GIS Resource Document 02-40 (GIS_RD_02-40) **November, 2002**

ArcGIS – Building geodatabases

Jim Detwiler

Basics

The geodatabase is a new data storage format introduced with the release of ArcGIS. There are two types of geodatabase: personal and multi-user (enterprise). A personal geodatabase is stored as a Microsoft Access .mdb file and can be created using any of the ArcGIS products: ArcView 8, ArcEditor 8, or ArcInfo 8. A multi-user geodatabase is stored in a more powerful relational database management system (RDBMS) like Oracle, Informix, SQL Server, or DB2 and must be interfaced with using ArcSDE software. Data from a multi-user geodatabase can be read using any of the ArcGIS products, but can only be edited using ArcEditor or ArcInfo.

Advantages of using a geodatabase

An important term to understand when dealing with a geodatabase is **feature class**. A feature class is a group of points, lines, or polygons representing similar geographic features. A drawback of the shapefile format is that it is only able to store one feature class (i.e., one group of points or one group of lines or one group of polygons). The most obvious advantage of a geodatabase is that it can store multiple feature classes all in the same file. Other advantages of using a geodatabase over shapefiles or coverages include the ability to:

- group related feature classes with the same spatial reference under one name (termed a **feature dataset**);
- set up domains on a field-by-field basis; that is, for each field in a geodatabase feature class or table you can specify a range or list of valid values;
- save labels to an annotation feature class in the geodatabase;

Some advanced functionality is only available when working with a multi-user geodatabase. These advantages include the ability to:

- establish relationship classes between feature classes in a feature dataset. For example, water valves and water lines are physically attached to one another. By setting up a relationship class, you can ensure that if a water line is moved, its water valves move with it;
- create geometric networks for modeling connectivity and performing trace and path finding analysis;
- store different versions of your data, for example, at different snapshots in time;
- store custom features that represent real-world features more accurately.

Though a personal geodatabase doesn't offer as many advantages as a multi-user geodatabase, simply having the ability to store multiple feature classes in one file makes it superior to the shapefile format. The rest of this document will focus on storing data in a personal geodatabase.

Building a personal geodatabase

As with any of the other ArcGIS data formats, a personal geodatabase is created in ArcCatalog. Follow these steps to create your own personal geodatabase:

1. Navigate to the desired folder in the directory tree.
2. Right-click on the folder and choose **New > Personal geodatabase**.
3. Your new geodatabase is added to the folder listing with a default name. Give it a new name and hit Enter.

Creating a new feature class

1. Double-click on the geodatabase to navigate inside it. The file listing on the right will be empty since there are not yet any feature classes or tables.
2. Right-click on the geodatabase or in the white area on the right side of the window and choose **New > Feature Class**. Note that there are also options for creating a new feature dataset or table. Recall that a feature dataset may be used to group together feature classes having the same spatial reference. One advantage to using a feature dataset is that if you add it to a map document in ArcMap, all of the feature classes it houses will be added at once. You may want to create a new table if you want to store tabular information without a tie to map features (e.g., a lookup table that stores codes and their descriptions.
3. Enter a name for your new feature class and click **Next**.
4. Accept the default storage configuration and click **Next**.
5. In the empty spaces under OBJECTID and SHAPE, enter each of the fields you'd like to store in the feature class. For each of the fields, be sure to set the data type along with any other desired field properties. Some useful properties include: whether NULL values are allowed, a default value, and a domain (range or list of valid values; domains are created in the Database Properties dialog, accessed by right-clicking on the geodatabase and choosing Properties).
6. Click **Finish**. You should now see your new feature class in the file listing.

Repeat the above steps for each feature class you'd like to store in the geodatabase. See the Digitizing resource document for instructions on inputting features into a feature class. It's also possible to convert data in other formats to a geodatabase feature class. For example, right-click on a shapefile, then choose **Export > Shapefile to Geodatabase**.

With your data stored in geodatabase format, should you wish to share it with others, you need only send them one file instead of several.

Penn State Resources

Chapter 14 of Getting to Know ArcGIS Desktop covers building a new personal geodatabase in greater detail. Another book, Building a Geodatabase, is focused solely on multi-user geodatabases, so is probably not as good a resource as it sounds.