

Map Digitizing

Digitizing in GIS is a process of transferring information from images or maps. You digitize by creating a layer or shapefile in ArcCatalog and then add features in ArcMap. You can digitize points, lines or polygons. When you digitize, you assign spatial and non-spatial attributes to features. Every feature you create will have to be given attribute values in the attribute table.

Explorer's Guide

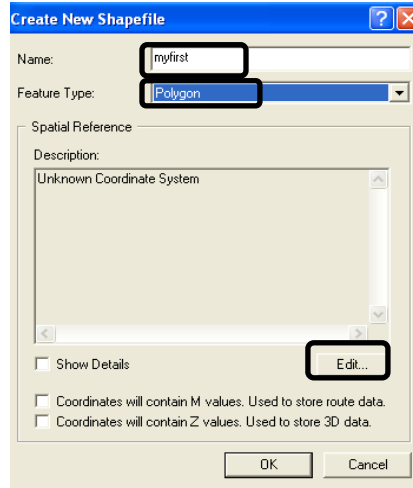
Before You Start

Take a look at this aerial image of the University of Nebraska-Lincoln. Discuss with your partner or team the different types of data (point, line, and polygon) you see in the image. Use colored pencils to draw the different point data, line data and polygon data on this paper map.

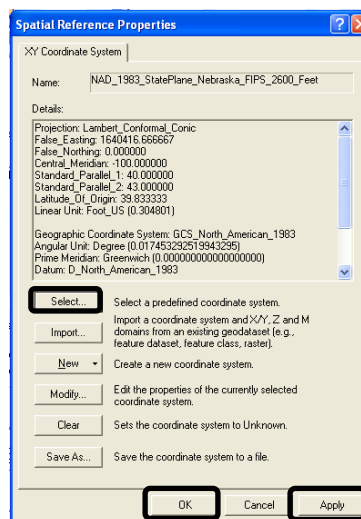


Learning by Doing

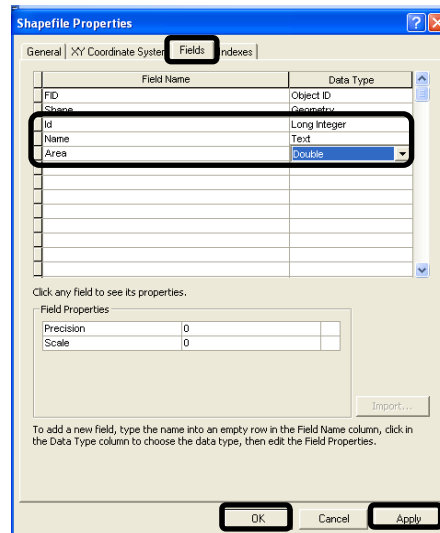
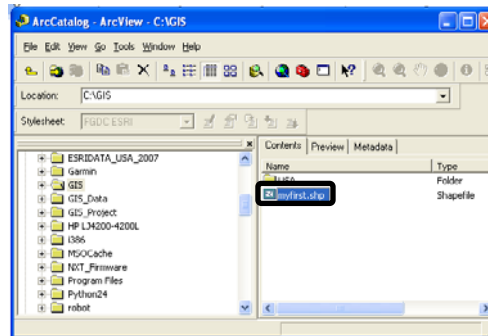
1. Start ArcCatalog and navigate to the assigned (by instructor) folder.
2. Right click the folder to get New > Shapefile. Specify a name for the shapefile and feature type (point, line or polygon).



- Now click the **Edit** button (as shown here) to specify a coordinate system for the shapefile you created. Choose **Select** (as shown here) and navigate to *Projected Coordinate system > State Plane > NAD 1983 (Feet) > NAD 1983 State Plane Nebraska FIPS 2600 (Feet).prj*. Click **Apply** and **OK** when done.

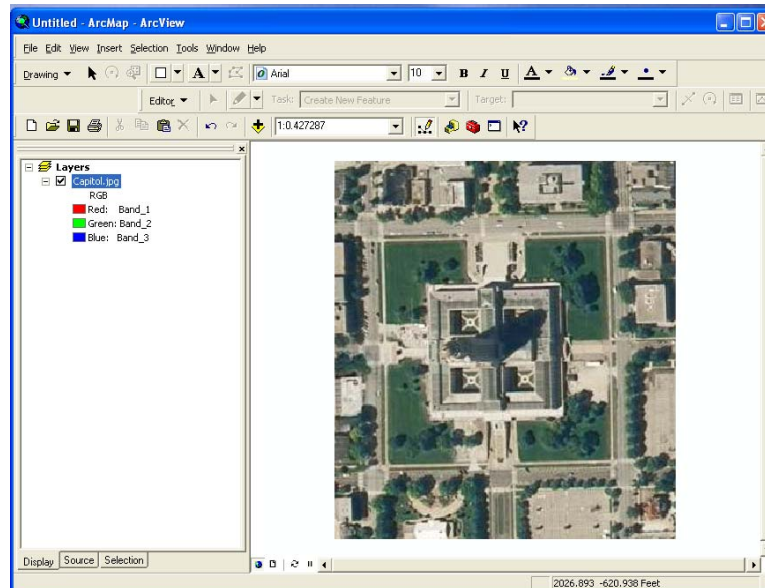


- After creating a new shapefile in ArcCatalog (as shown here), right click on the new shapefile and choose **Properties** to add attribute data. Click on the **Fields** tab and add your new fields. You can only add fields while not in editing mode. Click **Apply** and **OK** when you're done.

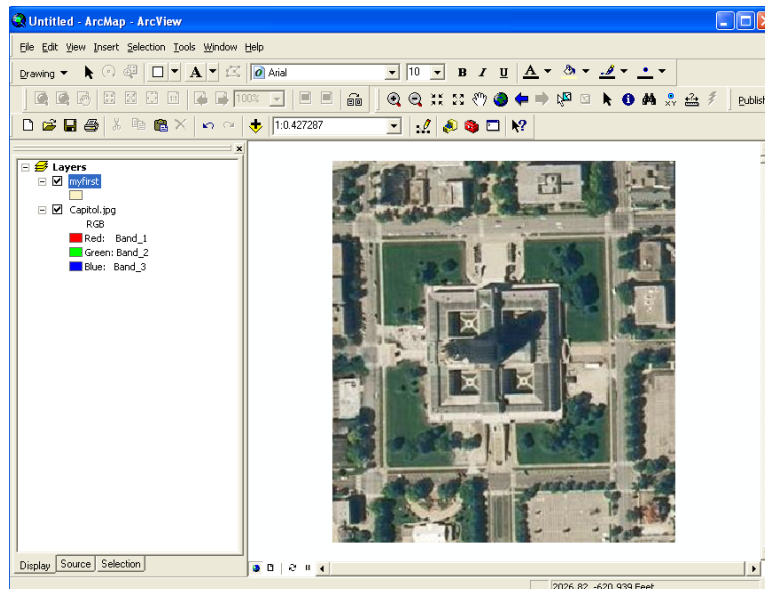


- Open ArcMap and add capitol. jpg. Capitol. jpg is found in 4H-GIS > Georeferencing. Your screen should look like this:





6. Now add the new shapefile. You will not be able to see anything on the map because there are no features in the shapefile yet.




7. To add features to this new shapefile, make sure you have the editor toolbar. If not go to View > Toolbars > Editor to get this editor toolbar.



8. In your Editor toolbar choose Editor > Start Editing. Make sure the Task shows **Create New Feature** and Target shows your new shapefile as shown here.



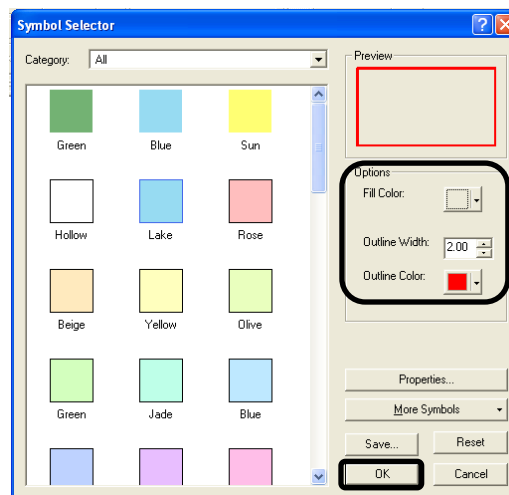
9. Now you are ready to draw the boundary polygon for the Nebraska state capitol building. Click the Pencil icon  in the Editor toolbar.



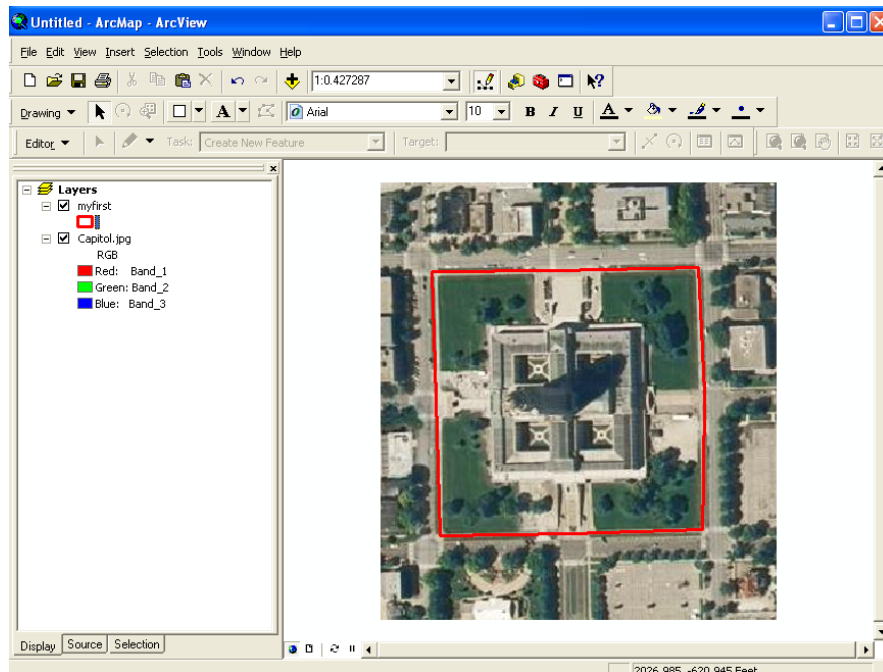
10. Place the cursor on one of the corners of the capitol building. You will see a circle with a cross-hair in it. Single click to add each polygon vertex and double click to close the polygon. If you get messed up you can right click and choose **Delete Sketch**.



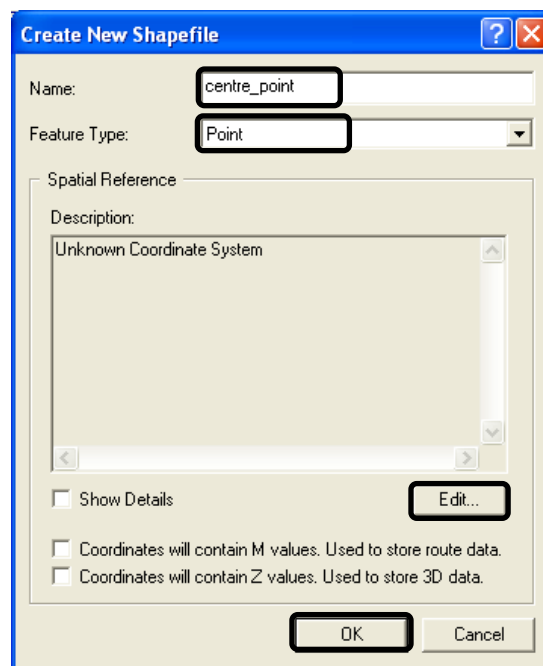
11. Click the attribute button in the Editor Toolbar to add attribute information for the new shapefile.
12. When you're done editing, choose *Editor > Save Edits* in the **editor toolbar**.
13. When you're done saving, end your editing mode by choosing *Editor > Stop Editing* in the **editor toolbar**.
14. Click the polygon icon to get the symbol selector as shown below. Choose Fill Color > No color. Change the outline color to red and outline width to 2.



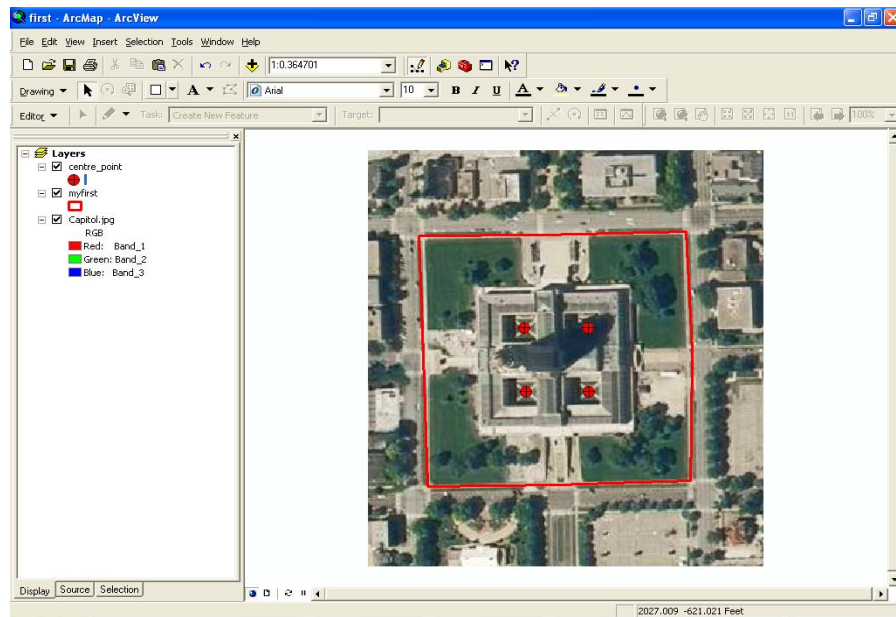
15. Your map should look like this:



16. In the same way, you can create point and line shapefiles. The steps that follow guide you to create a point shapefile for the centre of the four courtyards that are part of the Capitol.
17. In ArcCatalog navigate to the assigned folder and right click the folder to get New > Shapefile. Specify a name for the shapefile and feature type (point).



18. Repeat steps 3, 4, 6-13. Use step 14 to change the symbol selector of your point shapefile. Your final map should be similar to the map shown here.



How Does It Work?

In GIS you can create a new shapefile by digitizing geographic features from paper maps and/or imagery. The shapefile could be a point, line or polygon feature. It's easy to digitize from one end of the feature to the other specifying the vertices as you go. Digitizing is done with a mouse or with a digitizer. You can add, delete or move a vertex while digitizing.

- Digitizing *point* features is the process of creating a single point feature with an x, y coordinate.
- Digitizing *line* features is the process of creating a line feature with a start and end node and number of vertices to show the direction. Complex features require more vertices than a straight feature.
- Digitizing *polygons* is the process of creating an area confound by a set of connected lines. Use the editing tools to close polygons.
- While digitizing, set the snapping environment on to snap or attach new features to existing features. For this, use Editor Toolbar > Snapping to turn snapping on or off.

Additional Challenge

- Create a point shapefile to represent the trees around the Capitol Building.
- Create a line shapefile showing a route for tourists visiting the Capitol Building.
- Digitize your school boundary using an aerial image of your school.

Q & A

Share what you did!

Which was easier to work with, the paper image with the colored pencils or the digitized map?
What if there are mistakes in the data you're using? How would that affect your digitized map?

Process what's important!

What was the easiest part of this activity? Why?

What was the hardest part? Why?

Generalize to you life!

Have you used ArcCatalog before?

Have you used ArcMap before?

Apply what you've learned!

What are some of the uses of a digitized map?

What can you do if conditions in the map area change? How is that helpful?

Vocabulary

Shapefile is a vector file format for storing the location, shape and attributes of geographic features. It is stored in a set of several files with the same name and different extensions (e.g., .shp, .shx, .dbf).

Feature is a shape in a spatial data layer, such as a point, line or polygon that represents a geographic object.

Attribute represents information about a given geographical feature, which is generally stored in a table and linked to the features using a unique identifier (for example, attributes of a lake may include name, size and maximum depth).

Digitizing means converting shapes of geographic features from paper maps or raster imagery into vector data.

Digitizer is a tablet with a pointing device used for creating/editing shapes precisely. It converts electronic signals from positions on the tablet surface to digital x, y coordinates, yielding vector data consisting of points, lines and polygons.

Vertex is a set of x, y coordinates that constitutes a line. Two lines meet at a vertex to form an angle.

Vector data includes all discrete geographic objects (also called features). Three types of features are: points, lines and polygons..

Raster data represents all continuous surfaces, images or grids (photographs, interpolated weather maps, elevation models).

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