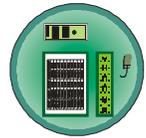


The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

February 2005

FEATURED COMMAND
CEDRA-DataEditor



Application Description

Every ArcView® GIS and ArcGIS® user has come across the application of having to edit a feature's attribute data. Using native ArcView or ArcMap functionality this editing process usually involves having to: (a) start an editing session, (b) click in the appropriate table cell, (c) enter the desired data, (d) click at another cell for the new entry to take effect, and (e) finally stopping the editing session. This approach can be quite tedious when dealing with large datasets and/or having to make several edits to a table. In addition, it offers no quality control, or data verification.

The CEDRA Solution

In our projects, we often encounter this very same problem, which is why we use the CEDRA-DataEditor™ software. The CEDRA-DataEditor software enables the user to create a custom dialog box for a layer or theme containing the attributes that the user wishes to edit. There is no limit to the number of layers or themes which can be defined, nor is there a limit to the number of attributes which the user can edit. *All of this is accomplished without having the user write any Avenue or Visual Basic code.*

The CEDRA-DataEditor Software

The basis for the CEDRA-DataEditor software is the Theme Attribute Data file. This file is ASCII based, and it contains the names of the themes or layers and their attributes which are available to the user for editing. This file can be created using any word processor, or

text editor, such as Word or Notepad. As an example, let us assume that we have a Line theme called THEME1, and that in this theme there are two attributes called FIELD1 and FIELD2 which the user wishes to edit. Given this, the Theme Attribute Data file could look like this:

```
/* Sample Attribute Data File
/* Identify the theme or layer
THEME
THEME1
/* Identify the first attribute
FIELD1
Enter the FIELD1 value:
/* Identify the second attribute
FIELD2
Enter the FIELD2 value:
/* Terminate the theme definition
END
```

Command Of The Month bulletin

This month's issue addresses how to edit and maintain a feature's attributes.

Shown in Figure 1 is the custom dialog box that would be created by the CEDRA-DataEditor software as a result of using the sample Theme Attribute Data file shown above. This dialog box will appear after the user selects to edit a Line feature in the THEME1 layer.

In creating the Theme Attribute Data file, *the name of this file must be themes.txt, and it must reside in the current working directory.*

Note that the data lines in the sample Theme Attribute Data file that begin with

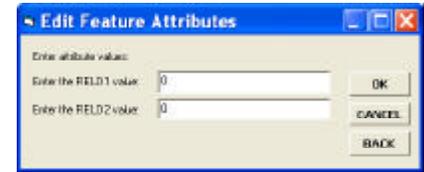
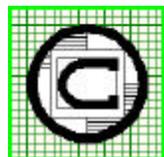


Figure 1
CEDRA-DataEditor Custom Dialog Box

the /* characters are referred to as comment lines. They are used solely to improve the readability of the file, and they are ignored. Comment lines may appear anywhere within this file.

The data line containing the command THEME is used to begin the definition of the theme or layer. Below the THEME command is the name of the theme or layer which is to be defined. *The spelling of the theme or layer name must match exactly the spelling of the theme or layer as it appears in the Table of Contents within ArcView or ArcMap.* Note that the name is not case sensitive. However, if there is an extension on the name, it must be included in the Theme Attribute Data file. For example, in ArcView a shapefile would typically appear as Theme1.shp in the Table of Contents. As such, the Theme Attribute Data file would have to have the name appear as Theme1.shp or THEME1.SHP in order for the CEDRA-DataEditor software to properly operate on this theme.

Below the name of the theme, the user lists the attributes which can be edited. In defining an attribute, the user must specify at a minimum two data lines. The first contains the name of the attribute, and the second contains the attribute label that the user wishes to be dis-



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played in the custom dialog box to the left of the attribute data field in the custom dialog box, as shown in Figure 1. The prompt to the left of the data field is referred to as the attribute label.

Once an attribute has been defined, the user is able to specify another attribute following the format described above. That is, the name of the attribute, on one data line, and below this, the attribute label.

Note, that the order, in which the attributes are listed under the THEME command, controls the display sequence of the attribute data fields in the custom dialog box.

Once all of the attributes have been defined, the END command is inserted to terminate the definition of the theme.

At this point, the user is able to define another theme following the format described above. As stated at the outset, there is no limit to the number of themes or layers which can be defined, as well as, no limit to the number of attributes which can be specified.

In specifying the attributes for a theme or layer which can be edited, the user does not have to specify every attribute associated with the theme or layer. The user only specifies those attributes which are to appear in the custom dialog box, and hence available for editing.

The number of data fields that can appear in a custom dialog box is controlled by the NLINES command, which can be the first, or last command in the Theme Attribute Data file. If the number of attributes to be displayed in the dialog box, and therefore be edited, exceeds the number of data fields which can be displayed in a custom dialog box, additional custom dialog boxes will be displayed once the OK button is selected. The BACK button can be used to return to previous custom dialog boxes.

Any feature based theme (point, polyline, polygon) which can be edited within ArcView or ArcMap can be specified in the Theme Attribute Data file. The

CEDRA-DataEditor software will handle shapefiles, as well as personal geodatabase and SDE enterprise geodatabases.

Drop-down Choice Lists

Obviously, the above example is very simplistic. However it does illustrate the concept of the Theme Attribute Data file. To enhance the data entry experience, the user is able to introduce drop-down or choice list data fields.

To define a drop-down data field, the user is able to introduce the CHOICES command. Expanding our example above, let us assume that we have another attribute called FIELD3 which can contain the values: Red, Blue or Green. As such, the Theme Attribute Data file could look like this:

```
/* Sample Attribute Data File
/* Identify the theme or layer
THEME
THEME1
/* Identify the first attribute
FIELD1
Enter the FIELD1 value:
/* Identify the second attribute
FIELD2
Enter the FIELD2 value:
/* Identify the third attribute
FIELD3
Select the FIELD3 value:
CHOICES
Red
Blue
Green
END
/*Terminate the theme definition
END
```

Shown in Figure 2 is how the custom dialog box would appear using the sample Theme Attribute Data file, as modified above.

As can be seen, the CHOICES command is placed below the attribute label, after which, the user enters all of the valid choices. The order in which the choices appear in the Theme Attribute File controls how they appear in the custom dialog box. Once all of the choices have been entered, the END command is used to terminate the CHOICES command. If the field is to be able to accept a blank



Figure 2
Custom Dialog Box with Choice List

string, a data line containing one or more blank characters should be entered.

Utilizing the CHOICES command is an excellent means of eliminating typographic errors, and ensuring valid data entry.

Equation Solving

In addition to the CHOICES command, the user is able to compute an attribute's value by evaluating an equation. To do this, the ATTRIBUTE_EQUATION command can be used.

Expanding our example further, let us assume that we have an attribute called SLOPE, which represents the slope of a pipe in percent form. The value of SLOPE is to be computed by using the values of the LEN, SZ and EZ attributes, where LEN represents the length of the pipe, SZ the elevation of the start point of the pipe, and EZ the elevation at the end point of the pipe. Furthermore, we wish to have the default value of the LEN attribute be the length of the pipe or line feature. As such, the Theme Attribute File could look like this:

```
/* Sample Attribute Data File
/* Identify the theme or layer
THEME
THEME1
/* Identify the first attribute
FIELD1
Enter the FIELD1 value:
/* Identify the second attribute
FIELD2
Enter the FIELD2 value:
/* Identify the third attribute
FIELD3
Select the FIELD3 value:
CHOICES
Red
Blue
Green
END
```

```

/* Identify the Start Elevation
SZ
Enter the Line Start Elevation:
/* Identify the End Elevation
EZ
Enter the Line End Elevation:
/* Identify the Line Length
LEN
Enter the Line Length:
DEFAULT RETURN_LENGTH
/* Compute the Pipe Slope
SLOPE
Pipe Slope (%):
ATTRIBUTE_EQUATION
((EZ-SZ)/LEN)*100.0
/* Terminate the theme definition
END
    
```

Shown in Figure 3 is how the custom dialog box would appear using the sample Theme Attribute Data file as modified above.



Figure 3
Attribute Equation Evaluation

Upon display of the custom dialog box, the user views the current values assigned to the various attributes. The default value for the LEN attribute is the length of the line feature. The value for the SLOPE attribute is the result of the equation which appears below the ATTRIBUTE_EQUATION command.

The DEFAULT command is used to compute an initial, or default value for an attribute that has not been previously populated. Default values can be in the form of coordinates, lengths, areas, dates, or an explicit value. Coordinates can be expressed in terms of state plane, UTM, or latitude and longitude. Areas can be expressed in square feet (square meters), or acres (hectares). Dates can be formatted according to a predefined or user-defined format.

Note that it is possible for the user to change the SZ, EZ or LEN attributes

values. However, attributes whose values are computed, based upon an equation, can not have their values entered explicitly. These attributes are always populated by evaluating their equation.

In addition, should the user alter the value for SZ, EZ or LEN, and then depress the Enter key, the value for SLOPE would be recomputed and the new result displayed in the custom dialog box. Thus, by depressing the Enter key the user is able to have those attributes, which have been assigned an equation, reevaluated without having to exit the custom dialog box.

In evaluating an equation, the CEDRA-DataEditor software supports a number of mathematical and boolean operators, and trigonometric functions. In addition, the user has the ability to specify conditionals, that is, IF statements. The use of IF statements is particularly useful because they allow the user the ability to compute values based upon the values of other attributes in the layer or theme. Parentheses can be used in IF statements to separate condition groups. The supported:

Mathematical operators include:

- ^ exponentiation,
- / division,
- * multiplication,
- + addition,
- subtraction.

Boolean operators include:

- = equality,
- < less than,
- > greater than,
- <= less than or equal to,
- >= greater than or equal to,
- <> not equal to.

Functions include:

- ABS absolute value,
- ACOS arc cosine in radians,
- ASIN arc sine in radians,
- ATAN arc tangent in radians,
- COS cosine in decimal degrees,
- DEG2RAD conversion of degrees to radians,
- RAD2DEG conversion of radians to degrees,
- ROUND rounding up of a number to the nearest whole number,

- SIN sine in decimal degrees,
- SQRT square root,
- TAN tangent in decimal degrees,
- TRUNCATE truncate a number.
- STRING treat the value as a string, not as a numeric value.
- TRIM remove leading and trailing blanks from the value.

Located at the URL address, <http://www.cedra.com/deusrman/>, a file called *deusrman.pdf* exists. This file contains a complete description on the operation, and functionality of the CEDRA-DataEditor software. The reader is encouraged to visit this site, and review the contents of this file.

Editing Features

Shown in Figure 4 are the tools which are included in the CEDRA-DataEditor toolbar. The first tool in the toolbar is the Edit Feature Attributes tool, and is the primary means of how the user edits a feature's attributes.

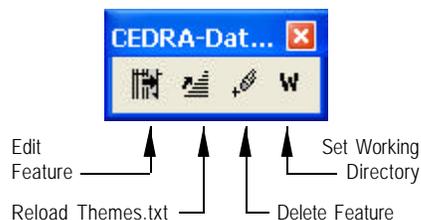


Figure 4
CEDRA-DataEditor Tools

Once this tool is selected, the user simply "picks" the feature which is to be edited. Upon confirmation of the feature selection, the custom dialog box for the layer in which the feature resides in is displayed. The user is then able to review the current attribute data assigned to the feature, and make the appropriate modifications.

Copying Features

A common technique in working with the CEDRA-DataEditor software is to use the software's ability to copy a feature into a theme or layer. As stated in the beginning of this document, the Theme Attribute Data file contains all of the themes or layers which the

CEDRA-DataEditor software can process, for a given ArcMap document, or ArcView project file. If the user selects a feature that does not reside in one of the themes in the Theme Attribute Data file, the program will inform the user and ask the user which theme or layer the selected feature is to be copied into.

This capability enables the user to create features in a temporary or scratch theme or layer and then use the Edit Feature Attributes tool to copy the feature from the scratch theme into a permanent or desired theme. Likewise, the user is able to copy features from an outside source, such as a DXF or DWG file, into a permanent or desired theme. Once the feature has been copied, the user is able to assign the appropriate attributes to the feature.

As an example, let us assume we have a SDE geodatabase containing sewer lines. A new subdivision is designed containing new sewer lines. We now desire to update the SDE geodatabase.

To accomplish this, we should have the new sewer lines given to us in the form of a shapefile, geodatabase, DXF, DWG or equivalent type of file that can be displayed within ArcView or ArcMap. With this on hand, we would next create a Theme Attribute Data file that contains the name of the SDE featureclass into which the sewer lines are to be copied into, and the attributes which are to be available for updating.

At this point we would create an ArcView project file or an ArcMap document file, and load the new sewer line dataset, as well as, the SDE featureclass. We then would load the CEDRA-DataEditor software, set the current working directory, and load the Theme Attribute Data file with the second tool, *Reload Themes.txt File*, of Figure 4.

We can now activate the Edit Feature Attribute tool to select a new sewer line. Since the Theme Attribute Data file would not include the theme that contains the new sewer lines, the Edit Feature Attribute tool would ask us for the theme into which the new sewer line

should be copied into. At this point we would specify the SDE sewer featureclass. The Edit Feature Attribute tool will then make a copy of the new sewer line, and add it to the SDE sewer featureclass, after which, it would display a custom dialog box containing the attributes that can be populated. This process could then be repeated for each of the new sewer lines to be introduced into the SDE sewer featureclass.

Note that when the software makes a copy of the new sewer line, the original sewer line is left intact. It is not deleted from the new sewer line dataset.

Loading the Theme Attribute Data file

The second tool in the CEDRA-DataEditor toolbar (see Figure 4) is the Reload the Theme Attribute Data File tool. This tool reads the Theme Attribute Data file, *themes.txt*, that is located in the current working directory. This enables the user to alter the Theme Attribute Data file, while ArcView or ArcMap is in use, and then reload the modified file to verify the modifications. This is extremely handy when the user is in the process of creating, and testing the Theme Attribute Data file.

Deleting Features

The third tool in the CEDRA-DataEditor toolbar (see Figure 4) is the Delete Selected Features tool. This tool enables the user to delete features which appear in the Theme Attribute Data file.

This tool is provided as an alternative to native ArcMap or ArcView deleting functionality. Note that the Undo command can be used to undo the deletion.

The Current Working Directory

The fourth tool in the CEDRA-DataEditor toolbar (see Figure 4) is the Set Working Directory tool. This tool enables the user to specify the current working directory. Using a conventional file navigation dialog box, the user can select the folder or directory where the desired Theme Attribute Data file resides.

This is a particularly useful command because the default working directory for ArcView or ArcMap is its home directory.

Note that although there is no limit to the number of Theme Attribute Data files that can be created in a computer, there can only be one *themes.txt* file per working directory or folder.

Expanding upon this, in our own applications we create a separate folder or directory for a specific project. Within this folder we create a Theme Attribute Data file, *themes.txt*, specific for that particular project. Furthermore, we store the ArcView project file (*.apr) or ArcMap document file (*.mxd) in the same folder where the Theme Attribute Data file resides. Although everyone has a slightly different approach to file management, we find this approach the most straightforward.

Summary

For those users who are involved in entering and updating data, the CEDRA-DataEditor software is an excellent tool in performing these types of applications.

As shown in the example presented in this document, the Theme Attribute Data file is fairly simple to create, yet offers a fair amount of flexibility and functionality. We encourage our users who have not used the CEDRA-DataEditor to try the software, and see how it works in their own applications.

As always should there be any questions on how to use the CEDRA-DataEditor, or recommendations in additional functionality that would be desirable, please let us know.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.