Migrating from a Single-user Geodatabase to a Multiuser Geodatabase

Transcript

Welcome to the ESRI Instructional Series podcast. This broadcast is titled, *Migrating from a Single-user Geodatabase to a Multiuser Geodatabase*. My name is Derek Law and I work at ESRI's main office in Redlands, California. I specialize in geodata management and ArcSDE technology. In this podcast, I will talk about migrating from a single-user geodatabase (e.g., a Microsoft Access personal geodatabase or file geodatabase) to a multiuser geodatabase (i.e., an ArcSDE geodatabase).

I will discuss reasons why you might want to upgrade to a multiuser geodatabase, some planning considerations before you perform the migration, and the different methods to do the geodatabase migration. This podcast is intended for GIS managers and GIS analysts who are interested in moving their GIS data from a single-user geodatabase into a multiuser geodatabase. (Note: You should already be familiar with the geodatabase data model and some of its basic functionality.)

To review, since the ArcGIS 9.2 release, three types of geodatabases are available. All of them are designed to support the full information model of the geodatabase. The first two types are the Microsoft Access personal geodatabase and the file geodatabase; both of these are primarily designed for a single user working on a single GIS project. The third type of geodatabase is the multiuser geodatabase (aka, the scalable or ArcSDE geodatabase). It requires ArcSDE technology and is implemented on a relational database management system (DBMS) software. It is available at three different levels:

- Desktop geodatabase (included with ArcEditor and ArcInfo), and is also called Personal ArcSDE
- Workgroup geodatabase (included with ArcGIS Server Workgroup—all editions), also called Workgroup ArcSDE, and
- Enterprise geodatabase (included with ArcGIS Server Enterprise—all editions)

The size capacity and number of possible concurrent users varies with each of the three different levels of multiuser geodatabase. For more information on the three different types of geodatabases, please listen to the ESRI Instructional [Series] podcast titled, *Types of Geodatabases at ArcGIS 9.2*.

Before I continue, Desktop and Workgroup geodatabases were designed to make using and managing a multiuser geodatabase easier. They are intended to only be managed within ArcCatalog; therefore, some of the concepts I will mention may not be directly applicable to these types of multiuser geodatabases and *only* applicable for enterprise geodatabases.

Let's start by discussing some reasons why you may want to migrate from a Microsoft Access personal geodatabase or file geodatabase to a multiuser geodatabase. One of the main driving forces for upgrading to a multiuser geodatabase is that a GIS project has increased in size. Instead of a single GIS analyst working with some GIS data in a file geodatabase, perhaps the project has expanded in scope to involve additional personnel who will also need to work with the same GIS data. Associated with this reason, is that the GIS project's workflow and/or business requirements may need to utilize some of the functionality only available in a multiuser geodatabase that is provided with ArcSDE technology—such as versioning, geodatabase replication, and geodatabase archiving.

- Versioning is the framework in a multiuser geodatabase that facilitates multiple concurrent users to access and edit the same data at the same time. It enables a multiuser geodatabase to manage and maintain multiple states while preserving database integrity.
- Geodatabase replication is the data distribution method that enables GIS data to be shared across two or more geodatabases. Data changes can be made independently in each geodatabase then synchronized to ensure they are consistent.
- Lastly, geodatabase archiving can be enabled on an individual table or feature class stored in a multiuser geodatabase. It records and provides access to all the changes made to the table or feature class over time.

Another reason to migrate to a multiuser geodatabase is that you can take advantage of the native DBMS capabilities that a multiuser geodatabase is implemented on. In particular, you have access to more data management functionality at the DBMS level. For example, you get:

- Enhanced security—such as access permission control for individual datasets and support for database views.
- Scalability—you can configure the physical data storage of the geodatabase over multiple servers and the geodatabase has no size limit.
- Failover options—you can utilize the DBMS backup and recovery features.

One final reason: A multiuser geodatabase enables you to more closely integrate your GIS data as part of a larger enterprise system. A multiuser geodatabase can be used as the data source for an ArcGIS Server solution, providing fast access and retrieval to large GIS datasets. Since a multiuser geodatabase is implemented on a DBMS, it can exist within an existing business database. It also supports DBMS spatial types, which allow direct SQL access to the geographic data in a geodatabase; therefore, your feature classes can work with both ArcGIS clients and other third-party clients via SQL queries. For example, if you had a parcel feature class, ArcGIS Desktop can be used to manage the parcel polygon features while

a tax assessment program that queries the DBMS could directly interact with the attributes of the parcels and their geometries.

Next, I am going to discuss some things to consider and plan for before migrating to a multiuser geodatabase. These are not specific steps for setting up and configuring a multiuser geodatabase—that is beyond the scope of this podcast. Instead, these are some key concepts you should be aware of and they are not DBMS platform specific.

1) A multiuser geodatabase is implemented on a DBMS, you will therefore need to explicitly define users for it. Unlike single-user geodatabases, which are file-based, a multiuser geodatabase requires user accounts to log into and access its contents. The user accounts are unique names and passwords used to identify a person or client application connecting to a multiuser geodatabase. They provide a way to control what type of access (if any) a person or client application has to the geodatabase and its datasets.

   There are two types of authentication used with multiuser geodatabases: operating system (OS) authentication and database authentication (note that Desktop and Workgroup geodatabases only support OS authentication). Appropriate privileges must also be defined for each multiuser geodatabase user in the DBMS.

2) There are two different ways to connect to a multiuser geodatabase: with an application server connection (aka, a three-tier connection) or with a direct connect (aka, a two-tier connection). Both connect types provide the same functionality to a multiuser geodatabase, and typically have the same performance. The only difference is where some of the workload is performed when data is retrieved from the multiuser geodatabase.

   For application server connections, the work is done on the server. This connection type requires that a giomgr service is running on the server. For direct connects, some of the work is performed on the client. This connection type does not use the giomgr service, but in some cases the client requires additional software. For example, for multiuser geodatabases implemented on Oracle, the client needs Oracle Net software.

   For enterprise geodatabases, you specify which connection type is used when connecting to a multiuser geodatabase in the Spatial Database Connection dialog box in ArcCatalog. Specifically, the

connection syntax specified for the service parameter in the dialog box determines whether you are making a direct connect or an application server connection. An enterprise geodatabase can support both connection types simultaneously from multiple clients—there is no configuration limitation. (Note that Desktop and Workgroup geodatabases only support direct connects.)

ESRI recommends that users connect to a multiuser geodatabase with direct connections. This reduces workload on the server.

3) A multiuser geodatabase has different data owners. As I mentioned earlier, connecting to a multiuser geodatabase requires a valid user account. When GIS data is created and/or loaded into a multiuser geodatabase using a specific database connection, then the user who made the connection is the owner of the new GIS data. While this may seem obvious, it is important to highlight the fact that, by default, only the data owner can see and access their GIS data in a multiuser geodatabase. To enable other users of the multiuser geodatabase to be able to see and access GIS data, the data owner must explicitly grant other users permission to their data. Data owners can allow other users to just read their data, or give them read/write permissions.

4) Configuration keywords: As part of the process of creating new datasets in a multiuser geodatabase, configuration keywords are used to specify how data is stored within the geodatabase. They represent a setting or group of settings that tell a multiuser geodatabase where or in what format to store data contents in each dataset. For example, configuration keywords can specify what geometry type to store vector data in (e.g., as ArcSDE Binary or as a spatial type), whether or not to cluster an index, or how much disk space can be used to store information within a system table.

   Configuration keywords are defined in the DBTUNE table of an enterprise geodatabase—this table can be edited and customized for your specific needs. For Desktop and Workgroup geodatabases, you will not need to change, nor customize, configuration keywords, since the storage parameters are preset for you. In most cases, simply choosing the default option will create new datasets that will work well for you.

In the last part of this podcast, I will discuss the different ways to migrate GIS data from a single-user geodatabase to a multiuser geodatabase. After you have set up and configured a multiuser geodatabase, the actual process of data migration is very simple and intuitive.

The easiest method is to use the copy/paste functionality in ArcCatalog to transfer the contents of your single-user geodatabase to a multiuser geodatabase: Select the single-user geodatabase in the Catalog tree; click the Contents tab, then select all the GIS data you want to copy; then select the connection to your multiuser geodatabase in the Catalog tree, right-click, and select Paste.

In the second method, you can use the ArcGIS Import/Export geoprocessing tools. To import data into a multiuser geodatabase, right-click on the multiuser geodatabase, select Import, then the appropriate data loader tool. To export data into a multiuser geodatabase, right-click on the single-user geodatabase, select Export, then the appropriate data loader tool. The ArcGIS Import/Export geoprocessing tools are also available in ArcToolbox and can be used as part of the ArcGIS geoprocessing framework (e.g., in ModelBuilder, the command line, and in Python scripting).

And the third method is that you can transfer the contents from a single-user geodatabase to a multiuser geodatabase by exporting an XML workspace document from the single-user geodatabase, then importing it into your multiuser geodatabase. You can transfer the entire contents of a geodatabase or just the schema. All three data transfer methods from a single-user geodatabase to a multiuser geodatabase are straightforward, and information on these methods can be found in the ArcGIS Desktop help.

To summarize, this podcast discussed migrating from a single-user geodatabase (e.g., a Microsoft Access personal geodatabase or file geodatabase) to a multiuser geodatabase (i.e., an ArcSDE geodatabase). I mentioned some reasons why you might want to upgrade to a multiuser geodatabase, some planning considerations before performing the migration, and three simple and intuitive methods to transfer GIS data from a single-user geodatabase to a multiuser geodatabase.

To learn more about some of the concepts that were discussed in this podcast, please read the help topic titled, *An overview of ArcSDE geodatabase administration* (in the ArcGIS online help documentation located at support.esri.com). A useful article on enterprise geodatabases is available at www.esri.com; enter *Enterprise Geodatabase 101* in the search. ESRI offers several instructor-led training classes on the topic of GIS data migration to the geodatabase: *Building Geodatabases* and *Introduction to the Multiuser Geodatabase*.

Thank you for listening and stay tuned for future podcasts.