Summer 2011 - Desktop GIS: You Want More Data?

By Joe Sapletal, GISP

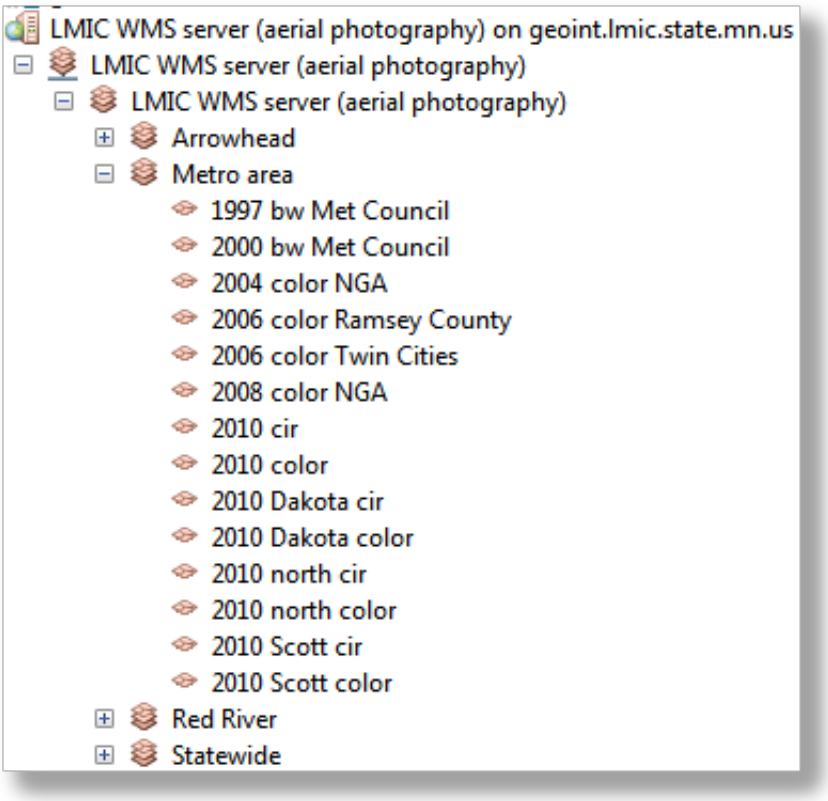
In the Summer 2010 Tech Talk article ArcGIS Services, we addressed connecting to ArcGIS Server through ArcCatalog to add basemaps and other datasets to your ArcMap document. That article focused on ArcGIS Server Map Services available on the Dakota County server, and a few others as well. But did you know that Web Map Services (WMS) have been around much longer than ArcGIS Server services? A WMS is a protocol for serving GIS data as images over the internet, and since 2000, organizations have been serving GIS data using WMS. Most importantly, they've been doing it fast - very fast!

Finding data is fairly easy; you can simply do an internet search for WMS and the data you are looking for and you will likely find what you need. Everything from weather radar to aerial photography is available online. A great aerial photography WMS for Minnesota is available from MnGEO at http://geoint.lmic.state.mn.us/cgi-bin/wms?. Let's have a look at it.

The first thing you have to do is connect to the server in ArcCatalog.

1. Open ArcCatalog
2. Click on **GIS Servers**
3. Double click on **Add WMS Server**
4. Enter a WMS Server URL into the URL box and Click **Get Layers**
5. Click **Ok**
6. If you wish to change the name in ArcCatalog, right click on the connection name and choose **Rename**
7. Rename it

Once you double-click on it to open the connection, you can see the available data layers.



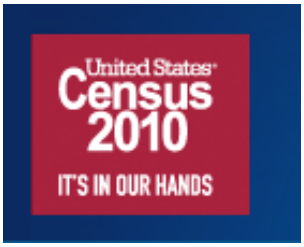
Try adding these services:

- MnGEO Digital Raster Graphs (DRG) - http://geoint.lmic.state.mn.us/cgi-bin/wmsz?
- MnDOT Roads - http://gisservices.dot.state.mn.us/ArcGIS/services/MNDOT_ROADS/MapServer/WMSServer?
- Weather RADAR - http://mesonet.agron.iastate.edu/cgi-bin/wms/nexrad/n0r.cgi?LAYERS=nexrad

Also, the MetroGIS Datafinder Catalog has a list of many great WMS's at http://www.datafinder.org/catalog/index.asp .

Summer 2011 - GIS 101: The 2010 Census - TIGER/Line Files - What Are They?

By Scott Laursen



Census data is released at several different geographic levels, with the areas covered progressing down in size from state to county, then county subdivision (which, in Minnesota, means municipality and township), Census tract, block group, and finally block. All levels of Census data are released in spreadsheet format – rows and columns of data. While this format works well for statistical analysis, geographers need the shapes of the corresponding areas to go along with the data in order to make their maps. TIGER (Topologically Integrated Geographic Encoding and Referencing) files (or TIGER/Line files, as they are officially called) are the Census Bureau's answer to that need.

Originally created for use with the 1990 Census, TIGER files are a database of lines that show geographic features. Physical features such as streets, rivers and lakes, railroads, etc., are included, as well as legally-defined lines such as city or county boundaries. These lines are then connected to form the polygons that make up the Census-defined areas such as Census tracts and block groups.

The accuracy of the lines has been the biggest concern of users since the beginning. The Census Bureau relies on multiple sources to create the TIGER lines, including USGS maps and aerial photography. As a result, the portions of the lines that follow geographic features are usually accurate. However, the legally-defined boundary lines often have problems. While the accuracy of the lines has improved greatly over the past 20 years, there are still a few problem areas.

As can be seen from the above image (click map to enlarge), the TIGER lines follow the lake edge quite well. For the most part they are also true to the street centerlines, but there are a few areas, such as in the left-hand blue circle, where they need to be corrected. The issue that causes the greatest number of problems is that the

Census Bureau does not follow parcel lines when drawing the TIGER lines. Look at the blue circle in the center. The TIGER line forming the boundary between blocks 1025 and 1026 started to follow the street centerline, but as it was a cul-de-sac, it ended part-way through. To finish the line, the Census Bureau merely dropped a straight line down to the destination line, cutting through a parcel in the process. These types of errors can be corrected by simply adjusting the TIGER lines to match the parcel lines. The last commonly-occurring error is when the Census Bureau creates unique boundary areas where none should exist, as shown in the blue circle in the upper right. As these lines form unique blocks, there is nothing that can be done to correct them.

Overall, the TIGER lines are quite accurate, and are very useful to cartographers. You can use them with confidence, if you remember to keep aware of the need for the occasional correction.

More information about the 2010 Census and TIGER/Line files can be found on the Census Bureau's website – http://www.census.gov.

Summer 2011 - Tech Talk: Parcel Data Updates as Easy as 1, 2,...10?

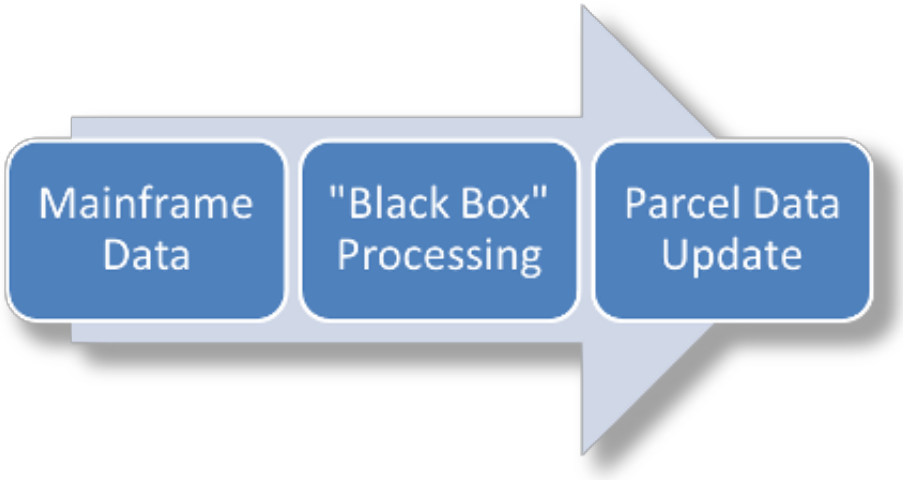
By Todd Lusk

The Dakota County Office of GIS recently began to streamline its parcel data update processes. But exactly what goes into the process? What all goes into making that information available? What types of information make up the data displayed, and where does that information come from? This article will take a look at just what it takes to make a parcel update happen.

Out With the Old and In With the New

The old parcel data update process involved a lot of behind-the-scenes text processing and custom-written applications (typically using Microsoft's Visual Basic programming language). The process was affectionately referred to as the "black box" by the Office of GIS, because most everyone was pretty sure no one single person knew exactly what the entire process did or how it worked.

The original process took several "flat" ASCII text files and ran a lot of UNIX text processing commands (awk, grep, sed, etc.) and custom-built programs on the files to massage them into appropriate formats. The text files originated in the County's mainframe and were produced by the County's Information Technology department. Ultimately, a DBF file was generated which was then joined together with the parcel geometry information and redistributed to all of the various GIS systems and applications sprinkled around the county. The entire update process took about an hour to run and was scheduled to run once a week to update the data.



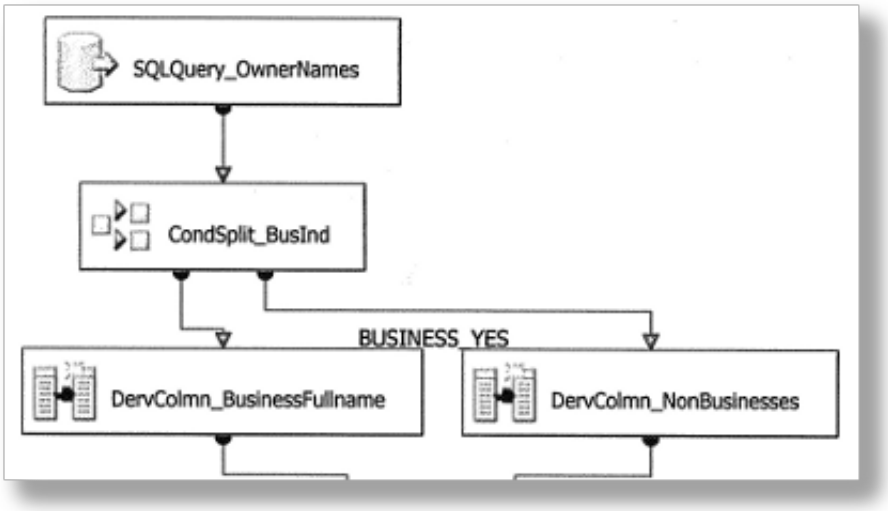
With a recent switch to a new taxation system, the Office of GIS saw an opportunity to rewrite and revamp some of the old text-based processing to bring it more in line with current technology, and to replace some unsupported techniques. The opportunity to utilize the capabilities of the full-scale relational database management system (RDBMS) on which the new taxation system was based was too good to pass up. Because the Office of GIS was already moving its geographic data into a RDBMS, it seemed like a natural opportunity to harness the power of both systems, to look for ways to make the update process more efficient and to utilize some of that processing power.

How Does It Work Now?

The new parcel data update process uses SQL Server to manage and run the actual processes. All the source data is now stored in a RDBMS which means the process itself gains a lot of efficiency. While it is still complex in nature, the efficiencies are gained through the abilities of SQL Server to manage, store, and process all of the data all in one location, on one server, in one format.

The primary parcel data table consists of 83 columns which originate in 10 different tables. Those SQL tables contain a wide range of information, ranging from owner names and addresses, to sales information, to tax and value information. The tables are updated nightly from the taxation system database by processes run by the County's IT Department. The Office of GIS, in turn, takes those tables and processes them further so they closely resemble the format of the DBF tables generated by the old "black box" process. The primary difference between the two is now the tabular data is stored in SQL Server instead more of a "flat" DBF file format. The SQL tables are then joined, just as the DBF tables were, to the geometry and exported as feature classes and/or shapefiles.

The figure below (click diagram to enlarge) shows the actual update process as it is diagrammed in SQL Server's data manipulation and processing tool, known as SQL Server Integration Services (SSIS). Essentially, the process creates a unique list of Parcel Identification Numbers (the top-most box in the figure) and uses those to link information together from the ten different tables. In some cases, some extra processing is done on input tables to ready them for the join, before they are pulled into the update process. For instance, because the "SALES" table stores data about more than just the most recent sale, it must be further refined before it can be used in the update process.



While the process looks complex in graphical form, it is actually much simpler, easier to maintain and more efficient now, because both the geometry and attribute data are stored in SQL Server. The processing and joins are all completed within the RDBMS, thus saving time. What used to be an hour-long update process can now be completed in as little as five minutes. The efficiencies gained may allow for more frequent updates of the parcel data. Some consideration has even been given to updating the parcel data on a nightly basis.

Ultimately, the switchover to a SQL-based RDBMS in both the Office of GIS and the new taxation system at Dakota County has resulted in gained efficiencies in the update of parcel data. This means the data can be updated more frequently and should be much easier to maintain in the future.