COA 690 / 790 GIS in Marine Science

Instructor: Wei Wu

1/30/2017 Lab 1: Organizing geographic data

In this lab, you will explore geographic data and organize data into a geodatabase. You need to complete two exercises (courtesy of ESRI).

For the week of Feb. 13, you need to hand in the answers to the questions in Exercise 1, all the problems you have encountered, and how you solve them during the exercises.

Exercise 1: Explore geographic data

For this exercise, suppose you are a graduate student collecting GIS data for your final project, in which you will assess flood risk in your city and propose some flood emergency plans. You have contacted different city departments and obtained from them some data that seemed relevant for your project.

Now you need to examine that data and determine whether it will in fact be useful. Your ultimate goal is to build a database to store all the project data.

Step 1 Start ArcMap and open a map document

Start ArcMap and open **FloodData.mxd** from your data folder.
The layers in this map reference the data that you collected from the city departments. The City Limits layer is displayed, while all the other layers are turned off.

You will now display the remaining layers one after another to view the rest of the data.

Step 2 Explore layers in ArcMap

ArcMap offers advantages for exploring geographic data: you can view many data layers at once, examine the level of detail shown in different layers, and compare the spatial extent of different layers.

Turn on the Schools, Local Streets, Parcels, and Land Use layers.

All the layers cover an area within the city limits. When you contacted the city's Planning Department, you asked for data for the entire city. As you can see, they granted your request.

Click the Zoom In tool and zoom in to an area of your choice.

Notice that parcels are inside land use polygons. Because parcels are contained by land use areas, the two layers are spatially related.

Click the Go Back To Previous Extent button to return to the previous extent.

Turn off the Schools, Local Streets, Parcels, and Land Use layers.

Turn on Wastewater Mains, Wastewater Valves, and Place Names.

The two wastewater layers cover only a small part of the city. For some reason, the Public Works Department gave you data for only part of the city. The Place Names layer contains the names of neighboring cities and therefore covers a larger area than City Limits.
Right-click Wastewater Mains and choose Zoom To Layer.

At this scale, you can see that the wastewater valves are on top of wastewater mains. This makes sense because in the real world wastewater valves must be connected to wastewater pipes.
Return to the previous extent.
Turn off Wastewater Mains, Wastewater Valves, and Place Names. Turn on Raster Aerial.

The aerial photo that you acquired from the Planning Department covers most parts of the city, but not all.
Turn off Raster Aerial.
Turn on Soils and click the Full Extent button.

The Soils layer is from the Parks and Recreation Department. It covers the largest area of all the layers in the map document.
Next, you will take a look behind the scenes of your map and view the map's source data.

Step 3 Display the data sources of your map

Remember, a map document doesn't actually store the data shown on the map. A map document references the data by storing the paths to the location on disk where the data is saved. In this step, you will see where the data that comprises this map is stored.
At the bottom of the table of contents, click the Source tab.
The Source tab shows you where the data referenced by the map layers is stored.

Tip: If your table of contents is too narrow to see the full paths to the data sources, you can hover your mouse pointer over the data sources to see the full paths.
Notice that all your data is stored in the data folder. Notice also that the layers are

now organized by their source location—WastewaterMains and WastewaterValves have moved to the top of the table of contents because they are stored along with City Limits, Schools, Parcels, and Place Names in the City.gdb geodatabase.

In the following steps, you will use ArcCatalog to explore the datasets that are referenced in this map document and assess whether they will be useful for the flood database.

Step 4 View city data in ArcCatalog

As opposed to ArcMap, where you can view your data all together, in ArcCatalog you can examine datasets one by one. In the remaining steps of this exercise, you will use ArcCatalog to explore the data that you have examined so far in ArcMap.
Click the ArcCatalog button to start ArcCatalog.
Close ArcMap without saving your changes to the map.
In the Catalog tree, expand your data folder (suppose it is called “Organize”) connection.
Click the folder to select it, then on the Standard toolbar, click the Details button .
Look at the Contents tab area.

On the left side of the Contents tab, you see the names of the items in the Organize folder, while on the right side in the Type column, you see a description of the items.
ArcCatalog uses graphical icons to indicate the format of datasets.
The Organize folder contains an item called City.gdb, which has the gray database icon of a geodatabase.

The Organize folder also contains a coverage called landuse, which has the icon of a polygon coverage; a map document called FloodData.mxd; and a shapefile called LocalStreets.shp.
Additionally, there are two raster datasets which have the ArcCatalog raster icon. One raster dataset is an image called raster_aerial.tif, while the other is an ESRI grid called soils, which has no file extension.
At the top of the Name column you see three folders. These folders contain additional data that you will work within the next exercise.
In the next few steps, you will explore each dataset and decide which can be used in the flood database you want to create.

Step 5 Explore the City geodatabase

Most of the data you received from the city is stored in the City.gdb geodatabase. You will explore the City.gdb geodatabase in this step and see what's inside.

In the Catalog tree, expand City.gdb.

Now you can see that the geodatabase contains a feature dataset called Sewer and four feature classes: CityLimits, Parcels, PlaceNames, and Schools.
The icons next to the feature classes indicate that CityLimits and Parcels are polygon feature classes and Schools is a point feature class.

The geodatabase also contains a table called SchoolBuildings. The SchoolBuildings table contains only attributes; in this case, information about the school buildings. You will examine the SchoolBuildings table later in this exercise.
While some feature classes in City.gdb are stand-alone, others are organized into a feature dataset. Next, you will examine the feature classes in the Sewer feature dataset.

Step 6 Explore the Sewer feature dataset

Is a feature dataset just another container inside the geodatabase? What criteria must the feature classes in a feature dataset fulfill? In this step, you will explore the feature classes in a feature dataset and understand why they are grouped together.
In the Catalog tree, expand the Sewer feature dataset.

The Sewer feature dataset contains the WastewaterMains and WastewaterValves feature classes. Remember, in step 2 of this exercise you viewed those layers in ArcMap.
Right-click Sewer and choose Properties.
The Feature Dataset Properties dialog box opens.
Click the XY Coordinate System tab.

You see the name and details of the coordinate system that both feature classes in the feature dataset share.

Question 1: Why do you think these feature classes are grouped together in a feature dataset?

Click OK to close the Feature Dataset Properties dialog box.

Do you think the WastewaterMains and WastewaterValves feature classes are useful for the flood database? In a flood situation, you want to prevent sewage and flood water from mixing because the sewage system might get blocked and flood water might get contaminated. Thus, data about the sewer system could be useful for your project.
However, remember that in ArcMap you discovered that the wastewater layers cover only a small part of the city. Before you make your final decision, you will take a closer look at the feature classes in this feature dataset.

Step 7 Explore Wastewater feature classes

In this step, you will preview the WastewaterMains and WastewaterValves feature classes.
In the Catalog tree, click WastewaterMains, then click the Preview tab.

The WastewaterMains feature class represents sewer pipes as line features. Remember, a feature class stores features of one geometry type: point, line, or polygon.
In the Preview drop-down list, choose Table.
Scroll through the attribute fields of the WastewaterMains table.
The WastewaterMains feature class has quite a few attributes, including diameter, material, and slope of the wastewater pipes. These attributes would be useful for a technical study of the sewage system, but they may not be useful for your flood emergency project.
Notice the Shape_Length field at the far right end of the table. This field stores the length of each feature in the WastewaterMains feature class in map units. One of the advantages of the geodatabase format is that this field is automatically added and maintained.

Now you will take a look at the WastewaterValves feature class.
In the Preview drop-down list, choose Geography.
In the Catalog tree, click WastewaterValves to preview its geography.
Now preview the attribute table of WastewaterValves.

Notice the Shape field at the beginning of the table. All feature classes contain a Shape field, which stores the coordinates of the features.
Scroll all the way to the right of the attribute table.
This table does not have a Shape_Length field. This makes sense, since point features don't have length.
Like WastewaterMains, the WastewaterValves feature class comes with many technical attributes, which you don't need for the flood emergency project. Considering also their insufficient spatial extent, you decide not to include these feature classes in the flood database.
Go back to Geography view.
Previewing data in ArcCatalog is convenient when you want to know what's stored inside a feature class without having to add it to ArcMap. In the next few steps, you will preview the remaining feature classes of the City.gdb geodatabase and determine whether they will be useful for the flood database.

Step 8 Explore stand-alone feature classes

The polygon feature classes you will examine now are stand-alone feature classes—they are not grouped into a feature dataset.
In the Catalog tree, click the CityLimits feature class to preview it.

The CityLimits polygon feature class stores two polygon features, one describing the outer boundary of the city, the other describing an enclave of county land

inside the city boundaries. The CityLimits feature class defines the study area of the flood project.
Preview the CityLimits table.
Scroll to the end of the table.

Notice the Shape_Length and Shape_Area fields in the table. The Shape_Length field stores the polygon features' perimeter, while Shape_Area stores their area.

Question 2: What is the AREA_ACRES field?

Another polygon feature class in City.gdb is Parcels. This feature class may be useful for determining which city parcels are at risk of being flooded.
In the Catalog tree, click Parcels to preview the table of the Parcels feature class.
Notice that the Parcels feature class contains attributes for land use code (LU_CODE) and zoning code (ZONE_CODE). The information in these fields can help you determine whether a parcel contains people that would be at risk in the event of a major flood.

Go back to Geography view.
Now that you've examined the attribute tables, you decide to include the CityLimits and Parcels feature classes in the flood database. Another feature class in the City.gdb geodatabase is the PlaceNames annotation feature class, which you will examine next.

Step 9 Explore the PlaceNames annotation feature class

An annotation feature class stores descriptive map text as annotation features in an annotation feature class.
Preview the PlaceNames feature class.

The names of the cities are displayed as annotation features.
Preview the table. Examine all the fields.
As you can see, the annotation feature class stores the properties of the text, including the text string, font name, and font size, as attributes.

Go back to Geography view.
Because the PlaceNames feature class will be useful for making flood and emergency planning maps of the area, you decide to include it in your flood database. Next, you will examine the school data you collected.

Step 10 Explore schools data

There are two sources of information about Schools: one is a point feature class called Schools, the other is a table called SchoolBuildings. In this step, you will examine the data related to schools.
Click the Schools feature class to preview its geography.

In a flood situation, schools may be used as shelters for evacuees. Therefore, the locations of schools are useful for flood emergency planning.
Preview the Schools table.

The Schools feature class contains attributes such as NAME, ADDRESS, and PHONE. This information is definitely useful when planning for shelters in a flood emergency.
The Schools attribute table doesn't contain all the attributes related to the schools, however. There is additional information stored in the SchoolBuildings table.
Preview the SchoolBuildings table.

The SchoolBuildings table contains information such as building type, year built, and area. There is no Shape field because this table doesn't store features. It just stores additional attributes about the schools.
Scroll to the end of the table.
The ID_ field contains ID numbers that are also included in the Schools feature class. This field can be used to join the two tables—after you join tables, you can query and symbolize features using information contained in each table.

The information in the SchoolBuildings table may also be useful for shelter planning in a flood emergency. You decide to include both the Schools feature class and the SchoolBuildings table in the flood database.

Step 11 Explore a coverage

The land use data that you received from the city's Planning Department came in the form of a coverage.

In the Catalog tree, expand landuse.

This coverage contains four feature classes: arc, label, polygon, and tic.
Preview the geography of the polygon feature class.

The landuse polygon feature class contains polygons for the different areas of land use.
Switch to Table view.
Each landuse polygon has attributes including area, perimeter, and land use code (LU_CODE).
Go back to Geography view and preview the geography of the arc feature class.

Arcs defines the boundaries of land use polygons.
Preview the label and tic feature classes.
Labels represent points in the center of each polygon, which can be used to place labels. Tics represent known real-world coordinates and they are used to reference the coverage to the real world.
Land use is useful for determining the number of commercial properties at risk of

being flooded. Remember that the Parcels feature class has a land use attribute as well. However, you may want to use land use in combination with other data, so you decide to include the landuse coverage in the flood database as well.

Step 12 Explore a shapefile

The street data that you obtained from the city's Transportation Department came as a feature class called LocalStreets. A shapefile represents a single feature class.

Preview the geography of LocalStreets.shp.

Local streets would be useful for determining evacuation routes and nearby shelters.
Preview the table of LocalStreets and examine its attributes.

The LocalStreets shapefile includes information such as street ID, class codes and descriptions, street name, and street type. Notice that there is no Shape_Length field in the shapefile attribute table. Only the geodatabase creates and maintains the Shape_Length attribute for line feature classes.
Go back to Geography view.
You will include the LocalStreets data in the flood database. Next, you will explore some raster datasets.

Step 13 Explore raster data

The aerial photo and the soils grid that you received from the city are raster datasets.

Click raster_aerial.tif to preview it.

The aerial photo could be used as a backdrop on your flood maps to create an attractive visual context.
Click the Zoom In button and zoom in anywhere on the image.
Notice that objects displayed on the image become clearer as you zoom in.
Zoom in until you can see the cells (pixels).

Click the Full Extent button to go back to the raster's full extent.
Preview the table of raster_aerial.tif.

The aerial photo's attribute table doesn't contain much useful information for the flood project. The Value field stores the gray value of the pixels (in bytes) and the Count field stores how many pixels of that gray value occur in the image.
To get more meaningful information about the image, you will look at its properties.
Right-click raster_aerial.tif and choose Properties. Examine the information

provided in the dialog box.

Question 3: What is the file format of the aerial photo? Choose one from the following four: TIFF, JPEG, SID, or IMG.
Click OK to close the Raster Dataset Properties dialog box.
Preview the geography of soils.

Soils is a an ESRI grid. When you viewed the soils grid in ArcMap, it was symbolized with a particular color scheme. By default, ArcCatalog uses a random color scheme to display grids.
Preview the table of the soils grid.

The SOIL_DESC field contains descriptions of the local soils that might be meaningful to a geologist, but they are meaningless to you. Although initially soils seemed relevant to your flood emergency project, you now decide that it will not be useful.

Step 14 Exit ArcCatalog

You have now explored all the geographic data you collected for your project.
Exit ArcCatalog.

In this exercise, you explored various vector and raster datasets. In ArcMap you inspected the data all together, while in ArcCatalog you examined the datasets and their attributes individually. You explored a geodatabase, a coverage, and a shapefile as well as an image and a grid.
Based on your findings, you have decided which data to include in your flood database:

Dataset Name	Use	Don't use	Reason
WastewaterMains		✓	Spatial extent too small, attributes too technical
WastewaterValves		✓	Spatial extent too small, attributes too technical
CityLimits	✓		Determines study area
Parcels	✓		Useful for determining properties at risk
PlaceNames	✓		Useful for mapping purposes
Schools	✓		Useful for shelter planning
SchoolBuildings	✓		Useful for shelter planning
landuse	✓		Useful for determining properties at risk
LocalStreets	✓		Useful for determining evacuation routes
Raster_aerial	✓		Useful for mapping purposes
Soils		✓	Attributes too technical

While you have collected a lot of data, there is still some missing data that would be helpful for your project. The most essential data you need are flood zones, areas that get flooded every year with a certain probability. And, to answer questions about the population in those areas, you need demographic data.

In the case of a flood emergency, you want to be able to quickly contact the agencies in charge and route emergency vehicles to the closest hospitals. Thus, you'd like to obtain emergency facilities data. Also, county data would be helpful—major roads and the county boundaries would be useful for planning evacuation routes. Now that you know what you need, all that's left is to go find it.

In the next exercise, you will work more with this data and organize it into a flood database.

Exercise 2: Create a project database

In this exercise, you return to the flood project. Recall that in the previous exercise, you examined data that you obtained from the city and decided which data would be useful for the flood database you want to build. You also identified some additional data you would like to include.
Over the last few days, you've been busy. You obtained flood zones and emergency facility data from FEMA (the U.S. Federal Emergency Management Agency), major roads and county boundaries from the county government, and census data from the U.S. Census Bureau.
You now have all the data you need for your flood risk assessment project, but it is all stored in different folders and in different formats. In this exercise, you will create a geodatabase and assemble all the flood data into it.

Step 1 View new data before you create the geodatabase, you will examine the new data you received.
Start ArcCatalog. In the Catalog tree, navigate to and expand your data folder (supposedly **Organize**) connection.
Expand the **Organize** folder, then expand the Census, County, and FEMA folders.

All the new data is in shapefile format (.shp). The Census folder contains census blocks. Because floods tend to be relatively localized, census blocks are an appropriate population measure, and they will be useful for answering questions about the population in the areas at risk of being flooded.
Preview the census blocks.
The County folder contains the data that you received from the county government: the county boundary and major roads. This data may be useful for dealing with transportation issues on a county level.
Preview the county boundary and major roads.
The FEMA folder contains data representing the areas in danger of being flooded: a shapefile called SB_Floodzones.
Preview the flood zones.
The FEMA folder also contains shapefiles representing the locations of emergency facilities: fire stations, hospitals, and police departments.
Preview the geography and table for FireDepts.shp.

Next, preview the tables of Hospitals.shp and PoliceDepts.shp.
Notice that all three shapefiles are point shapefiles with common attributes: NAME, ADDRESS, CITY, STATE, and ZIPCODE.
In the Catalog tree, click the Organize folder to select it.
Click the Contents tab, then click the Details button.
In the following steps, you will add the new data and the data that you decided to use in the previous exercise to a flood database.

Step 2 Create a file geodatabase In this step, you will create a file geodatabase to store all the data you've gathered.

You will add a file geodatabase to the Organize folder.
Right-click the Organize folder, point to New, then click File Geodatabase.
A new, empty geodatabase is created with the default name of New File Geodatabase.
In the Catalog tree, click New File Geodatabase.gdb slowly twice to select it. Type **Flood.gdb** and press Enter.

The Flood geodatabase is ready to be populated with data.

Step 3 Import multiple feature classes into the geodatabase. To populate Flood.gdb, you will first import feature classes. To work efficiently, you will import multiple feature classes at the same time.
Before importing the data, it's a good idea to check your environment settings.
From the Tools menu, choose Options.
In the Options dialog box, click the Geoprocessing tab.
Click Environments.
Click General Settings and make sure that Output Coordinate System is set to Same as Input.
Make sure that Extent is set to Default.
Scroll down to the bottom of the dialog box and click Geodatabase Settings.
Make sure that Output XY Domain is set to Same as Input.
Click OK, then OK again to close the Options dialog box.
Now you're ready to import data into the geodatabase.
Right-click Flood.gdb, point to Import, then click Feature Class (multiple).
In the Feature Class to Geodatabase (multiple) dialog box, click the Browse button next to the Input Features box.
Navigate to your **\Organize\County** folder and click **CountyBoundary.shp**. Hold down your Ctrl key, click **MajorRoads.shp**, then click Add.
Click the Browse button again, navigate to the **Organize\FEMA** folder, and add the **SB_Floodzones.shp** shapefile.
Finally, add the **CityLimits** and **Schools** feature classes from **Organize\City.gdb**.

At the bottom of the dialog box, notice that the path to the Output Geodatabase is already set.
Click OK.
You see a progress window which shows you the progress of the Feature Class to Geodatabase import operation. It may take a few moments to import the feature classes.
If necessary, click Close to close the progress window when the operation is complete.
In the Catalog tree, expand Flood.gdb.

The five feature classes have been added to the Flood.gdb geodatabase. In the next step, you will add the census blocks.

Step 4 Import the Census Blocks feature class and exclude attributes when a feature

class that you're importing has a lot of attribute fields, you may want to keep only some of them. When you want to exclude attribute fields of a feature class, you must import that feature class by itself.
Right-click Flood.gdb, point to Import, then click Feature Class (single).
For Input Features, browse to your **Organize\Census** folder and add **CensusBlocks.shp**.
For the Output Feature Class name, enter **Demographics**.
If necessary, scroll down in the dialog box to see the Field Map tree.

The Field Map tree lists the attributes of the CensusBlocks feature class and their data types (in parentheses). There are attributes for the total population count in each census block (POP2000), population count of males and females (MALES, FEMALES), population count by age groups (AGE_UNDER5 to AGE_65_UP), median age (MED_AGE), and the number of households (HOUSEHOLDS) in each census block. Each root-level entry in the tree is expandable. When expanded, you see the attribute's data source and type.
Note: In reality, census block data comes with many more attributes. They were deleted for this exercise to reduce the data size.
The total population in each census block, population by age groups, and the number of households are useful information for flood emergency planning. For logistical planning for evacuation, transportation, and shelter siting, you may need to identify the census blocks with a high percentage of young children or elderly persons who might need special assistance.
The attributes for the male and female population and median age are less useful. You will exclude these fields from being imported into the geodatabase.
In the Field Map tree, click MALES (Long), then click the Delete button.
Delete the FEMALES (Long) and MED_AGE (Double) fields as well.

Click OK.
If necessary, close the progress window when the operation is complete.
Examine Flood.gdb.

Preview the table of the new Demographics feature class.

Notice that the fields you deleted are not in the table.
Click the Contents tab.
So far, you have added stand-alone feature classes directly to the geodatabase. In the next step, you will import the Parcels and the landuse polygon feature classes into a feature dataset.

Step 5 Import the parcels and landuse feature classes into a new feature dataset
Because each parcel is designated exactly one land use type, each polygon in the Parcels feature class overlaps a part of one landuse polygon. One landuse polygon can contain multiple parcel polygons. The two feature classes are spatially related.

Also, these two feature classes cover the entire city area; that is, they have the same spatial extent. For these reasons, you decide it's a good idea to import the Parcels and landuse polygon feature classes into a feature dataset.
Before you can import feature classes into a feature dataset, you must create one.
Right-click Flood.gdb, point to New, then click Feature Dataset.
Name the new feature dataset **Municipal**.
Click Next.
The coordinate system is currently unknown. When you create a new feature dataset, you must define its coordinate system.
You will import the coordinate system from the Parcels feature class. Both the Parcels and landuse feature classes have the same coordinate system, so you could import the coordinate system for the feature dataset from either one.
Click Import.
Navigate to **Organize\City.gdb**, click **Parcels**, then click Add.

The name of the coordinate system associated with the Parcels feature class displays in the dialog box.
Click Next, then Next again.
You will accept the default XY tolerance. (The XY tolerance is the minimum distance between coordinates before they are considered to be the same coordinate.)
Click Finish to close the New Feature Dataset dialog box.

The Municipal feature dataset is added to Flood.gdb. It is still empty, though, so you will add the Parcels and the landuse polygon feature classes to it.
Right-click the Municipal feature dataset, point to Import, then click Feature Class (multiple).
For the first input feature class, browse to **Organize\City.gdb**, click **Parcels**, then click Add.
Next, click the Browse button and navigate to the **Organize\landuse** coverage. Add the **polygon** feature class.

Click OK.
It may take a few moments for the import operation to complete.
Close the progress window, if necessary, when the operation is complete.
In the Catalog tree, expand the Municipal feature dataset.

The Municipal feature dataset now contains the Parcels and landuse polygon feature classes.
So far, you have added existing feature classes to the geodatabase by importing them. Another way to add data to a geodatabase is to create an empty feature class first and then add data to it. In the next step, you will use this method.

Step 6 Create a new Emergency Facilities feature class. One advantage of creating a new, empty feature class first and then loading data into it is that you can combine data from different feature classes. Remember, the emergency facilities data that you received from FEMA came as separate shapefiles.

For the flood database, it makes sense to have all the emergency facilities stored together in one feature class, so you have decided to combine them into one geodatabase feature class.
You will now create a new and empty feature class called Emergency.
Right-click Flood.gdb, point to New, then click Feature Class.
Name the new feature class **Emergency**.
For an alias enter **Emergency Facilities**.
Now you need to define the geometry type of the new feature class. Because the emergency facilities came as point features, the new emergency facilities feature class must be a point feature class.
Under Type, click the down arrow and choose Point Features.

Click Next.
The coordinate system is unknown. As when creating a new feature dataset, you must define the coordinate system when creating a new feature class.
Because the coordinate system of the Emergency feature class and the data that will be loaded into it must be the same, you will import the coordinate system from one of the emergency facilities shapefiles.
Click Import.
Navigate to **Organize\FEMA**, click **FireDepts.shp**, then click Add.

The coordinate system information has been imported from the FireDepts shapefile.
Click Next.
You will accept the default XY tolerance, so click Next.
The Default Configuration Keyword is correct as well, so click Next.
Next, you will define the attribute fields for the new feature class. The Emergency feature class should have the same attribute fields as the shapefiles from which you will load the emergency facilities data. Otherwise, only the attributes that have matching fields will be loaded.
You will now create the attribute fields of the new Emergency feature class to match the attribute fields of the data that you will load.
In the Field Name column, click in the cell below SHAPE and type **NAME**.
Press Tab.
Notice that Text is the default data type. This is what you want.
The properties of a text field display below.
In the Field Properties area, for the field's length, change the number 50 to **30**.

Using the same procedure as above, create the following fields:

Field Name	Data Type	Length
ADDRESS	Text	40
CITY	Text	30
STATE	Text	2
ZIPCODE	Text	10

Now that you have defined the geometry type, coordinate system, and attribute fields for the new feature class, you are ready to create it.
Click Finish.
In the next step, you will load the emergency facilities data into the new feature class.

Step 7 Load data into an empty feature class Now you'll add the data from the Fire Departments, Hospitals, and Police Departments shapefiles into the Emergency geodatabase feature class.
Right-click Emergency, point to Load, then click Load Data.
The first panel of the Simple Data Loader wizard displays. You see an overview of what this wizard does.
Click Next.
For Input data, click the Browse button and navigate to **Organize\FEMA**.
Click **FireDepts**, then click Open.
Click Add to add this file to the box under "List of source data to load."

Browse to the **Hospitals.shp** and **PolicDepts.shp** shapefiles and add them as well.
Note: You have to add each shapefile separately.

Click Next.
In this panel you see the geodatabase and the feature class into which you will load your features.
Click Next.
This panel summarizes the Target fields in the Emergency feature class and the Matching Source Fields in the shapefiles that you are loading.
Click Next.
"Load all of the source data" should be selected. Click Next.
The last panel shows you a summary of the data load operation.

Click Finish.
Preview the table of the Emergency feature class.
The Emergency attribute table contains all the records from the three shapefiles you imported.
Go back to the Contents tab.
Your next step is to import a table into the Flood.gdb geodatabase.

Step 8 Import a table In step 3 you imported the Schools feature class into the Flood.gdb geodatabase. You also want to include the SchoolBuildings table, which contains attributes for the school buildings, in your flood database. You will import this table just like you imported the feature classes.
Right-click Flood.gdb, point to Import, then click Table (single).
Click the Browse button next to Input Rows and navigate to **Organize\City.gdb**. Add the **SchoolBuildings** table.
Under Output Table, enter **SchoolBuildings**.
In the Field Map area, all the fields in the SchoolBuildings table are listed and you can choose which ones to import. This time, you will import all the attribute fields.

Click OK. Close the progress window when the operation is completed.

The SchoolBuildings table has been imported into the geodatabase. The last item to add is the PlaceNames annotation feature class.

Step 9 Copy an annotation feature class. An annotation feature class is a special kind of feature class, and you cannot import it into a geodatabase like other feature classes. But because the PlaceNames annotation feature class is contained within the City.gdb geodatabase, you can copy and paste it into the Flood geodatabase.
In the Catalog tree, expand City.gdb.
Right-click PlaceNames and choose Copy.
Right-click Flood.gdb and choose Paste.
The Data Transfer window shows you the names of the attribute fields in the source and target geodatabase.

Click OK.
The PlaceNames annotation feature class has been added to the Flood.gdb geodatabase.

Congratulations, all the data for your flood project is in one place now: the Flood.gdb geodatabase—all the data except the aerial photo, that is.

Step 10 Import a raster dataset To make your project database complete, you will import the aerial photo (a raster dataset) into the Flood.gdb geodatabase.
Right-click Flood.gdb, point to Import, then click Raster Datasets.
For Input Rasters, browse to the Organize folder, click **raster_aerial.tif** and click Add.

Click OK. Close the progress window when the operation is completed.
If necessary, expand Flood.gdb in the Catalog tree.

Now your GIS database is ready for use. You have assembled all the flood data you collected into one geodatabase. As a final step, you will create thumbnails of the data.

Step 11 Create thumbnails Thumbnails are small images of your data. Creating them is a good way to provide an overview of data stored on your computer or network—others will be able to quickly understand what the data represents.
In this step, you will create thumbnails for all the feature classes that you imported into the Flood geodatabase.
Under Flood.gdb, click CityLimits.
Click the Preview tab.
Click the Create Thumbnail button, then click the Contents tab.

The CityLimits feature class now displays with its thumbnail.
Use the instructions above to create thumbnails for the other feature classes and for the raster dataset in the Flood geodatabase.

Note: The thumbnail for the raster dataset does not display in the Contents tab. Don't worry; you will view it in a moment.
Don't forget to expand the Municipal feature dataset and create thumbnails for those feature classes as well.
You cannot create a thumbnail for the SchoolBuildings table. Thumbnails can be created only for feature classes and map documents.
When you are finished creating all the thumbnails, click the Contents tab.
Finally, you'll take a look at all the feature classes that you added to the geodatabase.
Click Flood.gdb, then click the Thumbnails button to view your feature classes as thumbnails.

If necessary, scroll down to see all the thumbnails.
In the Catalog tree, click the Municipal feature dataset and view the thumbnails of the feature classes inside.
Exit ArcCatalog.

In this exercise, you built a geodatabase to store the data for a project from scratch. After creating a new and empty file geodatabase, you imported feature classes and a table from different data sources. You imported a single feature class, which gave you the opportunity to choose the attribute fields to be imported, and you also imported multiple feature classes at once.
You also created a feature dataset and imported feature classes into it. You then created an empty feature class and loaded data from three different source files. Additionally, you added an annotation feature class to your geodatabase by copying it from another geodatabase and imported a raster dataset. For each of the feature classes in the new geodatabase, you created a thumbnail.
You've now seen how easy it is to assemble a geodatabase. The geodatabase makes it possible to organize data that may be stored in a variety of formats. Organizing your geographic data is the first step towards efficient data management and using a GIS to solve problems.