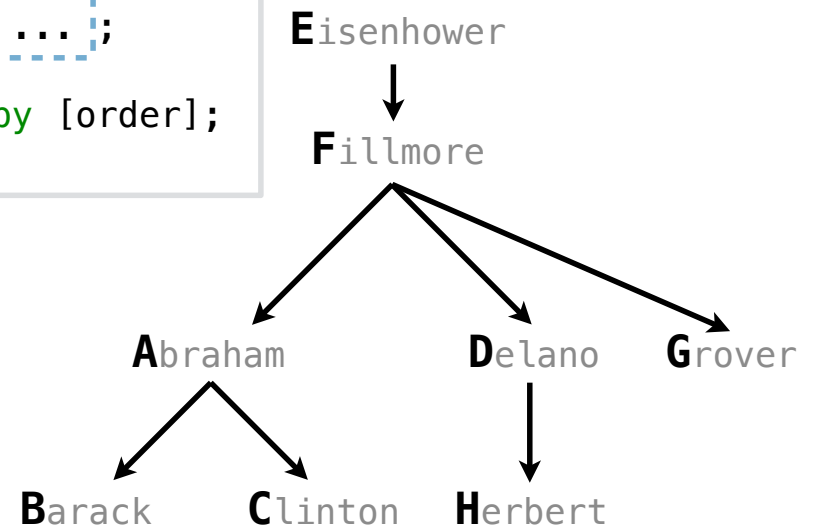
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select child from parents where parent = "abraham";
```



Select Statements Project Existing Tables

A **select** statement can specify an input table using a **from** clause

A subset of the rows of the input table can be selected using a **where** clause

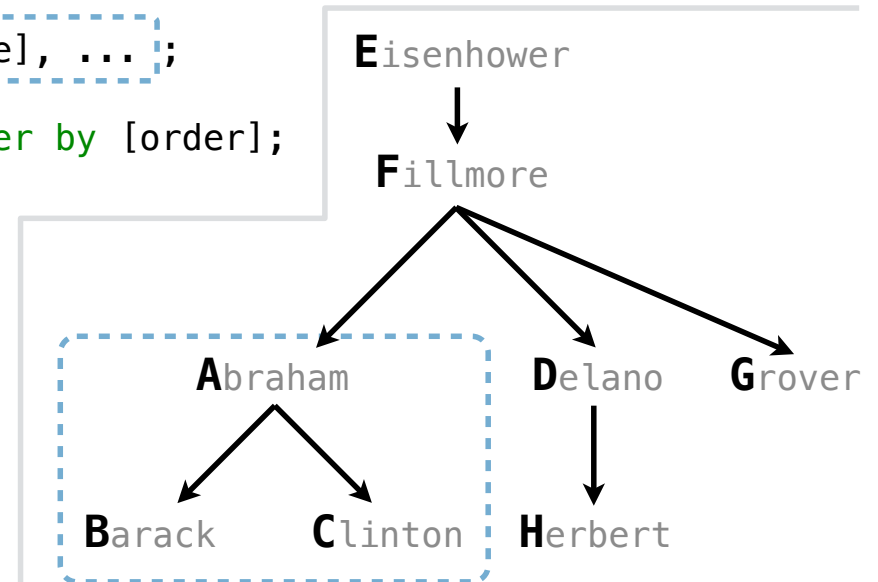
An ordering over the remaining rows can be declared using an **order by** clause

Column descriptions determine how each input row is projected to a result row

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

```
select [columns] from [table] where [condition] order by [order];
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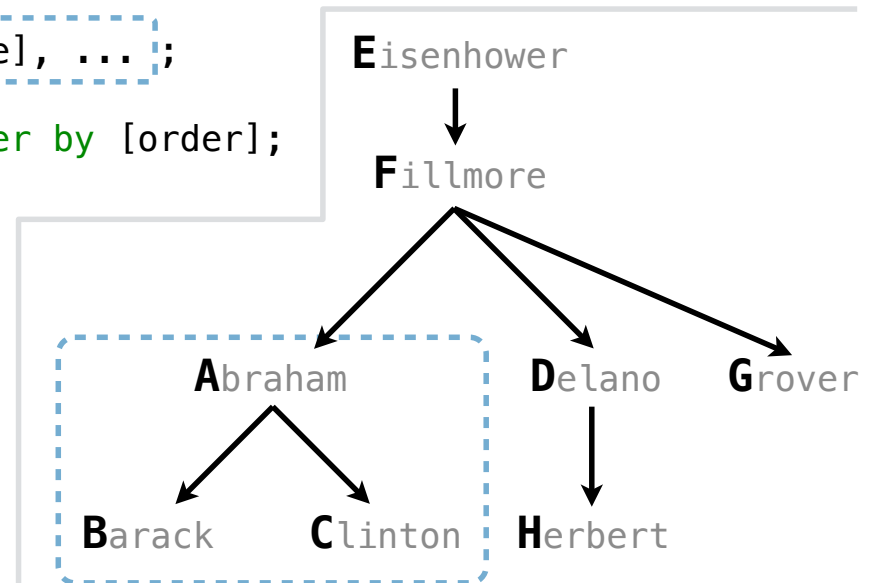
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Child
barack
clinton



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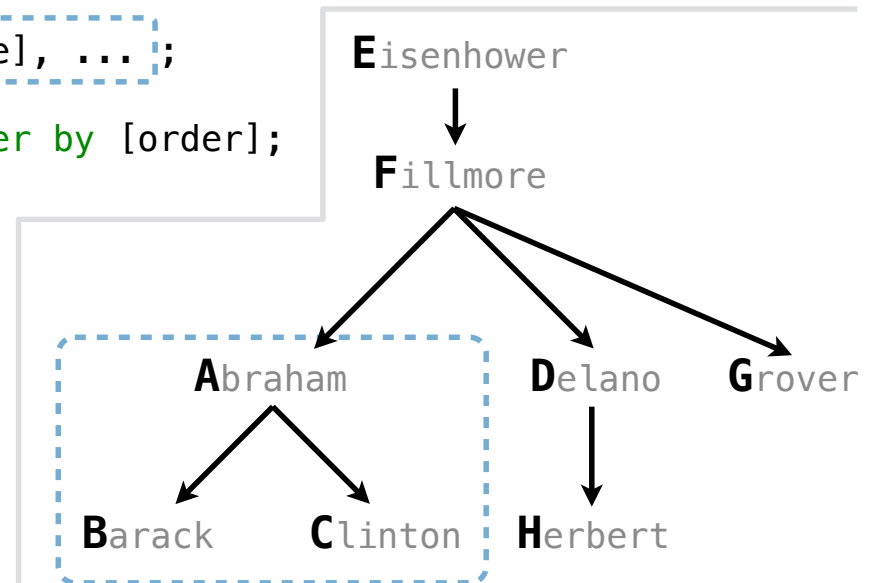
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select parent from parents where parent > child;
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clinton



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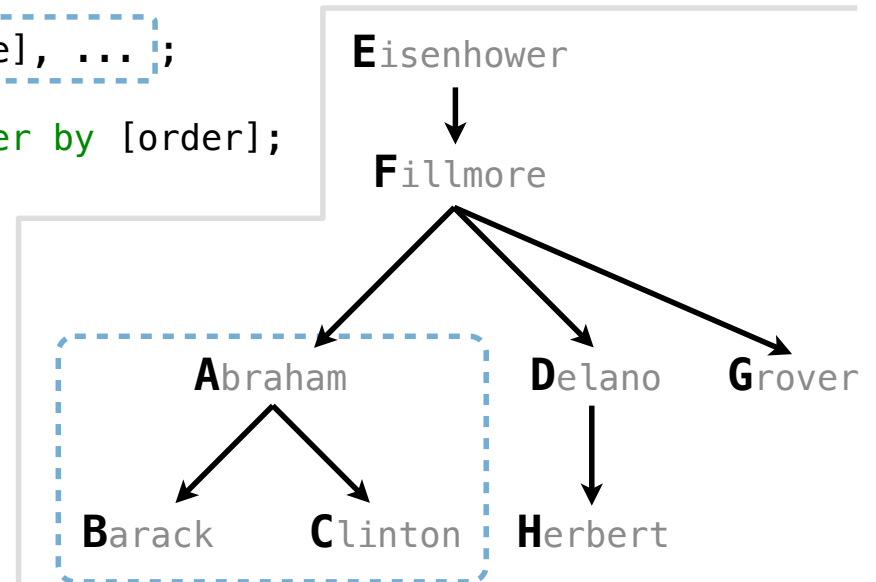
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Child
barack
clinton

Parent
fillmore
fillmore



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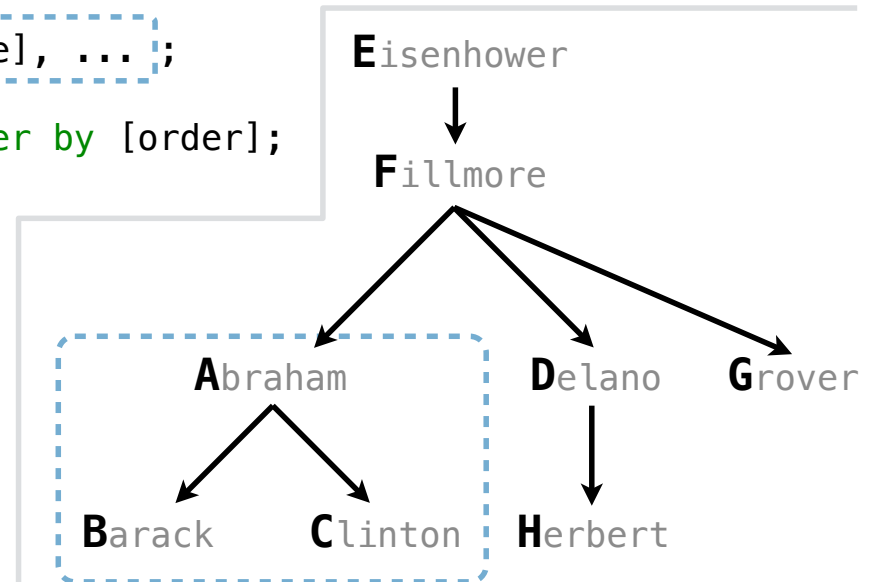
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Child
barack
clinton

Parent
fillmore
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(Demo)



Arithmetic

Arithmetic in Select Expressions

Arithmetic in Select Expressions

In a select expression, column names evaluate to row values

Arithmetic expressions can combine row values and constants

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```
create table lift as
  select 101 as chair, 2 as single, 2 as couple union
  select 102          , 0          , 3          union
  select 103          , 4          , 1;
```

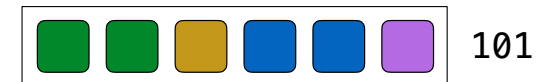


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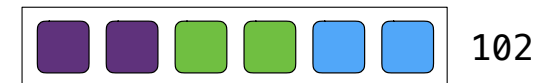
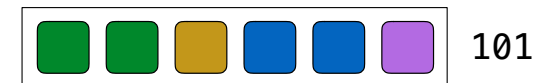


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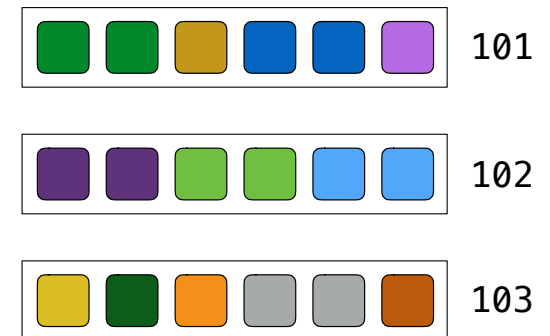


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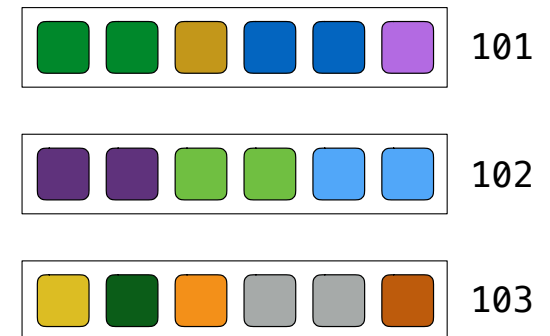
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```

```
select chair, single + 2 * couple as total from lift;
```



Arithmetic in Select Expressions

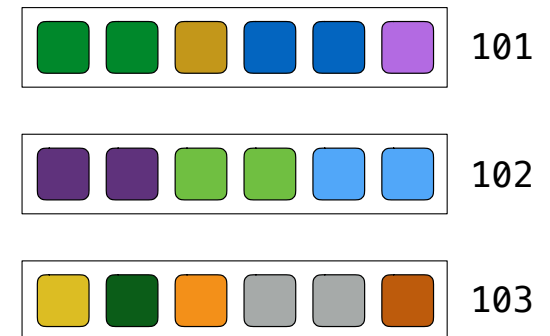
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```

```
select chair, single + 2 * couple as total from lift;
```

chair	total
101	6
102	6
103	6



Discussion Question

Given the table **ints** that describes how to sum powers of 2 to form various integers

```
create table ints as
  select "zero" as word, 0 as one, 0 as two, 0 as four, 0 as eight union
  select "one"      , 1      , 0      , 0      , 0      union
  select "two"      , 0      , 2      , 0      , 0      union
  select "three"    , 1      , 2      , 0      , 0      union
  select "four"     , 0      , 0      , 4      , 0      union
  select "five"     , 1      , 0      , 4      , 0      union
  select "six"      , 0      , 2      , 4      , 0      union
  select "seven"    , 1      , 2      , 4      , 0      union
  select "eight"    , 0      , 0      , 0      , 8      union
  select "nine"     , 1      , 0      , 0      , 8;
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(A) Write a select statement for a two-column table of the **word** and **value** for each integer

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```

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word	value
zero	0
one	1
two	2
three	3
...	...

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...

...

(B) Write a select statement for the **word** names of the powers of two

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word
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(Demo)

(B) Write a select statement for the **word** names of the powers of two

word
one
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