Joins and Relates Tutorial

Any GIS information you work with can be sorted and stored in many different ways. As you work with different layers in ArcMap, much of this information is stored in an attribute table. An attribute table contains information relevant to one of the layers that is in the Table of Contents (Figure 1). Oftentimes, it is very helpful to be able to access information from the attribute tables of different layers at the same time. Joins and Relates are the two operations that allow you to directly look at information from two or more attribute tables.

A Join is used when you wish to append or combine the two attribute tables of different layers into one table. Join operations are performed when there are one-to-one or many-to-one relationships in the data fields. In order to perform a join, you must first ensure that the attribute tables that you wish to join have a matching field, known as a common key (Figure 2). This key is the feature that you will select when you are performing the join operation.
A **Relate** is similar to a join, in that it enables you to access information from two different attribute tables. However, a relate is not a permanent combination of the two tables. It merely establishes a relationship, which can be used to quickly locate relevant data.

**How to Complete a Join or Relate**

For this tutorial, we will be performing a join involving data containing counties and Economic Service regions of the State of Utah. All the data you will need should have been provided in this Joins and Relates tutorial folder.

1: Open ArcMap and select a new blank map.

2: Expand the “catalog” tab on the right side of the screen. Right-click Folder Connections, then select “Connect to Folder.” Browse through your computer files for the location of this tutorial folder. Once you have located the folder, click on the folder, and then click OK. The Joins and Relates folder now has a folder connection, and this folder connection will allow you to quickly access the data.
3: Once you have established the folder connection, it is time to add the files to your map. Open the Counties folder and drag and drop the Counties shapefile onto your map (Figure 3).

![Figure 3](image3.png)

4: Now that this counties layer has been added, we can look at some of the data concerning the counties of Utah. On the left-hand side of the screen, in the Table of Contents, right-click on the counties layer and select **open attribute table**. A table then pops up that displays various information about the counties, including their names, an assigned county number, and even some information about population size. You can resize the attribute table by hovering your mouse on one of the attribute table corners and then clicking and dragging the corner to the desired size. Feel free to scroll through and look at all the information. Close the table.

5: Now we are going to add the table containing the economic service area data. In your Catalog, click on the plus sign next to the Utah_Economic_Service_Areas.xlsx. The Utah_Economic_Service_Areas.xlsx will expand and show ‘Economic Service Data$’ underneath (Figure 4). Click and drag this over to your map area.

![Figure 4](image4.png)
6: In the Table of Contents window, right-click on the ‘Economic Service Data$’ table and select open. For convenience’s sake, this table only contains the two necessary fields we need to perform the join. Notice when you select a field on the table your selection is not highlighted on the map. This is because the data in these fields does not yet have any spatial properties (Figure 5). Close the table.

![Figure 5](image)

7: Now we will perform the join operation. Right-click on the “counties” layer in the Table of Contents. Select Joins and Relates, and then select Join. A Join Data window will open. This window is where you select what fields will be joined and how they will be joined (Figure 6).

- What do you want to join to this layer? Ensure that the drop-down box displays “Join attributes from a table.”
- Under “Choose the field in this layer that the join will be based on” click on the drop-down box and select NAME.
• Ensure that the “Choose the table to join to this layer” has Economic Service Data$ selected. If Economic Service Data$ is not selected, click on the yellow folder button on the right of the drop-down box and then browse and select the Economic Service Data$ spreadsheet. Leave the “Show the attribute tables of layers in this list” checked.

• Ensure that Name is selected in the “Choose the field in the table to base the join on.” If “Name” is not selected, select it from the drop-down box.

Notice that you can select either “Keep all records” or “Keep only matching records”. Keeping all records allows you access to all the information from the two different features, while only keeping the matching records will eliminate records that do not pair up in both tables. In this tutorial we will keep all records. Click OK.

![Join Data](image)

**Figure 6**

8: One useful tool that can help you catch any errors before you complete the join is the validate join button. This tool will run a process to ensure that everything in your tables and fields is compatible. Once you click the button, a dialog box will pop up and show you which steps are being performed in order to validate your join. At the end of the process, a report will appear listing any problems that were encountered during the validation process. Errors will appear as yellow triangles with an exclamation mark next
to them, and the processes completed without any issues appear as green check marks. The most common errors arise from the use of invalid characters in the fields or field names. If your validation report comes back without any issues, feel free to close the report and continue with the tutorial. If your validation report contains yellow triangles with exclamation marks, read the problems next to the yellow triangles and adjust your join table as necessary.


9: Now that the two datasets are joined, we will be able to access the information from them much more easily. Right-click on the “counties” layer again and open the attribute table. In the attribute table, scroll all the way to the right. Now the attribute table lists which economic service area each county belongs to. If desired, you can right-click on any redundant fields (e.g. Name) and turn them off. (If you want to turn a field back on, right-click on the particular layer in the Table of Contents and select Properties. In our example, it would be the “counties” layer. In the Layer Properties box, click on the Fields tab and then check the checkbox for each layer you want to view in the attribute table. Click OK.)

Note: After a Join, when using Select By Attributes, the fields’ names will change (Figure 7). In the new name, the name of the source layer of the join will appear first, followed by a period, and then the field name (e.g. Counties.Name or Economic Service Data$.NAME).

![Select By Attributes](https://example.com/choose.png)
10: Now when you select the counties based on their economic service area the selection will appear on your map (Figure 8).