GIS Attribute Tables and Indices

In order for a GIS to successfully manipulate and portray geographic data, feature files must be indexed to attributes providing more information. As detailed in Chapter 1, most standard GIS data formats consist of a feature file, an index file, and a linked attribute table, whereby the feature file contains geographic object feature information, the attribute table (file) contains explicative attributes for spatial features, and the index file links attributes with features.

Briefly stated, index files act as attribute pointers. Indices contain unique identifiers that contain more detailed information about a specific feature. This embedded linkage helps speed up spatial feature queries within the GIS and serves as an index file's only true function.

The following attribute field data types are most common and are supported in many major GIS environments:

- *Short Integer.* A basic attribute data type that includes one signed bit and 15 binary bits.
- *Long Integer.* A more complex form of the basic attribute type that incorporates one signed bit and 31 binary bits. As you can imagine, the *Long Integer* offers greater precision than the *Short Integer.*
- *Float.* Contains one signed bit, seven exponent bits, and 24 mantissa bits.
- *Double.* A more complex form of the *Float* attribute type with one sign bit, seven exponent bits, and 56 mantissa bits. As with the *Long Integer, the Double attribute type holds greater precision than the Float attribute type.*
- *Text. Contains varying forms of data, such as numbers, letters, and symbols. The Text attribute type is a character string that can hold any amount of characters, but each character is stored using eight bits (called a byte). An interesting aspect to Text attribute data are that each text value in the same field must have the same number of characters. To achieve this, end blanks are used to fill in the empty slots.*
- *Date.* Though not apparent from the attribute data type name, a Date type contains date and time data. The value is based upon a standard time format and is automatically transformed into the current day and time within the system's local time zone.
- *BLOB.* Short for *Binary Large Object*. A BLOB is a complex (and large) object stored in the database that may include an image, sound, video, or geometry. BLOBs allow users the ability to insert any type of multimedia data into the geodatabase.
- *GUID.* Acronym for *Globally Unique Identifier.* A GUID is a unique 128-bit (16 byte) number that is produced to identify a particular application, file, database entry, hardware, or user. Each generated GUID is "mathematically guaranteed" to be unique since the total number of unique keys is colossal and the probability of generating an identical GUID is virtually impossible.