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

\[
\begin{align*}
\text{select} & \quad [\text{columns}] \\
\text{from} & \quad [\text{table}] \\
\text{where} & \quad [\text{expression}] \\
\text{order by} & \quad [\text{expression}];
\end{align*}
\]

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 , 18 union
select "ferret" , 4 , 18 union
select "penguin" , 2 , 10 union
select "t-rex" , 2 , 12000;
```

```
select max(legs) from animals;
```

```
animals:
<table>
<thead>
<tr>
<th>kind</th>
<th>legs</th>
<th>weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>dog</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>cat</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>ferret</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>penguin</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>t-rex</td>
<td>2</td>
<td>12000</td>
</tr>
</tbody>
</table>
```

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

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

```
create table animals as
select "dog" as kind, 4 as legs, 20 as weight union
select "cat" , 4 , 18 union
select "ferret" , 4 , 18 union
select "penguin" , 2 , 10 union
select "t-rex" , 2 , 12000;
```

```
select max(legs) from animals;
```

```
animals:
<table>
<thead>
<tr>
<th>kind</th>
<th>legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>dog</td>
<td>4</td>
</tr>
<tr>
<td>cat</td>
<td>4</td>
</tr>
<tr>
<td>ferret</td>
<td>4</td>
</tr>
<tr>
<td>penguin</td>
<td>2</td>
</tr>
<tr>
<td>t-rex</td>
<td>2</td>
</tr>
</tbody>
</table>
```

Discussion Question

What are all the kinds of animals that have the maximal number of legs?
Selecting Groups

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

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

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

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

Example: Big Game

<table>
<thead>
<tr>
<th>Kind</th>
<th>Legs</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>dog</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>cat</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ferret</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>penguin</td>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>t-rex</td>
<td>2</td>
<td>12000</td>
</tr>
</tbody>
</table>

Discussion Question

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