SDE Implementation at Union Pacific Railroad

Technical Summary

Union Pacific has been using Computer Aided Drafting for mapping for over 20 years. Many of the engineers and draftsman are used to working with CAD and want to continue doing so. In most cases there are good reasons why they should. One of the technical issues that we had to overcome was how to incorporate CAD data into our GIS using SDE.

We needed to take real estate land parcels for leases, sales, appraisals, etc., georeference them and enter the GIS data into SDE. We were able to do this with some effort. The steps we had to take were:

1. Project our track data and street/highway data.
2. Using the projected track, street, and highway data, georeference existing scanned right-of-way image files by scaling and rotating them.
3. Using the projected track, street, and highway data along with the georeferenced map image as a background, create the land parcel outline in CAD.
4. Convert the land parcel from CAD to an Arc/Info coverage.
5. Change the projection of the coverage to geographic coordinates.
6. Move the coverage to the SDE server.
7. Move the data into SDE using cov2sde.

This proved, in theory, that what we wanted to do was possible.

Working with ESRI, we first tried to use SDE Cad Client. This did everything but change the data from projected to geographic coordinates. We were faced with keeping a projected set of data. Having a track network in 23 states, we didn't think that there would be one projection that would work all of the time. We were used to working with ArcView and being able to project on the fly with data in geographic coordinates. Also, we had all of our other data already in SDE using geographic coordinates. Neither ArcView nor MapObjects (version 1.2) could work with data when some of it was projected and the rest was in geographic coordinates. We would have to learn to program the SDE projection engine as part of a custom solution.

SDE Cad Client had some features that we were not comfortable with. Part of the process of using it involved copying all or part of a layer of data from SDE into the Microstation file. Afterwards the data that was written back to SDE had to be separated from the rest of the contents of the CAD file using a fence. If this step was not completed correctly, one would put too much data from the CAD file into SDE. To make it work smoothly, one would almost need to create a custom application on the Microstation side.

Our whole process of searching for a solution took enough time that ESRI came up with a solution for us with their version 2.0 upgrade to MapObjects. MO 2.0 has the capabilities to change the projection of data, can write to SDE, and can read some CAD files directly (i.e. AutoCAD). However, we will have to wait for version 2.1 to be able to read Microstation files.

Using MO 2.0 and ArcView the steps to enter CAD data into SDE will be as follows:

1. Copies of the track and street layers were converted to CAD using Arc/Info . These CAD drawings are now used to georeference the scanned right-of-way maps. These will be used as background for creating the land parcels in Microstation.
2. The Microstation file, with the land parcel, is converted to an ArcView shape file with ArcView.
3. A custom application created using MapObjects 2.0, will be written to read the ArcView shape file, change from project to geographic coordinates, and enter the data into SDE.

We are looking forward to having a version of MapObjects that will read the Microstation files directly so we can eliminate step 2.

Below are 10 points to consider when using SDE:

1. Have both the SDE administrator and the database administrator attend the SDE Administration Class.
2. Work with users in order to avoid unrealistic expectations.
3. Develop a detailed plan of data implementation and use.
4. Follow ESRI's database tuning recommendations.
5. Learn about SDE configuration parameters – dbtune.sde and giomgr.defs file.
6. Experiment with various grid sizes and numbers of grids.
7. Compare SDE to alternatives.
8. Keep licensing costs in mind - both SDE and data.
9. Keep expertise of users in mind - use programmed interface for all but the most experienced users.
10. For the future how will Oracle Spatial Cartridge and SDO compare to SDE?