One of the powerful aspects of a GIS is that you can join statistical data tables (ie: .dbf file showing income by census tract) to spatial data (ie: census tract .shp ). Once the tables are joined you can create a thematic map that shows the distribution of income levels by census tract across your area of interest. In order to do this it is helpful to have a basic understanding of table relationships in database management.

Good database design suggests that you organize your data into multiple tables – each focused on a specific topic – rather than one large table containing all your data. By joining or relating two tables, the tables are ‘connected so that you can use one table to reference another. Two tables can be connected if there is a field in each table, which contains common values in each and has unique values in each row of the new additional table.

There are three basic relationships, which the data in your tables can have to each other.

One-to-one: Each record in your attribute table relates to only one record in your additional table. For example, house ownership – commonly each owner has only one house and each house has only one owner. Tables where the data has a one-to-one relationship are associated using a ‘table join’. Once tables are joined, you can query, symbolize and analyze your data based on the joined values. When joining two tables the names of the common fields need not be the same, but the fields need to be of the same data type. Joined tables are not permanently connected – the table join is ‘virtual’ and you can remove it whenever you wish. The two tables still exist as separate entities.

One-to-many or many-to-one: Each record in your attribute table relates to more than one record in your additional table or many records on your attribute table relate to one record in your additional table. For example it is possible that each owner may own more than one house or a house may have more than one owner. Tables with a one-to-many relationship can be associated using a ‘table relate’.

Relating tables define a relationship between two tables based on a common field but does not append one table to the other. You relate tables instead of joining them when there is a one-to-many or a many-to-many relationship. The tables remain separate and you must open both in order to view related data. You access data in the related table by selecting records in one table and accessing the related records in the other table.

**Editing tables:**

**Adding a new field to a table:**

1. **Open** ArcMap: Start > Programs > ArcGIS > ArcMAP. Open an existing or new map.
2. Click the Add data button to add the table or layer (attribute table) you wish to edit.
3. Open the table: **Right click** on the table or layer > Open or Open attribute table
4. Click on the **Table Options** button in the top left of the window > Add field
5. In the **Add Field** dialog box input the following information
   a. **Name**
WORKING WITH TABLES

b. Type of data format
c. Field properties dependent upon type of data format.

6. Click OK

Editing the contents of a table by keying in data:

1. Open ArcMap: Start > Programs > ArcGIS > ArcMAP. Open an existing or new map.
2. Add the Editor Tool bar to ArcMap click on Customize > Toolbars and click onto Editor. Note: there will be a check mark to the left of Editor if it is activated.
3. Click the Add data button to add the table or layer (attribute table) you wish to edit.
4. Open the table: Right click on the table or layer > Open or Open attribute table
5. Click on the Editor dropdown box and click on Start Editing. Select the folder that has the table or layer whose attribute table you wish to edit. Click OK
6. Click into the field you wish to edit and input your data.
7. When you are finished click on the Editor dropdown box and click on Stop Editing. Click yes, when prompted to save your edits.

Adding a field, using field calculator and joining tables (Census Tract Example)

In the example below, we wish to join two tables using a census tract unique identifier code. The problem here is that the codes are not in the exact same format. To join these tables we need to add a field to our statistical table ___ .dbf and use the field calculator to convert the contents of its geography field so that it looks like the CTUID field in the attribute table of the Census Tract shapefile ___ ct. See figure below:

<table>
<thead>
<tr>
<th>Table name</th>
<th>Field in table that holds the census tract information</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ .dbf</td>
<td>Geography field looks like this: 0001.01 (550000101) 00000</td>
</tr>
<tr>
<td>___ ct</td>
<td>CTUID field looks like this: 5500001.01</td>
</tr>
</tbody>
</table>

Adding a field:

Open the ____ .dbf table. Click the Table Options button in the top left of the window and click Add Field.

In the Add Field dialog box enter the following:

- Name: CTUID
- Type: text
- Length: 12
- Click OK.
Using Field Calculator:

1. Calculate the values for this new field using field calculator: **Right click** on the field title, **CTUID** and then click on ‘Field Calculator’. If a dialog box appears warning you that you are about to calculate outside an edit session **Click Yes**. In the calculator enter the equation below replacing **your cma number** with the appropriate cma number:

   \[ your\ cma\ number \&\ Left\ (\ [GEOGRAPHY],7 \) \]

2. Click OK

Joining tables

1. **Right click** on the ___ ct layer and choose **Joins and Relate > Join**.
   In the Join Data dialog box select:

<table>
<thead>
<tr>
<th>What do you want to join to this Layer?:</th>
<th>Join attributes from a table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose the field in this layer that the join will be based on:</td>
<td>‘CTUID’</td>
</tr>
<tr>
<td>Choose the table to join to this layer:</td>
<td>___ .dbf</td>
</tr>
<tr>
<td>Choose the field in the table to base the join on:</td>
<td>‘CTUID’</td>
</tr>
</tbody>
</table>

2. **Click** OK and then No for the index creation.

3. **Open** the ___ ct attribute table and examine the fields. (Notice the names of the newly appended fields – you can tell from which table a field originated.)