

Geography 220 – Exploring the Geodatabase

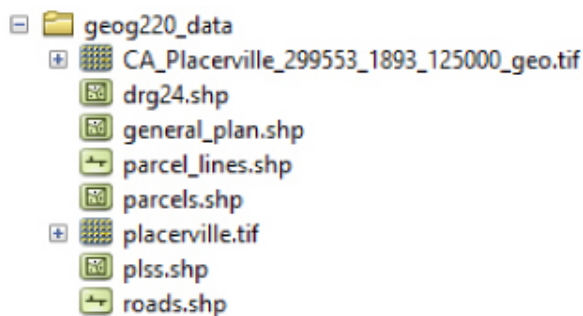
Mike Pesses, Antelope Valley College

The **geodatabase** is the basis for data storage in modern ArcGIS products. We can still use shapefiles and coverages leftover from past versions of the software, but working exclusively within a properly designed geodatabase can save time and ease frustration.

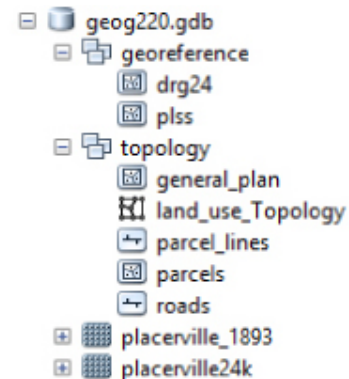
You can think of a **geodatabase** as a file cabinet of sorts. It is a container, ready to hold data that you gather or create. Within each geodatabase we can then add a **feature dataset**, which is equivalent to a folder. Within these, we can then have **feature classes**, which are effectively the documents found in each folder in the file cabinet itself.



There are a number of advantages to using the geodatabase system in ArcGIS (see page 10 of *Modeling Our World, 2nd edition*), but perhaps the greatest is the organizational structure when viewed in ArcCatalog. As the image below shows, we can organize datasets into a much easier to navigate way when using a geodatabase. This may not seem like a big deal, but if you have ever inherited data from a prior employee or a cryptic ftp site you know the headache that comes with trying to decipher data.



Shapefile and Raster storage



Geodatabase storage

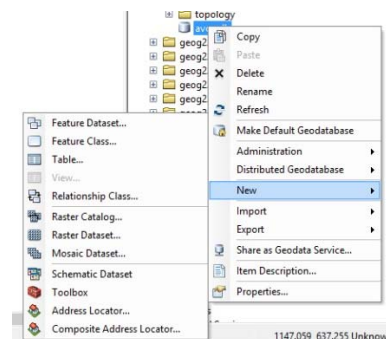
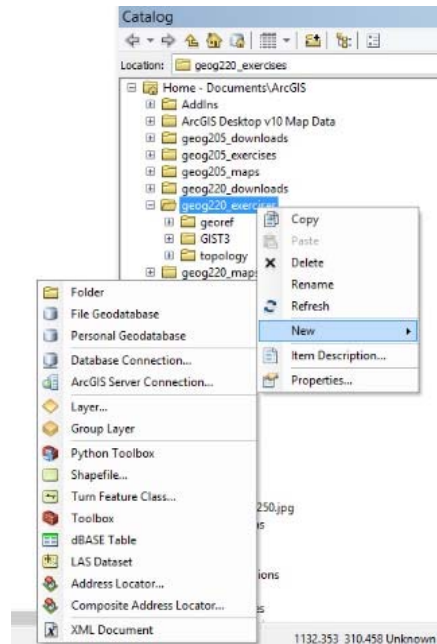
Creating a geodatabase

If you need to create a new geodatabase, you will want to move slowly at first to save time later on. A properly designed database of any kind will make your life easier, while a poorly crafted one will make even the simplest task seem impossible. The trick with database design is to try to anticipate everything you will want the database to be able to do later on. This isn't always possible, but worth a shot...

Page 19 of *Modeling Our World* has an excellent graphic explaining the steps you should go through when designing a large geodatabase. This is a lengthy process, and does not necessarily start at the computer. This paper will skip the initial steps in design and focus instead on the physical creation of the geodatabase within ArcCatalog. The following will go over the steps necessary to actually build a geodatabase for Antelope Valley College.

To create a geodatabase, you simply need to navigate to where you want to store it in ArcCatalog and **right click**.

From that new menu, select “New” and click “File

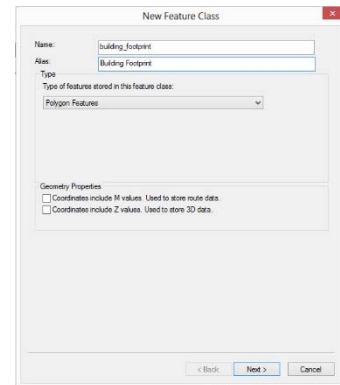


Geodatabase.” You will see some other choices, including “Personal Geodatabase,” but when creating a new one, select the “File” version. The Personal Geodatabase is an older version that has limited functionality. There really isn't a need to use it. Once you select it, you can name it, which for this example call it “avc.gdb” for Antelope Valley College.

This new geodatabase is completely empty at this point. We have simply made a file cabinet, but have no files actually in it. To populate the geodatabase you can import existing files or begin to create your own datasets. We will start with the latter. **Right click on avc.gdb, select New, and click on “Feature Dataset.”** This Feature Dataset will serve as a way to keep track of our data, both spatially and visually as we look at it in ArcCatalog. **Name this feature dataset “facilities”**

and click Next. The next window has you select a coordinate system in which all of your feature classes will be based. For this one, we will use **NAD 1983 State Plane California V FIPS 0405 (US Feet)**, located in the “Projected Coordinate Systems” folder. Once selected, **click Next.** The next window allows you to choose a vertical coordinate system if you will be working in three dimensions. We won’t for this exercise, so we will **click next.** The next window allows you to select the tolerances for your dataset. This determines how close separate objects can get before ArcMap assumes they are the same thing. Your dataset probably defaults to an XY Tolerance of 0.0032808333333333, which means objects can get within 0.04 inches of each other. We aren’t working with anything that is measuring to that precision, so the default is fine. **Click Finish.**

Now, right click on the new geodataset and select New, then feature class. This first feature class will be for building footprints around the AVC campus. **For name, type “building_footprint” and for alias, type “Building Footprint.”** The name is how it will be stored in the computer; the alias is how it will appear when added to ArcMap. Make sure **polygon features** is selected under type. **Click Next.**



In the next window, leave the keyword as “default” and click Next. The following window allows you to set up the attribute table for the feature class. “OBJECTID” and “SHAPE” are defaults generated by ArcGIS, but in the space provided under the Field Name column you can add additional fields. **Click on the first empty cell, and type “bldng_id”.** Then **click in the next column to choose the data type.** A drop-down menu appears and you are given the various options you have in storing data. The table below outlines the different types. We want to **select “text”** from the menu. Below in the “Field Properties” table, you can select specific properties for the field. Under **Alias, type “Building ID”.** Also, **change length to 10, meaning you can enter up to 10 characters into the field.**

You need to be aware of a few things about what we just did. First, we want our field names to be as simple as possible to avoid having the computer freak out. That means we want short names with no spaces or special characters. By naming the above example “bldng_id” we keep

the computer happy, and by giving it the alias of “Building ID” it will make more sense when we view it in ArcMap. The other important thing is deciding on the data type. We need to know if we want to fill our field with numerical values for mathematic operations or a string of text or a specific date. The table below gives you a basic rundown of the different types we can select.

Data Types	Purpose	Examples of Use
ObjectID	Created by ArcGIS for database management	ArcGIS takes care of this, don't worry about it...
Short Integer	Number between -32,000 and 32,000	Small counts that will require mathematical operations for analysis (deer sightings)
Long integer	Number between -2.1 billion and 2.1 billion	Larger counts that will require mathematical operations for analysis (human population)
Float	Can handle decimals; precision refers to total digits in number, scale refers to number of decimal places	Measurements, percentages
Double	Larger version of “float”	See above
Text	To list descriptive names	Street names, Zip Codes
Date	To maintain calendar dates	Event dates
BLOB	Binary Large Objects, collection of binary data	Multimedia objects – images, video, etc.
GUID	Globally Unique Identifier, typically randomly generated	Large datasets that need to ensure unique numbers

I want you to repeat the above process to add fields for the following: *building name, square footage, number of floors, building type, operational hours, number of classrooms, and primary subjects taught in each building*. Before you begin adding fields to the feature class, you should spend some time planning your attack. On this or another sheet of paper, write down what you will put for each field name, alias, data type, etc. to ensure your database is done right the first time. Enter your information and click Finish.

Finally, be sure to add your new feature class into ArcMap. Nothing will appear because you haven't actually drawn in the features themselves, but you can check to see how your attribute table looks. We'll play with the editing later...