

Exercise 1 - Lab 3b: Explore tables and attributes

Lab 3b Explore tables and attributes – exercise 1

Find total sales based on customer data from a small chain of Austin, Texas area stores.

In this exercise, you will:

- ✓ Display spatial locations from tabular data.
- ✓ Change the appearance and structure of tables.
- ✓ Summarize data.

Austin, Texas area stores
with attributes



Shopping Center	Street	City
Westgate Shopping Ctr	4477 S Lamar Blvd	Austin
La Frontera Village	120 Sundance Parkway	Round Rock
Wolf Ranch	I-35 and SR 29	Georgetown
Barton Creek Square Mall	10515 N Mo Pac Expy	Austin

Step 1: tabular

Many tables contain geographic information that allows you to display locations directly on your map. Street addresses or geographic coordinates (e.g., longitude and latitude), are the most common type of attributes that allow you to display point locations on your map.

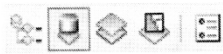
In this step, you will display store locations from a table.

- a. Start ArcMap.
- b. In the ArcMap - Getting Started dialog box, click Cancel to begin with a new blank map.
- c. In the Catalog window, browse to your .. \GEOG270 - Advanced Topics in GIS\Lab 3\Lab 3 Exercise Data\3b_Tables.
- d. Expand the Stores geodatabase.

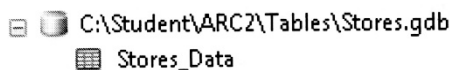


- e. Right-click the Stores geodatabase and choose Make Default Geodatabase.
- f. Click the Stores_Data table and drag the table onto your map.

Notice that your table of contents changes to the List By Source view, as indicated by the selected button at the top of the window.



This view allows you to see tables used in your map, as well as the paths to data sources for the layers.



- g. Open the table.

Hint: Right-click the table and choose Open.

- h. Examine the attributes.

1. Do you see attributes that could be used to display a location for each store?

The table has several attributes, including the store address, number of parking spaces, and number of employees. You will use the Lon (longitude) and Lat (latitude) attributes to display the location of each store.

i. Close the Table window.

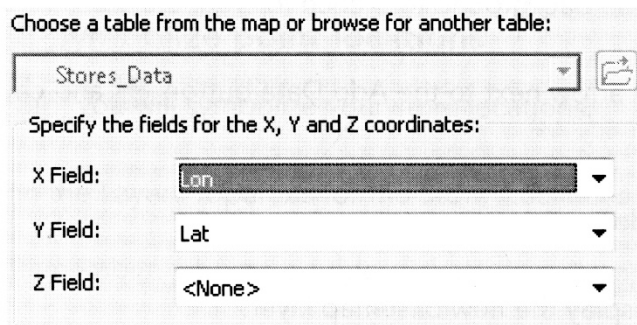
Step 2: Display points on geographic coordinates

In this step, you will display locations for the stores based on the geographic coordinates provided in the Stores_Data table.

a. In the table of contents, right-click the Stores_Data table and choose Display XY Data.

In the dialog box that opens, you can specify which attributes ArcMap should use to display the data.

b. Confirm that the top portion of your dialog box matches the following graphic.



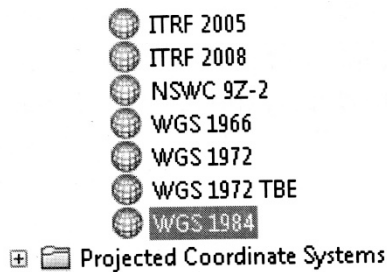
ArcMap tries to determine attribute fields that may contain X and Y coordinate values. If the chosen fields are not correct, you can choose the correct attributes from the drop-down lists.

Next, you will specify the output coordinate system for your points. The Lon and Lat values in your table are WGS 1984 geographic coordinates.

c. Near the bottom of the dialog box, click Edit.

In the Spatial Reference Properties:

- Expand Geographic Coordinate Systems.
- Scroll down and expand World.
- Scroll to the bottom of the list and click WGS 1984.



Hint: To reduce the list of choices in the coordinate system folders, type WGS 1984 in the search box and click the Search button.

e. Click OK in both open dialog boxes to display your store locations.

Your map displays four points that correspond to the Lon and Lat attributes.

A new layer named Stores_Data Events has been added to your table of contents. Event layers display geographic locations that are stored in a tabular format (rather than spatial).

Next, you will add a basemap layer to provide background reference for your stores.

f. On the Standard toolbar, click the down arrow next to the Add Data button and choose Add Basemap.

g. Select the Streets basemap and click Add.

It will take a few moments for the map to display the new basemap layer.

Step 3: Export point locations to a create a new feature class

The store locations on your map are a visual representation of the Stores_Data table. In this step, you will create a geodatabase feature class of these store locations.

a. Right-click the Stores_Data Events layer, point to Data, and choose Export Data.

b. In the Export Data dialog box, click the Browse button.

c. In the Saving Data dialog box:

- Click the Go To Default Geodatabase button.
- For Name, type **Store__Locations**.
- Click Save.

d. Click OK to export your data.

When prompted to add your exported data as a layer, click Yes.

Now that you have a feature class of store locations, you can remove the event layer.

Right-click Stores_Data Events and choose Remove.

Open the attribute table for the Store_Locations layer.

2. Do the attributes look the same as the original Stores_Data table?

h. Close the attribute table.

Step 4: Symbolize point locations

In this step, you will symbolize your store locations.

a. Open the Layer Properties for the Store_Locations layer.

Remember, you can double-click the layer to open the Layer Properties.

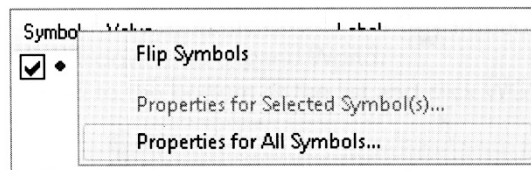
b. Click the Symbology tab.

You will symbolize each store based on its STOREID attribute.

c. On the left, click Categories and confirm that the Unique values renderer is selected.

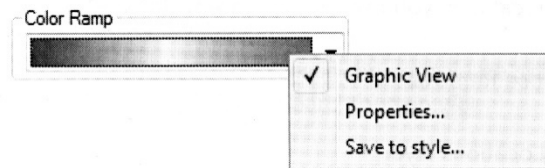
d. For Value Field, choose Store_ID from the list.

e. Click the Symbol column heading and choose Properties for All Symbols (as shown).



f. In the Symbol Selector, click the Circle 1 symbol and click OK.

g. Right-click the Color Ramp.



h. Click Graphic View to remove the check mark.

The color ramps are now listed by name.

i. Choose the Enamel color ramp from the list.

j. Click Add All Values.

ArcMap chooses random colors from the color ramp.

k. In the Symbol column, uncheck the box next to the symbol for <all other values>.

Symbol	Value	Label
<input type="checkbox"/> ●	<all other values>	<all other values>
	<Heading>	Store_ID
●	1	1
●	2	2
●	3	3
●	4	4

You will display a unique symbol for each STORE_ID value, so you don't need a symbol to represent "all other values."

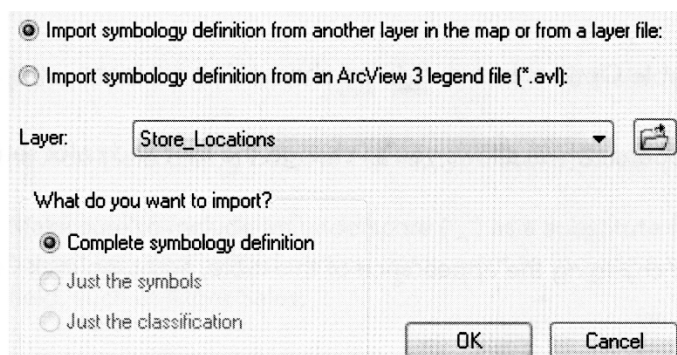
l. Click OK to apply the new symbols to your layer.

- m. Save your map as Stores.mxd in your ..\GEOG270 - Advanced Topics in GIS\Lab 3\Lab 3 Exercise Data\3b_Tables folder.

Step 5: Import to match corresponding features

In this step, you will display customers who have made purchases from one or more of these stores. You will also import the symbology from your Store_Locations layer so that the customer points for each store match the color of the store symbol.

- a. Open the Catalog window.
- b. From your Stores geodatabase, add the Customers feature class to your map.
- c. Open the Layer Properties for the Customers layer.
- d. On the Symbology tab, click the Categories renderer.
- e. For Value Field, choose STOREID.
- f. Click Import.
- g. In the Import Symbology dialog box, confirm that the Layer is set to Store_Locations.



- h. Click OK.

Next, you will specify which field in the Customers layer matches the values used for symbolizing the Store_Locations layer.

- i. In the Import Symbology Matching Dialog, choose STOREID from the list, and click OK.

Now that your customer symbols match the color of the store symbols, you will change the size of the customer symbols.

j. Click the Symbol column heading and choose Properties for All Symbols.

k. In the Symbol Selector, change Size to 5 and click OK.

Symbol	Value	Label
<input type="checkbox"/> •	<all other values>	<all other values>
	<Heading>	Store_ID
•	1	1
•	2	2
•	3	3
•	4	4

l. Click OK to apply your changes.

Now your map shows customers based on the store from which they purchased items.

Step 6: Change the appearance of the attribute table

In this step, you will make changes to the appearance of your Store_Locations attribute table.

a. Open the Store_Locations attribute table.

b. In the Table window, click the Table Options button and choose Appearance.

The Table Appearance dialog box opens, which allows you to change the font and color settings for your table.

c. Explore the different options for changing the appearance of this table, and then click OK to see any changes you've made.

Next, you will make changes to an attribute field.

d. Right-click the Ctr_Name field heading and choose Properties.

e. For Alias, type Shopping Center and click OK.

Notice that the field name changed to display the alias instead.

You can also turn off fields.

f. Right-click the OBJECTID field heading and choose Turn Field Off.

Some fields (such as OBJECTID) are used by ArcGIS for system and database functions. You can turn these fields off if you do not want to see them.

g. Turn off the Shape field.

To turn a field on again, open the Layer Properties, click the Fields tab, and check the box next to the field name.

You no longer need the information in the Lon and Lat fields, so you will delete these fields and the information they contain.

h. Right-click the Lon field heading and choose Delete Field.

i. Click Yes to confirm the deletion.

j. Delete the Lat field.

Next, you will add a field to hold the total sales attribute of each store.

k. Click the Table Options button and choose Add Field.

l. In the Add Field dialog box, for Name, type **Store_Sales**.

Make sure to include an underscore (_) as a substitute for a space character. Spaces cannot be used in field names. If you want to include a space, create an Alias value for the field, such as Store Sales.

m. For Type, choose Double and then click OK.

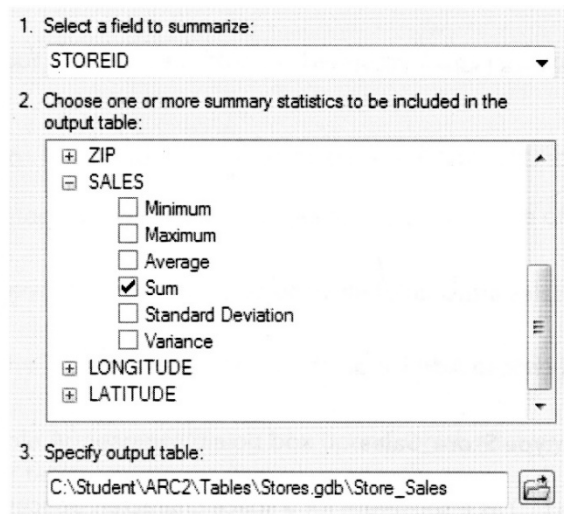
Your new field is added to the table, but there are no attribute values. Later you will populate this empty column with the total sales of each store.

n. A Close the Table window.

Step 7: Summarize a table

In this step, you will create a summary table to calculate the total sales and customers for each store.

- a. Open the Customers attribute table.
- b. Right-click the STOREID field heading and choose Summarize.
- c. In the Summarize dialog box:
 - For item 1, choose STOREID.
 - For item 2, expand SALES and check the box next to Sum.
 - For item 3, browse to ..\GEOG270 - Advanced Topics in GIS\Lab 3\Lab 3 Exercise Data\3b_Tables\Stores.gdb and name the table **Store_Sales**.



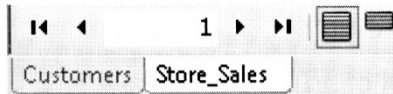
- d. Click OK to create your summary table.
- e. Click Yes to add the result table to your map.
- f. Keep the Table window open.
- g. Open the Store_Sales table.

	OBJECTID *	STOREID	Count_STOREID	Sum_SALES
▶	1	1	4020	684270.8631
	2	2	3413	522882.5635
	3	3	3115	474500.4352
	4	4	1516	193137.3807

The new Store_Sales table is a summary of your customers attribute table. The total sales were added together for each STOREID, as were the total number of customers.

- The total sales for each store is displayed in the Sum_SALES field.
- The number of customers for each store is displayed in the Count_STOREID field.

Notice that your table window has two tabs at the bottom: Customers and Store_Sales.



h. Click the Customers tab to view the Customers table.

If you need to view both tables at the same time within the Table window, you can display them side by side using a drag-and-drop operation.

i. Click the Customers tab, and drag it into the Table window and on top of one of the blue docking icon arrows that appear.



You can choose the top, bottom, left, or right docking arrows to position the Customers table relative to the Store_Sales table. Using the docking arrows allows you to view multiple tables at the same time in the Table window. (To stack the tables again, choose the center position.)

j. Click the X in the upper-right corner of the Customers table to close only that table.

If you accidentally close the entire Table window, re-open the Store_Sales table.

Step 8: Format a field

In this step, you will format the sales values in the Store_Sales table.

a. Open the properties for the Sum_SALES field.

Hint: Right-click the Sum_SALES field and choose Properties.

- b. Click the Numeric button
- c. Under Category, choose Currency.
- d. Click OK in all open dialog boxes to see the changes in your table.

Sum_SALES
\$684,270.86
\$522,882.56
\$474,500.44
\$193,137.38

The Sum_SALES values are now formatted as currency.

- e. Close the Table window.
- f. Save your map document.
- g. Minimize ArcMap.

You will use this map document in the next exercise in this lab

Table relationships

Most database designs encourage organizing your data into multiple tables, with each one focused on a specific topic. Data stored in this way is more efficient than one large table containing all the necessary fields. Having multiple tables prevents unnecessary duplication in your database. When you need information that is not in the current table, you can link the two tables together.

The following two tables list information about countries, cities, and capitals. Imagine that you were using the table that listed only the country and its capital, but you also wished to have the cities in that country available for you to access.

Two tables that share common information.

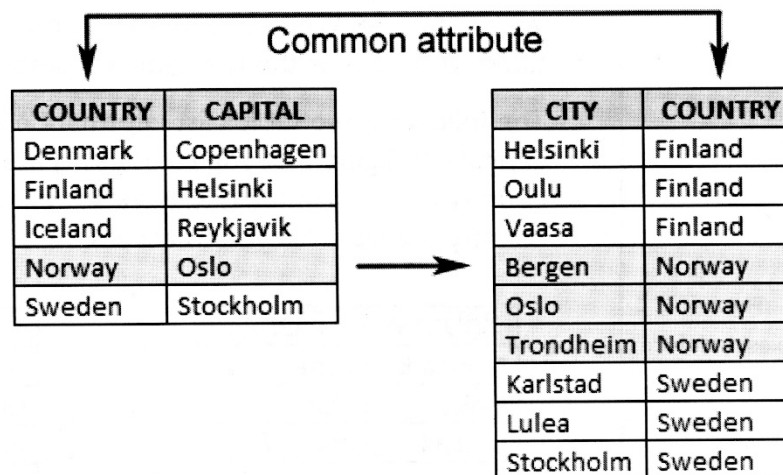
COUNTRY	CAPITAL
Denmark	Copenhagen
Finland	Helsinki
Iceland	Reykjavik
Norway	Oslo
Sweden	Stockholm

CITY	COUNTRY
Helsinki	Finland
Oulu	Finland
Vaasa	Finland
Bergen	Norway
Oslo	Norway
Trondheim	Norway
Karlstad	Sweden
Lulea	Sweden
Stockholm	Sweden

How can tables be linked together?

By creating table relationships, you can join attributes together based on common values in both tables, in the following example, you can link both tables together based on the COUNTRY attribute. This attribute field is known as a key field.

Table relationships
linked through
common attribute
values



Creating these relationships allows you to access a variety of information that you can link to your map features. After you have created these relationships, the related attributes are available to help you analyze your data and solve spatial problems.

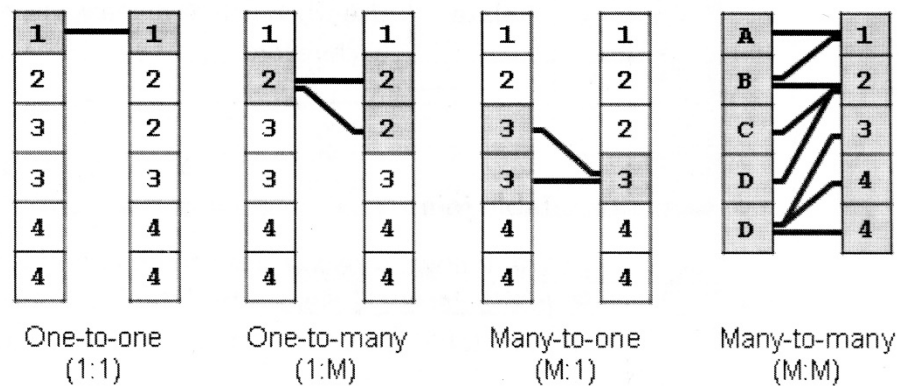
Types of table relationships

When working with tables, you will need to determine how the values match, in other words, for each value in your table, how many matching values occur in another table? This is referred to as cardinality.

What types of table relationships are available?

There are four types of relationships, or cardinality, as shown in this example.

The four types
of cardinality, along
with their common
notation.



Determining table cardinality is important because it will determine the method you will use to access your related information.

ArcGIS will not determine table cardinality for you. Exploring your attributes to discover how your tables relate to one another is the first step in creating table relationships. Creating a separate table by summarizing a key field is a useful technique for determining cardinality.

Working with table relationships

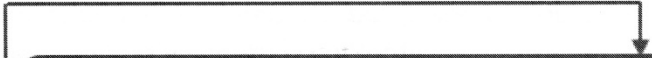
You can create table relationships in ArcGIS using one of two possible methods: **Join** or **Relate**.

Method	When to use	Cardinalities
Join	Use when you have one matching value for each record.	<ul style="list-style-type: none"> • 1:1 • M:1
Relate	Use when you have many values matching each record.	<ul style="list-style-type: none"> • 1:M • M:M

Table join

The following two tables can be joined together based on the values in the Parish_ID field in both tables. In this example, the key fields in each table have the same name; however, this is not a requirement.

When joining tables, you use a common attribute value to link attributes together.



PARISH	PARISH ID
ACADIA	1
ASCENSION	2
ASSUMPTION	3
CALCASIEU	4
CAMERON	5
EAST BATON ROUGE	6
IBERIA	7
IBERVILLE	8
JEFFERSON	9
JEFFERSON DAVIS	10

ID	STATUS	CONDITION	BREACHED	PARISH ID
03_tb_23291	ACTIVE	INADEQUATE	N	2
03_tb_23433	ACTIVE	INADEQUATE	N	2
04_mh_23513	ACTIVE	INADEQUATE	Y	3
04_tb_23527	ACTIVE	INADEQUATE	Y	3
04_tb_23571	ABANDONED/ INACTIVE	INADEQUATE	Y	3
10_f_19152	ACTIVE	ADEQUATE	N	4
10_w_19357	ACTIVE	INADEQUATE	N	4
12_p_13465	ACTIVE	ADEQUATE	Y	5
12_tb_18683	ABANDONED/ INACTIVE	INADEQUATE	N	5

ID	STATUS	CONDITION	BREACHED	PARISH ID	PARISH	PARISH ID
03_tb_23291	ACTIVE	INADEQUATE	N	2	ASCENSION	2
03_tb_23433	ACTIVE	INADEQUATE	N	2	ASCENSION	2
04_mh_23513	ACTIVE	INADEQUATE	Y	3	ASSUMPTION	3
04_tb_23527	ACTIVE	INADEQUATE	Y	3	ASSUMPTION	3
04_tb_23571	ABANDONED/ INACTIVE	INADEQUATE	Y	3	ASSUMPTION	3
10_f_19152	ACTIVE	ADEQUATE	N	4	CALCASIEU	4
10_w_19357	ACTIVE	INADEQUATE	N	4	CALCASIEU	4
12_p_13465	ACTIVE	ADEQUATE	Y	5	CAMERON	5
12_tb_18683	ABANDONED/ INACTIVE	INADEQUATE	N	5	CAMERON	5

Table relate

The following two tables can be related together based on the values in the ID and ID_NUMBER fields. After you have established the relate, the tables remain independent, unlike the join, where the tables are combined in the same table view. Because each record potentially has many matches, you must navigate the relationship to find and use related records. Several tools in ArcMap allow you to navigate this relationship and view related records.

When relating tables, a common attribute value is used to link attributes together, similar to a join. However, after the tables are related, they are not combined in the table view.

STATUS	CONDITION	BREACHED	ID
ACTIVE	ADEQUATE	N	03_o_23255
ACTIVE	INADEQUATE	Y	03_o_23308
ACTIVE	ADEQUATE	N	03_p_23252
ACTIVE	ADEQUATE	N	03_p_23253
ACTIVE	INADEQUATE	N	03_tb_23291
ACTIVE	INADEQUATE	N	03_tb_23433
ACTIVE	INADEQUATE	Y	04_mh_23513
ACTIVE	INADEQUATE	Y	04_tb_23527
ABANDONED/ INACTIVE	INADEQUATE	Y	04_tb_23571
ACTIVE	ADEQUATE	N	10_f_19152

METAL	CONCENTRATION	ID_NUMBER
Cr	1.78	03_o_23255
Zn	0.93	03_o_23255
Ba	0.3	03_o_23308
Zn	15.89	03_o_23308
Ba	507.9	03_p_23252
Zn	104.8	03_p_23252
Ba	224.5	03_p_23253
Zn	110.2	03_p_23253
Ba	2.4	03_tb_23291
Ba	545.5	03_tb_23433

Why use joins and relates?

Most database designs promote organizing data into multiple tables, with each table focused on a specific topic. This is preferred over one large table containing all possible fields. Having multiple tables prevents duplicating information in the database because you store the information only once. When you need information that is not in the current table, you can link the two tables together. This makes updating your data simpler, and it also removes the possibility of not updating all redundant data values.

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