

# Data 1

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*Data/Information  
in the GIS Database*

# 1 Data/Information in the GIS Database

This environmental GIS database was prepared in the Master Plan Study on Integrated Environmental Management in Baku City in Azerbaijan Republic, under the Development Study Programme of the Japan International Cooperation Agency (JICA). In this chapter, the team introduces regarding a GIS manual, a database management, a GIS data book and a homepage of BCE.

## 1.1 GIS Manual

This section will only refer to the important aspects that were considered in the period of training. The other details of utilisation of Arc View, is explained in the manuals “Using ArcView GIS”.

### 1.1.1 Introduction

ArcView is a powerful, easy-to-use tool that brings geographic information to your desktop. ArcView gives you the power to visualise, explore, query and analyze data spatially.

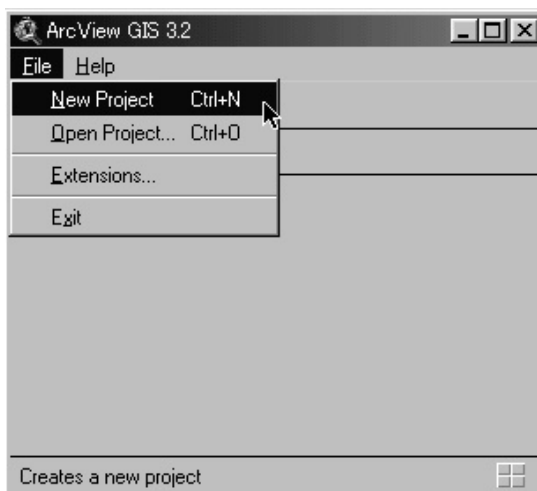
ArcView is produced by Environmental Systems Research Institute (ESRI), the maker of ARC/INFO.

### 1.1.2 Working with Project

A project is the file in which work you do in ArcView is stored. A project typically contains all the view, tables, charts, layouts, and scripts that you use for a particular ArcView application. In this way, your work is stored in one convenient place. The next time you want to work on this application you can simply open this project file in ArcView and all the components you need are available for you to use. Project files have an [.apr] extension.

#### a. Creating a project

1. Start ArcView, and from the File menu, choose New Project

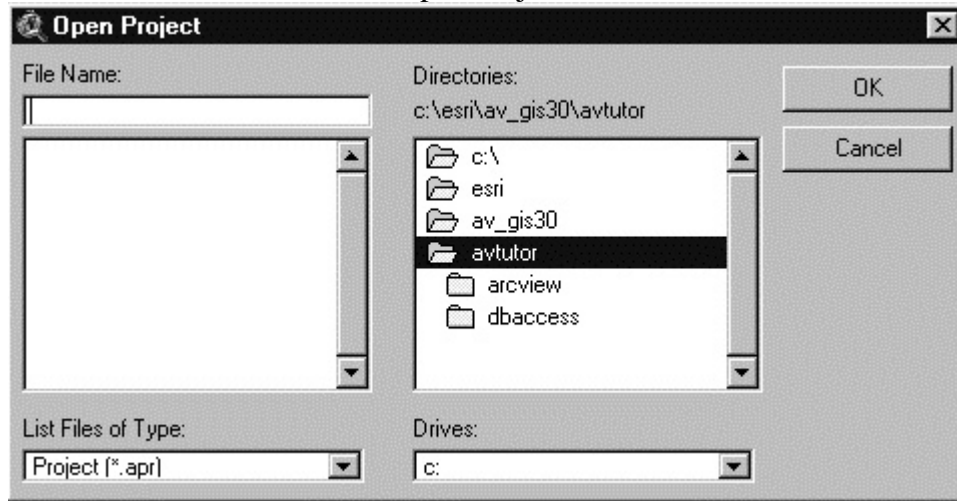


2. ArcView creates a new project called Untitled and opens the project window.

### 1.1.3 Management of a Project

#### a. Opening an existing project

1. From the File menu, choose Open Project.



2. ArcView displays the Open Project dialog box where you specify the name and location of the project you want to open.

#### b. Copying a project

1. From the File menu, choose Save Project As. ArcView displays a dialog box in which you give the active project a different name and save it.

#### c. Renaming or deleting a project

1. Close the project. In a multi-user environment, confirm that all users have closed the project.
2. Use your system's file management application, desktop editing technique or the appropriate rename or delete command to work with the ArcView [.apr] file. If you are renaming the project, the new name can be up to eight characters long but can't contain spaces.

### 1.1.4 Creating and using maps

#### a. What is a view and theme?

A view is an interactive map that lets you display, explore, query and analyze geographic data in ArcView. Views are saved in the ArcView project you are currently working with. A view defines the geographic data that will be used and how it will be displayed, but it doesn't contain the geographic data files themselves. Instead, a view references these source data files. This means that a view is dynamic, because it reflects the current status of the source data. If the source data changes, a view that uses this data will automatically reflect the change the next time the view is drawn.

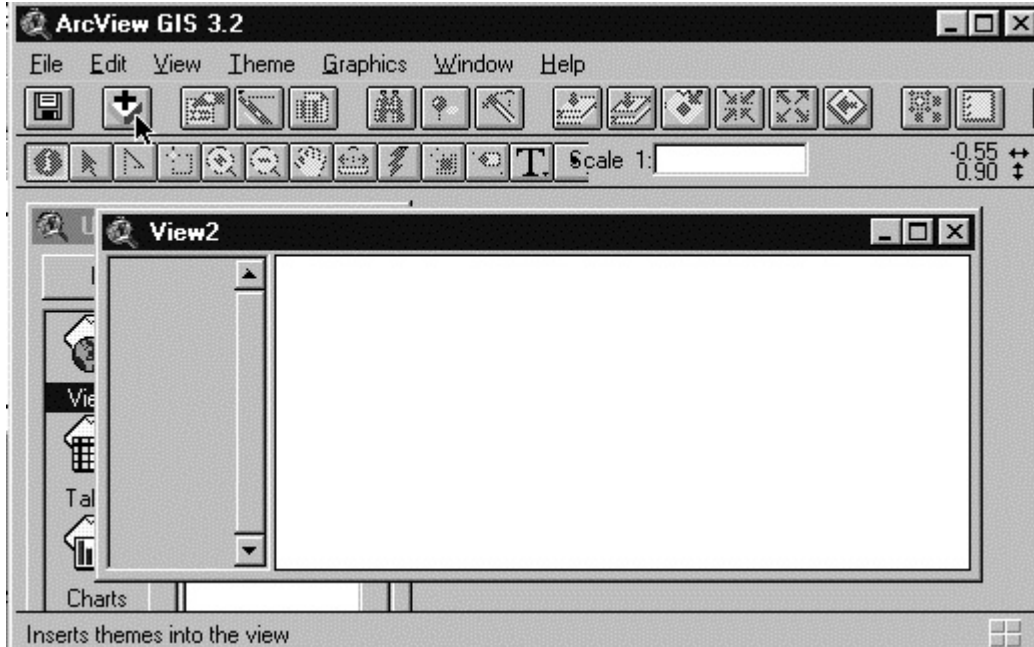
A view is actually a collection of themes. A theme represents a distinct set of geographic features in a particular geographic data source. For example, a view showing a country might have one theme representing cities, one theme representing roads, one representing rivers, etc.

**b. Creating a new view and adding a theme to a view**

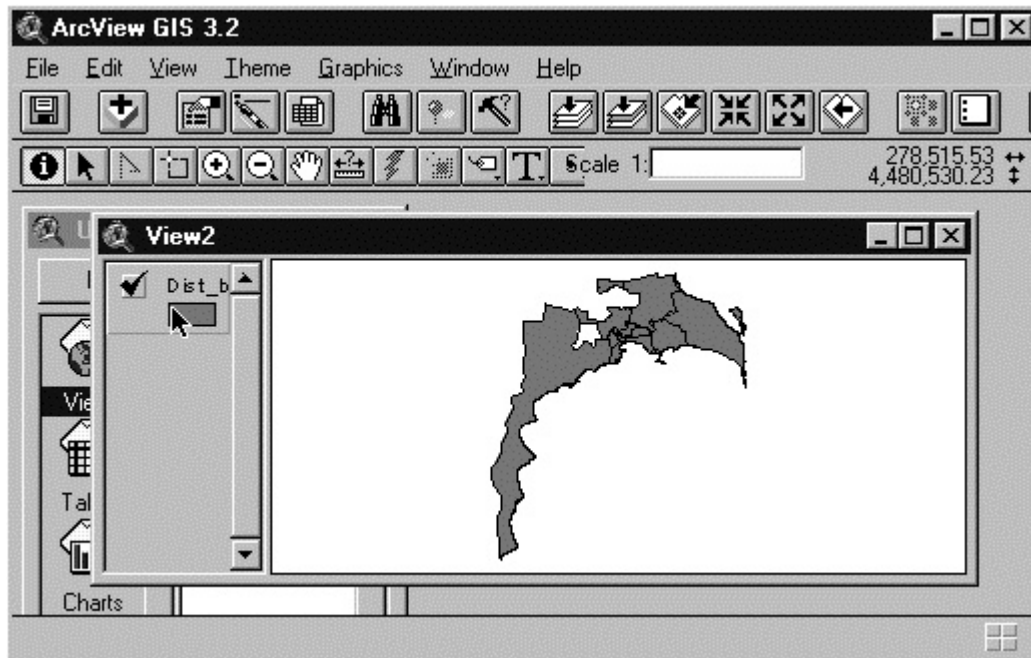
1. On the Project window, click the Views button and then press the New button. A new, empty view will appear in your project.



2. Add themes to the view for each spatial data source you want to display. You can also add themes based on tabular data such as street addresses or XY coordinates. Click in the add button.



3. ArcView displays the **Add theme** dialog box where you specify the name and location of the theme you want to add.
4. Click check boxes of the theme names to drawn in your view. These check boxes let you toggle themes on and off in the view.



### 1.1.5 Laying out and printing maps

#### a. Creating a layout

A layout is a map that lets you display views, charts, tables, imported graphics, and graphic primitives. The layout is used to prepare these graphics for output from ArcView. The layout defines what data will be used for output and how they will be displayed. The layout can be dynamic because it allows you to make specific graphics live. When a graphic is live, it reflects the current status of the data. For example, if the data in a view changes, the layout automatically reflects the change.

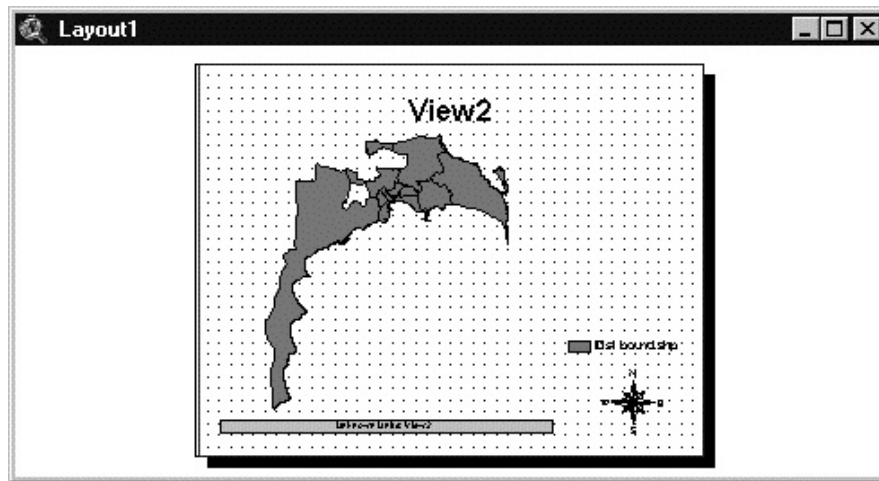
1. From the file menu selects **Layout**.



2. Select the paper size, orientation and then Click ok button.



3. Add legend, scale bar, title, graphic and when you are finally satisfied with your layout you can send it to a printer.

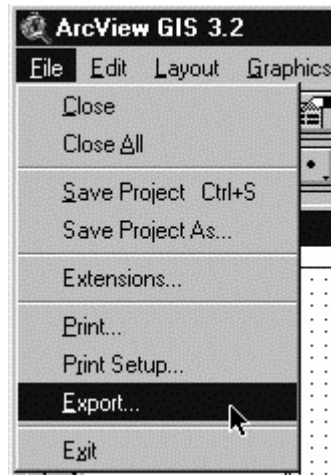


#### b. Exporting a layout

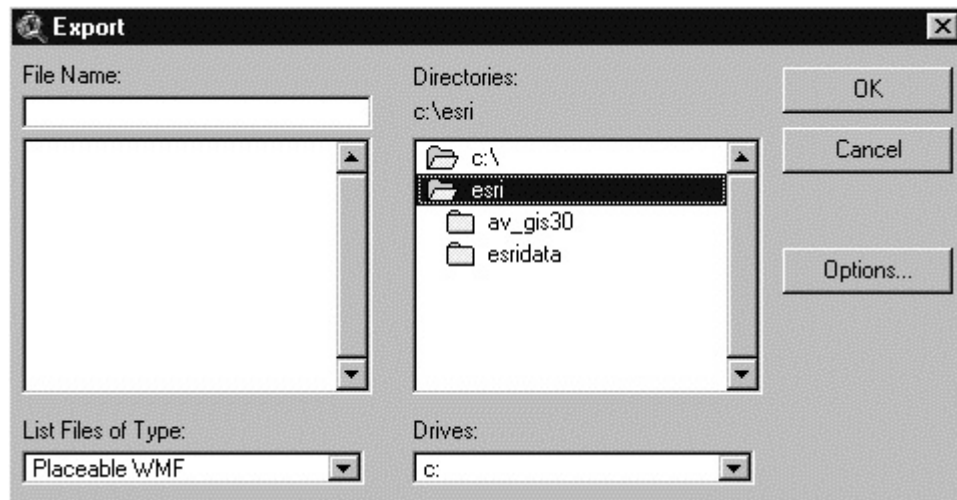
You can export a layout to a file in any of a number of supported output formats. ArcView exports to the following formats:

- Placeable Windows Metafile
- Windows Metafile
- Windows Bitmap
- Encapsulated PostScript - New
- Encapsulated PostScript - Old
- Adobe Illustrator
- CGM Binary
- CGM Character
- CGM Clear Text
- JPEG

1. Select the layout you want to export
2. From the file menu select **Export**.



3. ArcView displays the **Export** dialog box where you specify the name and location of the layout to export, and select a file format from the **List Files of Type**.



### 1.1.6 Working with tabular data

#### a. What is a table?

A table lets you work with data from a tabular data source in ArcView. You can bring data from almost any tabular data source in your organisation into ArcView as tables. Then you can add data from these tables to maps, and symbolise, query and analyze this data geographically.

An ArcView table references the tabular data source it represents, but doesn't contain the tabular data itself. This means that tables are dynamic, because they reflect the current status of the source data they are based on. If the source data changes, a table based on this data will automatically reflect the change the next time you open the project containing this table. You can also choose Refresh from the Table menu to refresh the table at any time to see the current state of your source data. The definitions of tables you add to ArcView are saved in the project file you are currently working on.

You can create new tables in ArcView and type data values into them directly. You can also edit some tables, depending on the type of tabular data source they represent and whether you have write permission to them. See editing the values in a table.

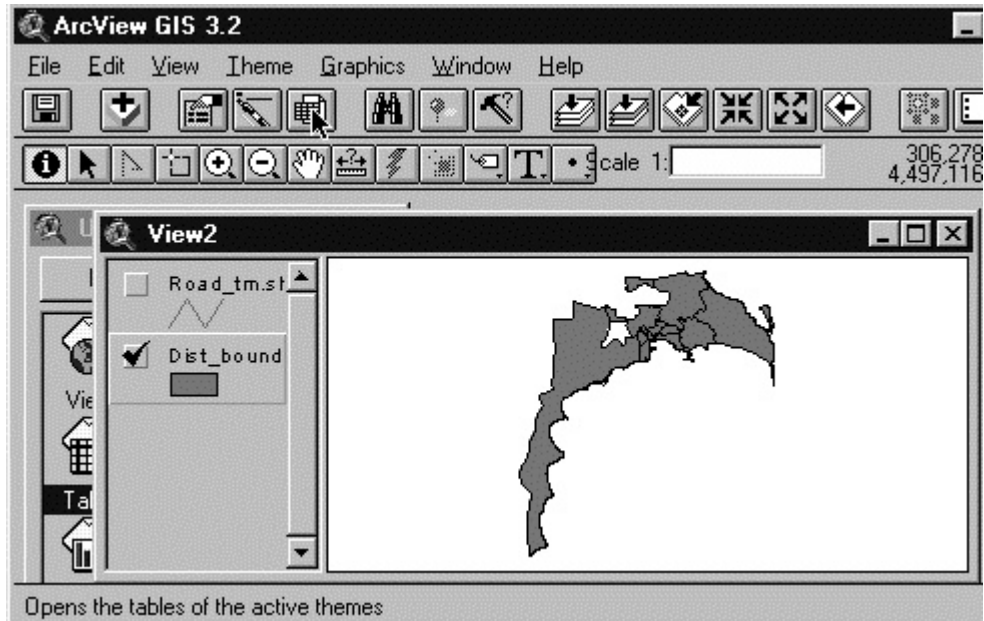
You can add dBASE, INFO, and tab or comma delimited text files into ArcView as tables. These data sources can contain any data that you wish to work with in ArcView. For example, these tables might contain additional information about the features displayed on a view.

From ArcView, you can connect to a database server, such as Oracle or Sybase, and run an SQL query to retrieve records from it as a table. ArcView stores the definition of the SQL query you used, not the records themselves. See Connecting to a database to create a table.

## b. Management of a Table

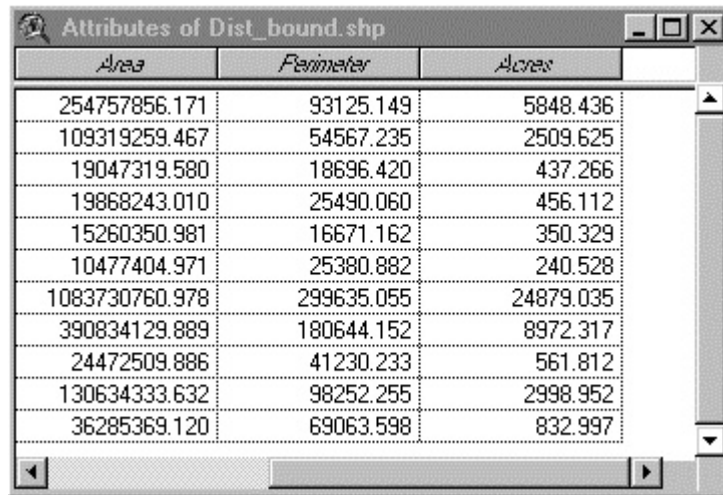
### b.1 Opening a theme's table

1. Open the view containing the theme.
2. Click on the theme to make it active and Click the *Open Theme Table* button in the View button bar.



3. When you open a theme's table, it will appear in the list of tables in the Project window in which case it can also be opened using the Open button on the Project window.





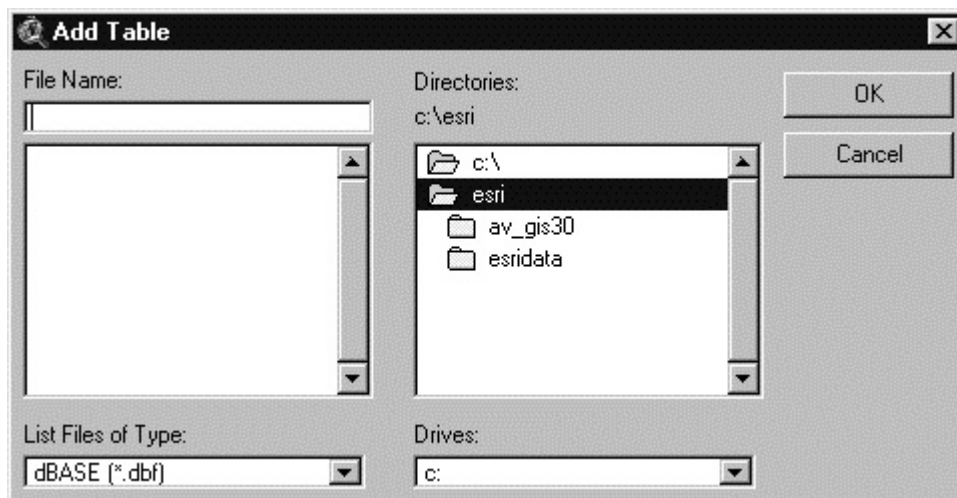
Area	Perimeter	Acres
254757856.171	93125.149	5848.436
109319259.467	54567.235	2509.625
19047319.580	18696.420	437.266
19868243.010	25490.060	456.112
15260350.981	16671.162	350.329
10477404.971	25380.882	240.528
1083730760.978	299635.055	24879.035
390834129.889	180644.152	8972.317
24472509.886	41230.233	561.812
130634333.632	98252.255	2998.952
36285369.120	69063.598	832.997

## b.2 Adding a table into a project

1. Select the table icon in the project windows and click the “Add” button.

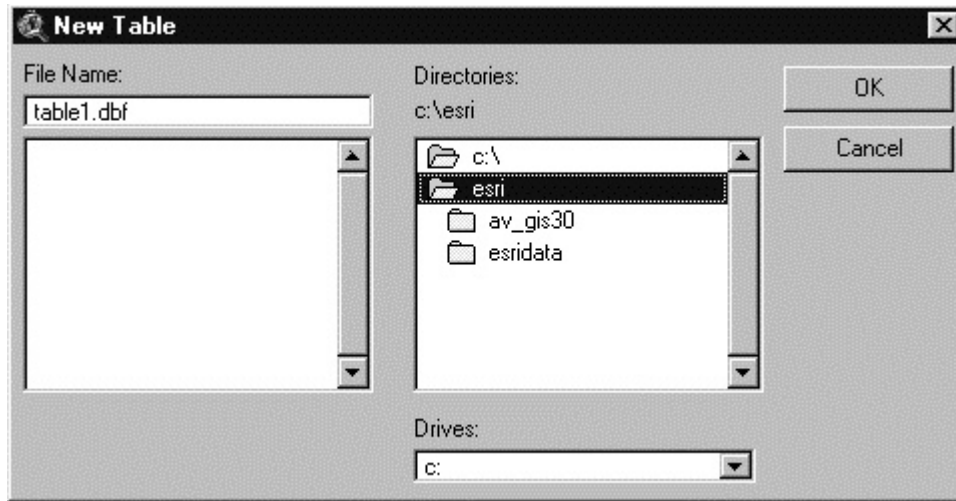


2. ArcView displays the [Add Table] dialog box where you specify the name, type and location of the file to add a dBASE, INFO or delimited text file as a table in your project.



### b.3 Creating a new table

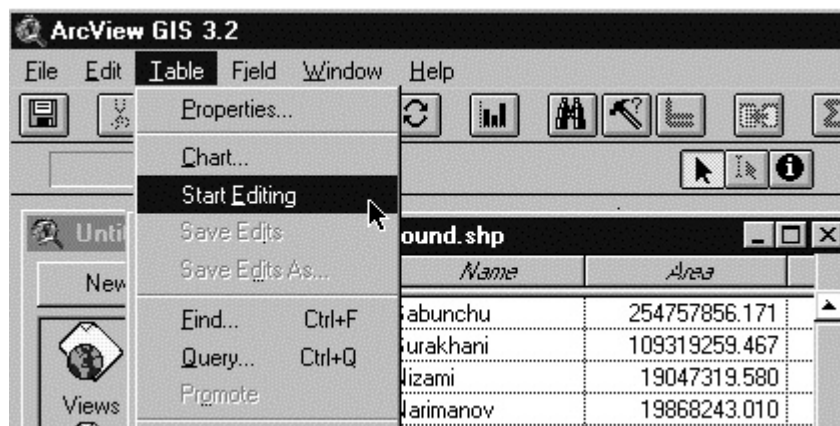
1. With the Tables icon selected, click the New button at the top of the Project window.



2. Enter a name and a disk location for the dBASE file that ArcView will create to store the source data for the table. ArcView creates a new table and its name will appear in the list of tables in the project. ArcView names new tables in numerical order: Table1, Table2, Table3, etc.

### b.4 Editing a table

1. Open the table you want to edit.
2. From the Table menu, choose Start Editing. If you have write access to the data source, you will be allowed to edit the table. You can add or delete fields and records and edit the values in the table.



### b.5 Closing a table

1. From the File menu, choose Close, or click the close control on the table's window.

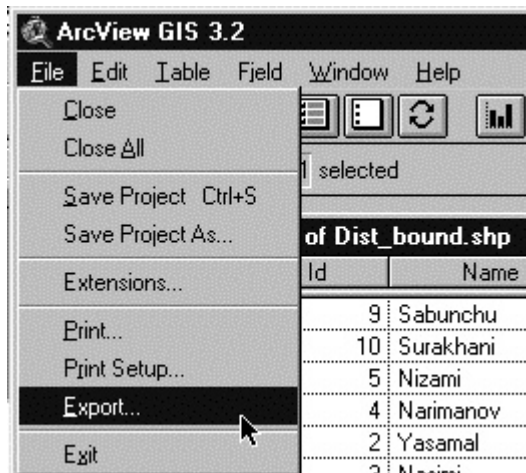
### b.6 Deleting a table

Click once on the table in the list in the Project window and choose Delete from the Project menu. You will be prompted to confirm deleting the table. Deleting a table

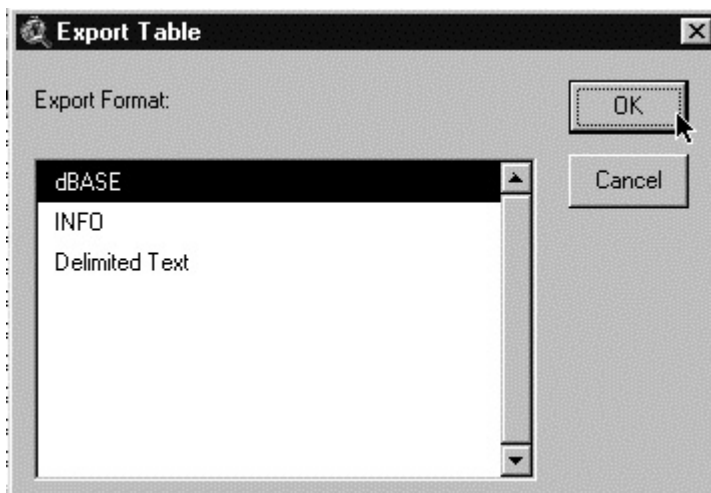
removes it from the project, but does not affect the tabular data source that the table is based on.

### b.7 Exporting a table

1. Open the table you want to export.
2. From the File menu, choose [Export]



3. ArcView displays the [Export Table] dialog box where you specify the export format and then click the [OK] button.



### c. Join tables

You can join a table to the active table based on the values of a common field found in both tables. Join establishes a one-to-one or many-to-one relationship between the destination table (the active table) and the source table (the table you are joining into the active table). Typically, the source table contains descriptive attributes of features that you wish to join into a theme's table so that you can symbolise, label, query and analyze the features in the theme using the data from your source table.

#### c.1 Joining two tables

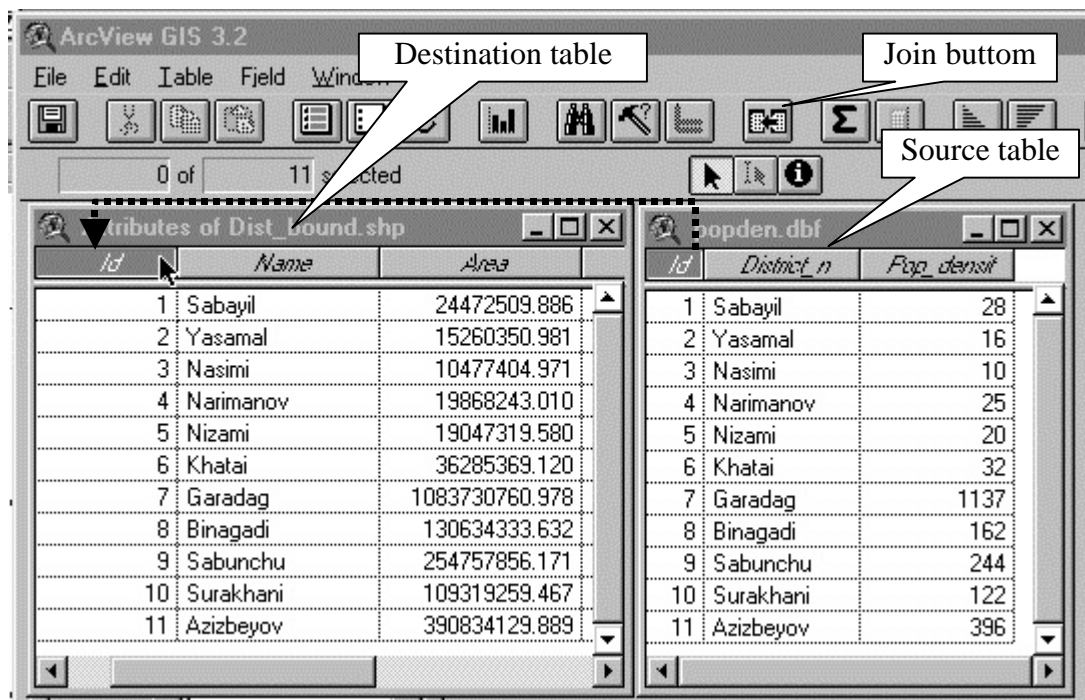
1. Open the tables you wish to join.
2. For example to join district population density with attribute of district boundary table.

3. Make the source table active (district population density). Click the name of the common field you wish to use (ID).

Id	Name	Area
1	Sabayil	24472509.886
2	Yasamal	15260350.981
3	Nasimi	10477404.971
4	Narimanov	19868243.010
5	Nizami	19047319.580
6	Khatai	36285369.120
7	Garadag	1083730760.978
8	Binagadi	130634333.632
9	Sabunchu	254757856.171
10	Surakhani	109319259.467
11	Azizbeyov	390834129.889

Id	District_n	Pop_densit
1	Sabayil	28
2	Yasamal	16
3	Nasimi	10
4	Narimanov	25
5	Nizami	20
6	Khatai	32
7	Garadag	1137
8	Binagadi	162
9	Sabunchu	244
10	Surakhani	122
11	Azizbeyov	396

4. Make the destination table (attribute of District boundary). Click the name of the common field you wish to use (ID).



5. From the Table menu choose Join, or click the Join button. Now you have a table of district boundary with a population density.

Shape	Id	Name	Area	Pop_densit
Polygon	9	Sabunchu	254757856.171	244
Polygon	10	Surakhani	109319259.467	122
Polygon	5	Nizami	19047319.580	20
Polygon	4	Narimanov	19868243.010	25
Polygon	2	Yasamal	15260350.981	16
Polygon	3	Nasimi	10477404.971	10
Polygon	7	Garadag	1083730760.978	1137
Polygon	11	Azizbeyov	390834129.889	396
Polygon	1	Sabayil	24472509.886	28
Polygon	8	Binagadi	130634333.632	162
Polygon	6	Khatai	36285369.120	32

Tables are joined based on a field that is found in both tables. The name of the field does not have to be the same in both tables, but the data type has to be the same. You can join;

- Numbers to numbers
- Strings to strings
- Booleans to Booleans
- Dates to dates.

Any field can be chosen as the basis for a join, not just ones that uniquely identify geographic features.

### c.2 Why is the join option dimmed out when I try to join tables

1. The problem may be because the source table already contains a join. For example, if you join table A to table B and then try to join table B to table C, the join option will appear dimmed out. To see if your source table already contains a join, make it active and look at the Remove All Joins option in the Table menu. If Remove All Joins is not dimmed out, your source table does contain one or more joins.

To perform a join in this situation you can either choose Remove All Joins to remove any existing join(s) from your source table and then perform the join or export the source table into a new table, add that table into your project, then do the join. The latter option is more useful than the first because it ensures that all the data in your original table is joined to the destination table.

To perform a join in this situation you can either choose Remove All Joins to remove any existing join(s) from your source table and then perform the join or export the source table into a new table, add that table into your project, then do the join. The latter option is more useful than the first because it ensures that all the data in your original table is joined to the destination table.

The destination table (the table that is active when you choose Join) can contain existing joins.

2. Join will also be dimmed out if the data types of the fields that you are joining are different. For example, trying to join tables on a zip code field that is of type number in one table and of type string in another table. The string field is

left justified while the number field is right justified. To resolve this issue, add a field to one of the tables that is of the appropriate type and use the calculator to add zip codes from the original field.

3. Joins are also not possible if the source table is in edit mode.

### **c.3 Editing joined data**

When editing a joined table, you can only edit the fields in the destination table. Edits to the fields from source tables must be performed directly on those tables. You can then use Refresh from the Table menu to show the changes in the joined table.

### **c.4 How are joins saved**

When you save a project containing a join, ArcView saves the definition of the join rather than saving the joined data itself. The next time you open the project, ArcView rejoins any joined tables by reading their files from disk or re-executing the SQL queries they are based on. In this way, any changes to the source or destination tables that have taken place since they were last joined are automatically included in the project, and reflected in any views, tables, charts or layouts based on the joined data.

Because joining tables has no effect on their physical files on disk, you don't need to have write permission to files to be able to join them in ArcView.

If you want to make a new table on disk to permanently store the joined data, you choose Export from the Table menu. You would do this, for example, if you wanted to use the table in another application.

To remove joined fields from a table you are working on, choose Remove All Joins from the Table menu.

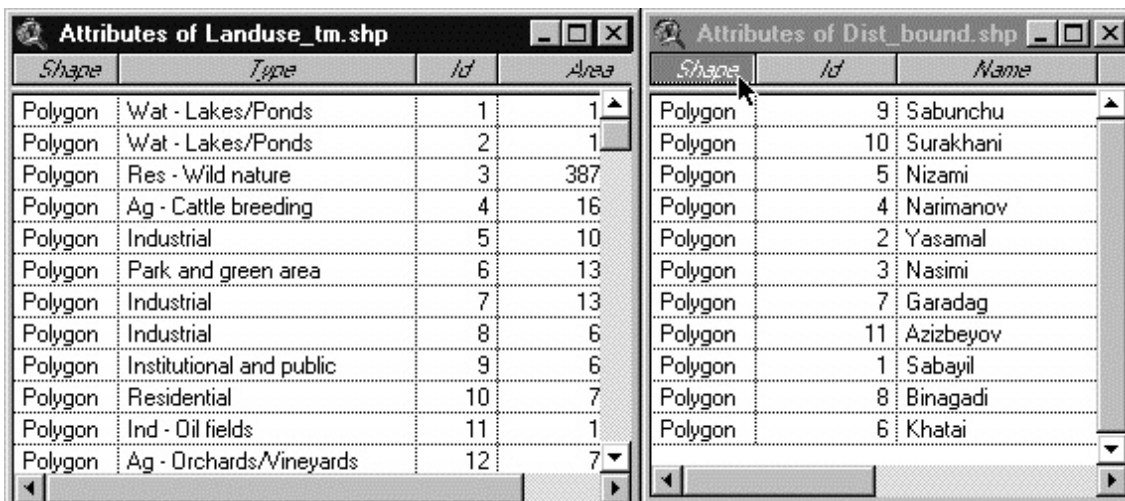
## **d. Spatial joins**

If you join two theme attribute tables together using their Shape field as the common field, ArcView automatically bases the join on the spatial relationship between the features in the two themes.

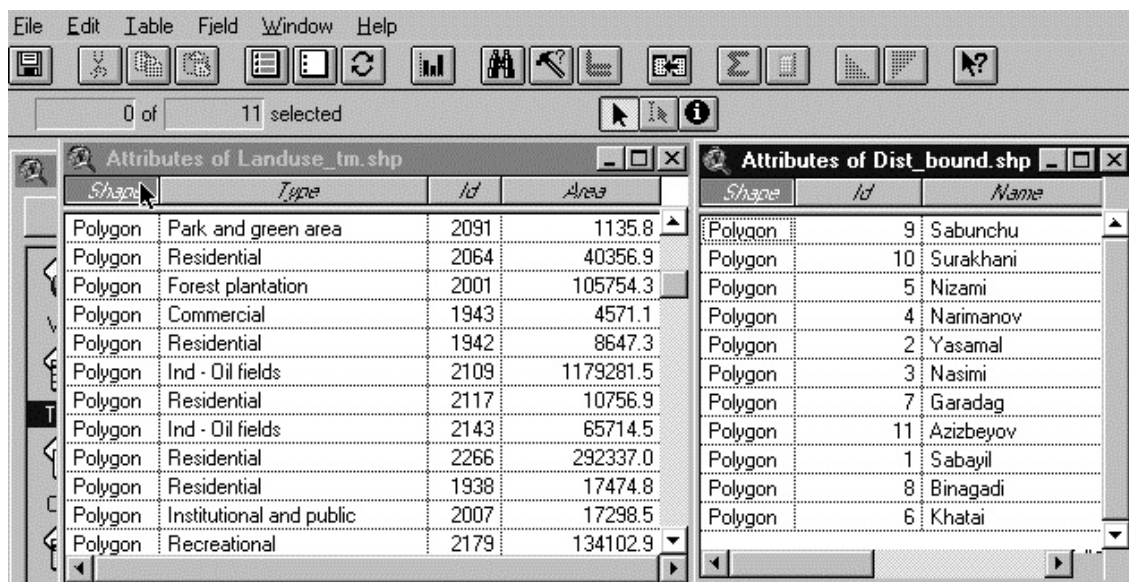
### **d.1 Performing a spatial join**

For example you have a land use themes and district boundary themes, and if you want to know the land use type per each district.

1. From the view, open the attribute tables of the themes you wish to join. In this case land use themes and district boundary themes.
2. Make the source table active (District boundary). This is the table you wish to join to the other table. Click the Shape field's name.



3. Make the destination table active (Land use). This is the table you wish to receive the values of the source table. Click the Shape field's name.



4. From the Table menu choose Join, or click the Join button. The source table is joined to the destination table. The source table is closed automatically.

A spatial join is similar to an attribute join; however it is based on the spatial relationship between the features in the two themes. For each feature represented in the destination table, ArcView looks to see if it has one of the following spatial relationships with any feature represented in the source table, and if it does, that feature's record from the source table is joined into the destination table:

Shapes	Point	Line	Polygon
Point	Nearest	Nearest	Inside
Line	Nearest	Part of	Inside
Polygon	n/a	n/a	Inside

When the spatial join is based on the 'nearest' relationship (i.e., neither of the two themes involved contains polygons and one of them contains points), ArcView adds a Distance field to the destination table. This field is automatically calculated by ArcView and contains the distance to the nearest feature represented in the source table for each feature represented in the destination table. The distance is calculated in the view's map units.

When the spatial join is based on the 'part of' relationship (i.e., both themes involved contain line features), the line features represented in the destination table have to be substrings of the line features represented in the source table to satisfy the spatial join. In other words, the lines in one theme are part of the lines in the other theme.

#### e. Link two tables

Join establishes a one-to-one or many-to-one relationship between the destination table and the source table. However in some situations you may want to establish a one-to-many relationship between the destination table and the source table.

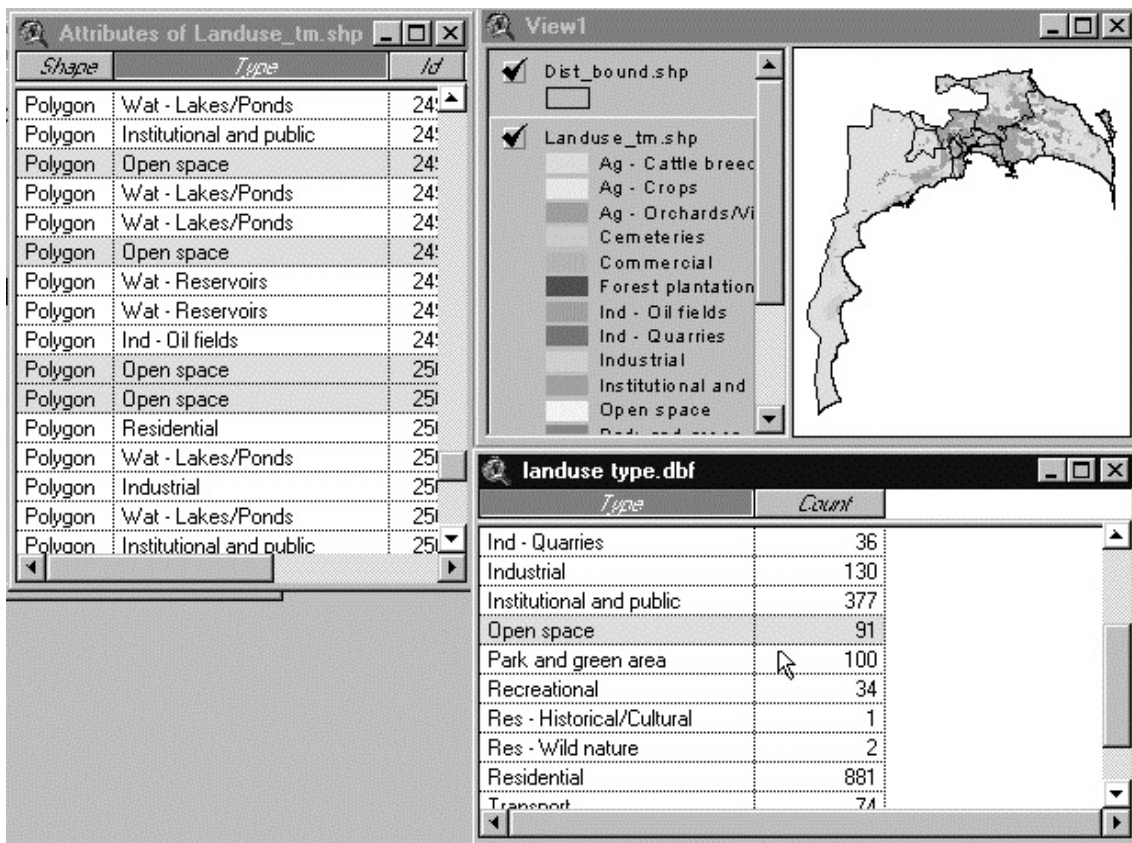
An example of a one-to-many relationship is a table of type of land use and the table of land use of the entire district. One type of land use is many in the entire district. You may want to select a specific type of land use in the entire district.

1. From the view, open the attribute tables of the themes you wish to join. In this case *type of land use* themes and *land use of the district* themes.
2. Make the source table active (land use of the district. This is the table you wish to link to the other table (type of land use). Click the field's name to link (type).
3. From the [Table] menu select [Link]



4. Select open space in the type of land use table, and will be selected all open space in the land use of the district.

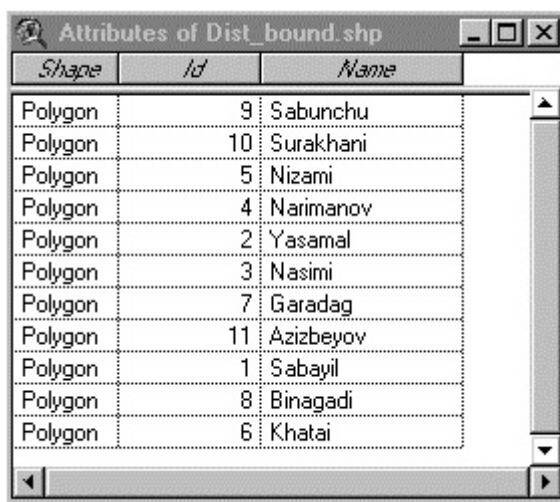




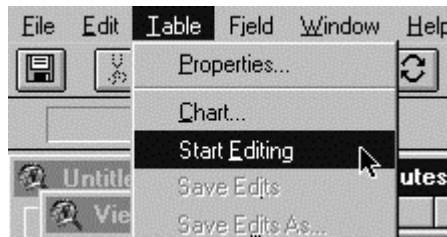
**f. Calculating features**

**f.1 Calculating area of polygon themes**

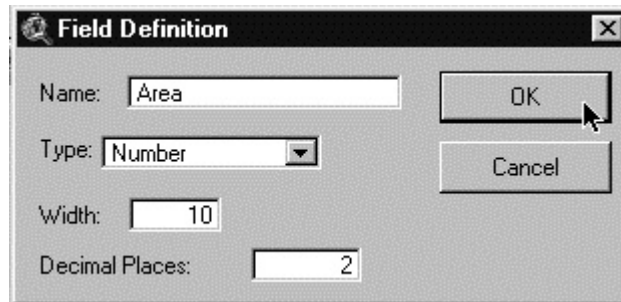
1. Open the attribute tables of the themes you wish to calculate the area. In this example District boundary themes.



2. Make the source table active and from the [Table] menu select [Start Editing]. The table will enable to make changes.



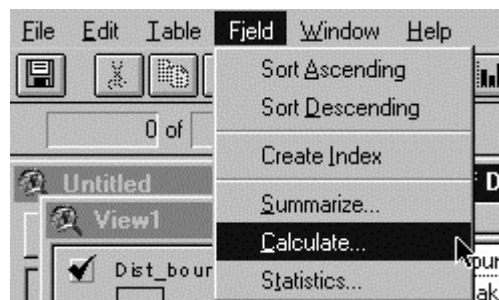
3. From the [Edit] menu, select [Add Fields]. Input the name, type, Width and decimal places of the fields, and then click the [OK] button.



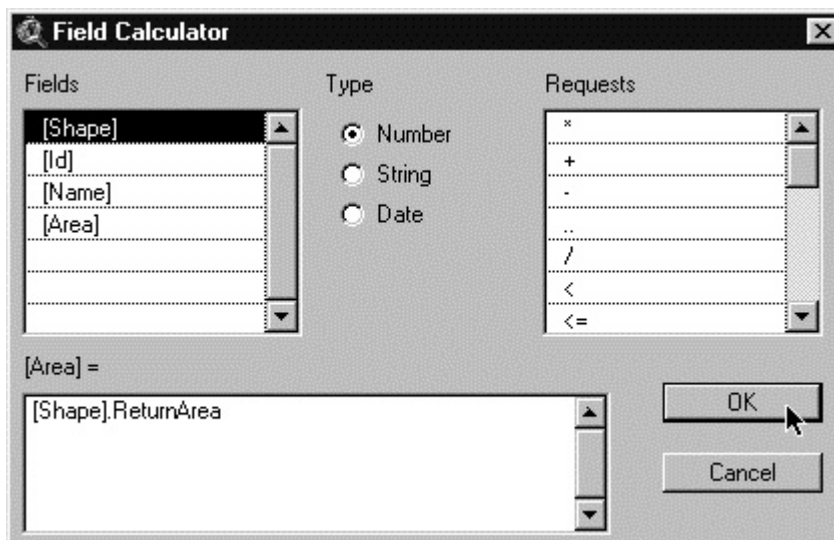
4. Now you have a table with the new fields to calculate the area of the polygons.

Id	Name	Area
9	Sabunchu	
10	Surakhani	
5	Nizami	
4	Narimanov	
2	Yasamal	
3	Nasimi	
7	Garadag	
11	Azizbeyov	
1	Sabayil	
8	Binagadi	
6	Khatai	

5. From the [Field] menu, select [Calculate].



6. In the [Field Calculator] dialog box type [Shape]. Type "ReturnArea", and then click in the [OK] button.



7. ArcView calculate the area of each polygon in the table. To save the changes in the table select [Stop editing] from the [Table] menu.

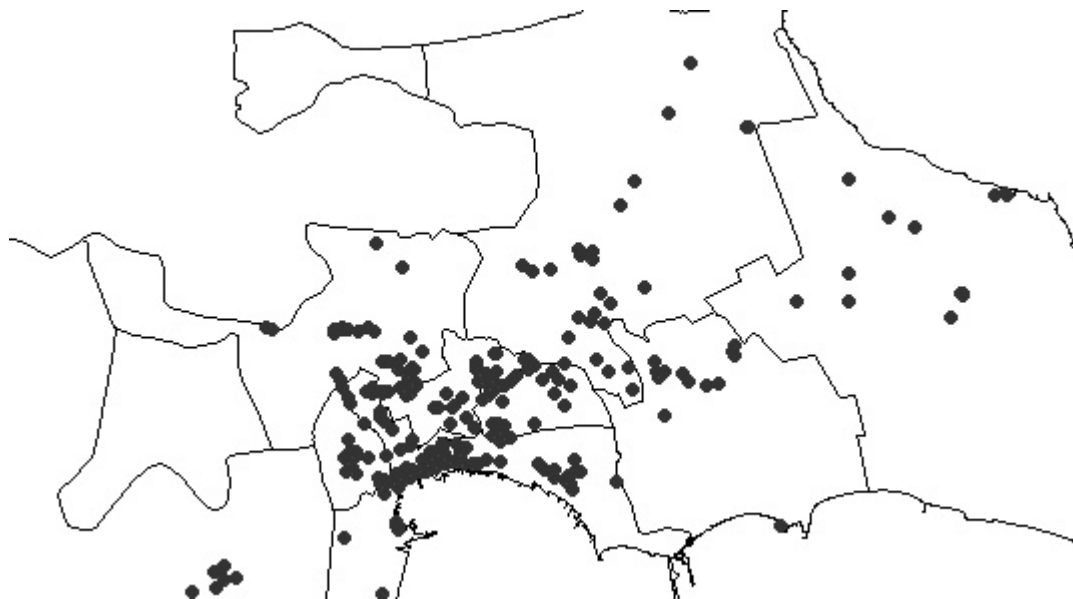
Id	Name	Area
9	Sabunchu	254757856.
10	Surakhani	109319259.
5	Nizami	19047319.5
4	Narimanov	19868243.0
2	Yasamal	15260350.9
3	Nasimi	10477404.9
7	Garadag	1083730760
11	Azizbeyov	390834129.
1	Sabayil	24472509.8
8	Binagadi	130634333.
6	Khatai	36285369.1

## f.2 Calculating the length of line themes

1. Same as calculating area, Open the attribute tables of the themes you wish to calculate the area. In this example District boundary themes.
2. In the [Field Calculator] dialog box type [Shape]. Type "Returnlength", and then click in the [OK] button.
3. ArcView calculate the length of the shape in the table. In the case of the polygons, calculate the length of perimeters, and in the case of polyline, calculate the length of the line.

## g. Getting the X and Y coordinate from point themes

1. Follow the same step to edit and add fields.
2. In this example will calculate the X and Y coordinate of the location of industries.



3. Open the table of industries themes
4. Add new fields to calculate the X and Y coordinates.
5. Select the new fields X.
6. In the [Field Calculator] dialog box type [Shape]. Get X, and then click in the [OK] button.
7. ArcView calculate the X coordinate of the point shape in the table.
8. Select the new fields Y.
9. In the [Field Calculator] dialog box type [Shape]. Get Y, and then click in the [OK] button.
10. ArcView calculate the Y coordinate of the point shape in the table. You can get a table of each industry with the X and Y coordinate.

Shape	Id	x	y
Point	43	402995	4472684
Point	44	403051	4472181
Point	45	403299	4472093
Point	48	401767	4471862
Point	49	403315	4471846
Point	56	402549	4472205
Point	57	403187	4472388
Point	58	401464	4472755
Point	59	401025	4473808
Point	60	400419	4474351
Point	2	402062	4471741
Point	5	401000	4471000

### 1.1.7 GeoProcessing

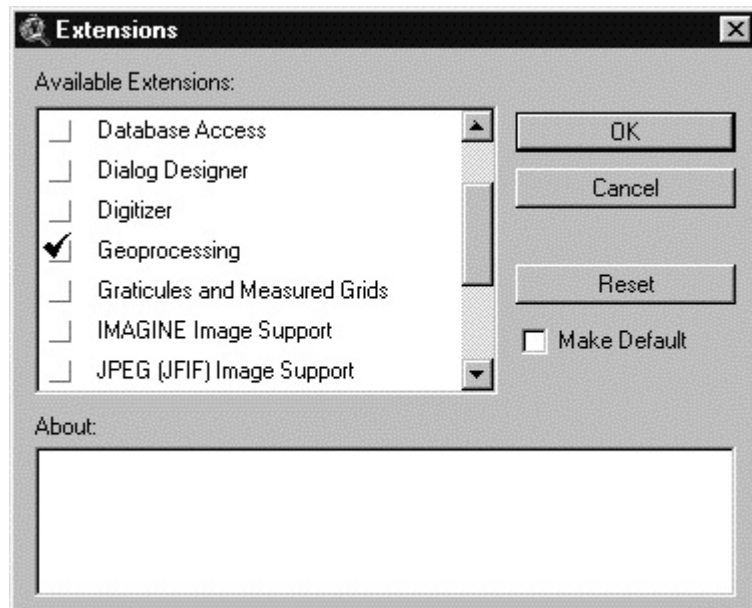
GeoProcessing is a way to create new data based on themes in your view. In most cases you will alter the geometric properties of the features in a dataset while controlling some aspects of how its attribute data is handled.

**a. Starting GeoProcessing**

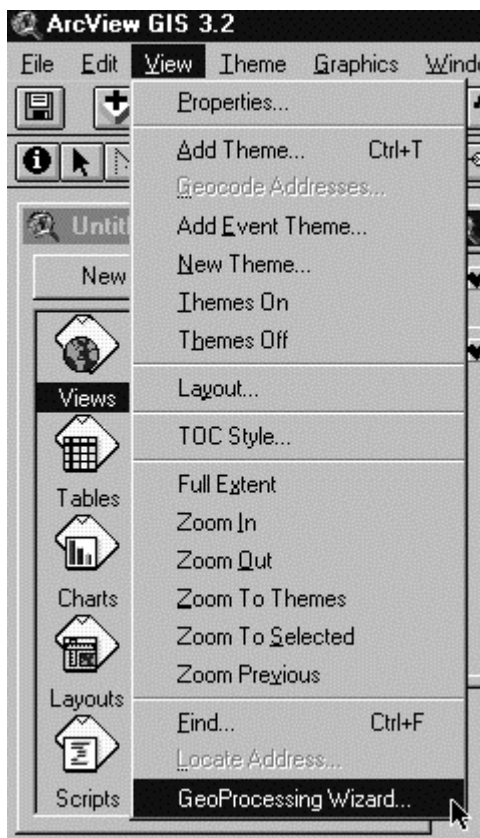
1. From the [File], menu select [Extensions].



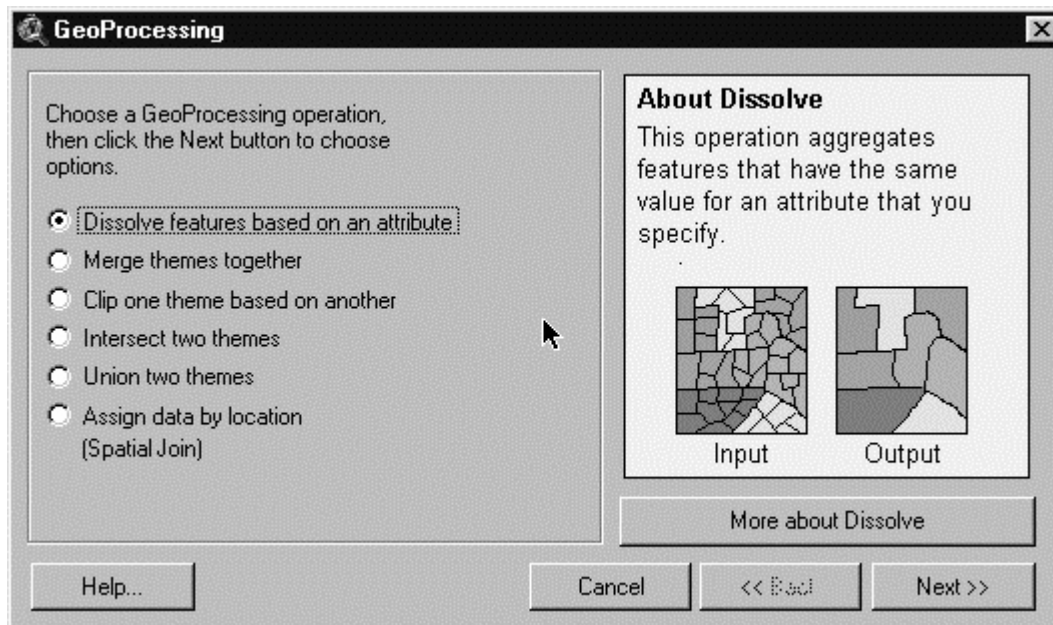
2. In the [Extensions] dialog box select [Geoprocessing].



3. Now you can select [Geoprocessing Wizard] from the [View] menu.



4. Then appear the next Geoprocessing dialog box.



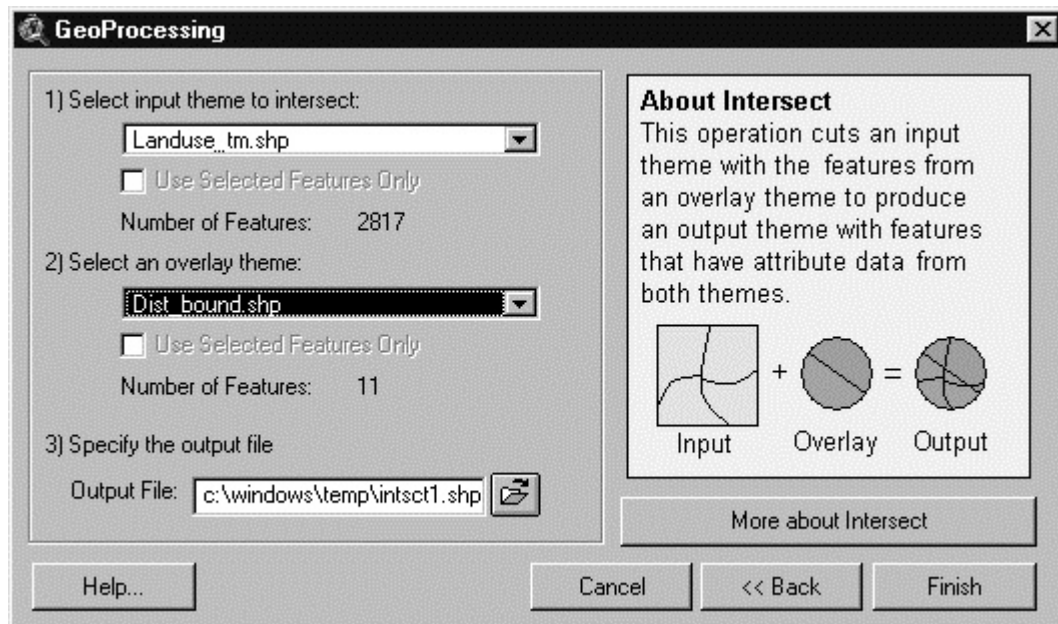
**b. Intersecting two themes**

This process is similar to clipping a theme, except it preserves only those features falling within the spatial extent common to both themes. The features of the input theme are intersected or sliced by the intersect theme. The attribute data from both themes are included in the new theme's attribute table.

The Intersect process computes the geometric intersection of the two themes and adds it to your view as a new theme. The input theme can be a line or polygon theme. The overlay theme must be a polygon theme. The overlay theme's features will split the input theme. Any features in the input theme that are not overlaid by features in the overlay theme will not be added to the new theme. The output shapefile's features will be of the same type as the input theme features. When intersecting features of the input theme with the polygons of the overlay theme, the attribute tables are also updated. The attribute table for the output shapefile includes the attributes from the input and overlay theme.

Use the Intersect process when you want to integrate two spatial data sets while preserving only those features falling within the spatial extent common to both themes. For example you have a land use themes and district boundary themes, and you will want to know the exactly area of land use type by each district you had to intersect those two themes.

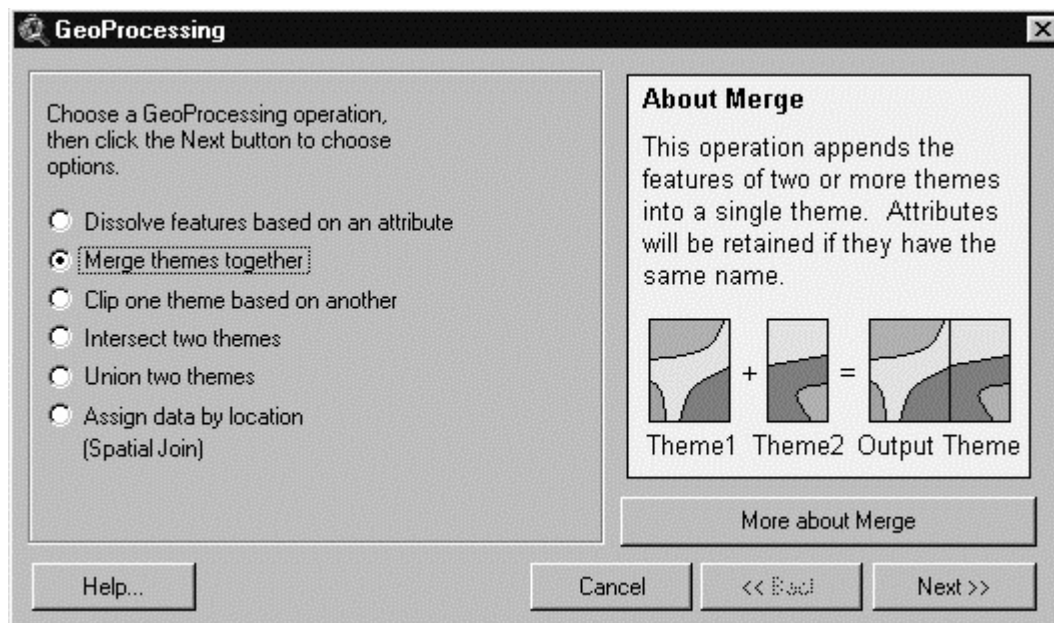
1. Open the themes to intersect
2. In the [Geoprocessing], dialog box select [Intersect two themes].
3. Select the input theme, the overlay theme and the location of the output file, and then click the [Finish] button.



4. ArcView will process the intersection and create the new theme.

### c. Merging features

Use the Merge process when you want to create a new theme containing two or more adjacent themes of the same shapefile type. For example, you may want to merge or append highway data delivered as a series of tiles. Merge allows you to append the data while maintaining the attributes contained in whichever shapefile you select.



Select themes to merge: Choose two or more themes that are of the same geometry type. The Finish button will not be enabled until you have two or more themes of the same type selected. You can use the Control and Shift keys in conjunction with your mouse click to select more than one or a range of themes.

Use Fields from: Choose the theme that contains the attributes you want to use in the theme that will result from this merge operation. If each of the other chosen themes have the same fields, then all cells in the attribute table of the merged theme will be populated. If any of the other input themes have additional fields, that data will not be included. If any of the other input themes are missing the fields, then no data will be added to those fields for the features of the selected theme.

Note: The dropdown list of available themes will not be activated until two or more themes of the same shapefile type have been selected for merging. To select more than one theme, you need to hold down the Shift key.

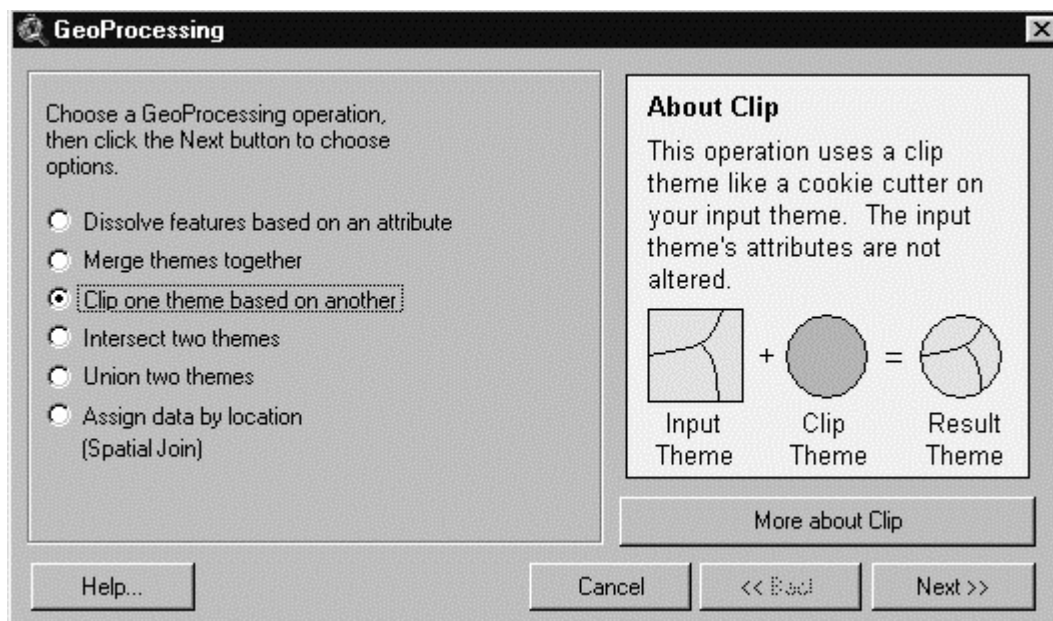
Specify the output file: Browse for or enter the shapefile name that will be used to store the results of the merge operation.

#### **d. Clipping features**

Use the clip operation when you want to cut out a piece of one theme using another theme as a "cookie cutter". For example, you may want to select a county boundary from your counties theme to extract the roads from your roads theme to create a new theme containing a smaller number of roads.

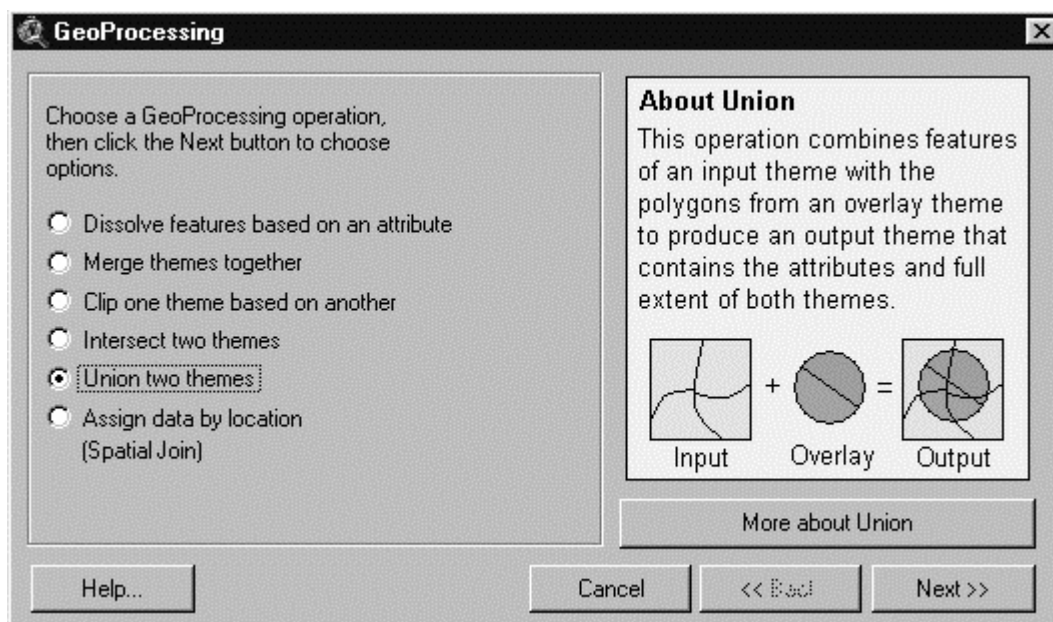
For this process you can use the Clip option in the GeoProcessing Wizard, but remember to first select the county polygons defining the clip area before starting the Clip wizard. Enter the roads data as the input theme and the county boundaries as the polygon overlay theme. The clipping theme is used as the "cookie cutter" to clip the roads. Then, check the "Use selected feature only" box to use the selected features as your clipping area. Then specify the output theme name or use the default name, clip1.shp.





**e. Union two themes**

Use the Union process when you want to produce a new theme containing the features and attributes of two polygon themes. Let's look at using Union to provide the basis for performing an erosion analysis of soils during a flood. Some combinations of slope and soil type represent high risk for erosion, and knowing where these conditions are enables risk assessment of crops. For instance, rocky or sandy soil on a relatively steep slope could represent flash-flooding dangers to either crop or grazing agricultural activities during rainstorms.



**f. Assigning data by location**

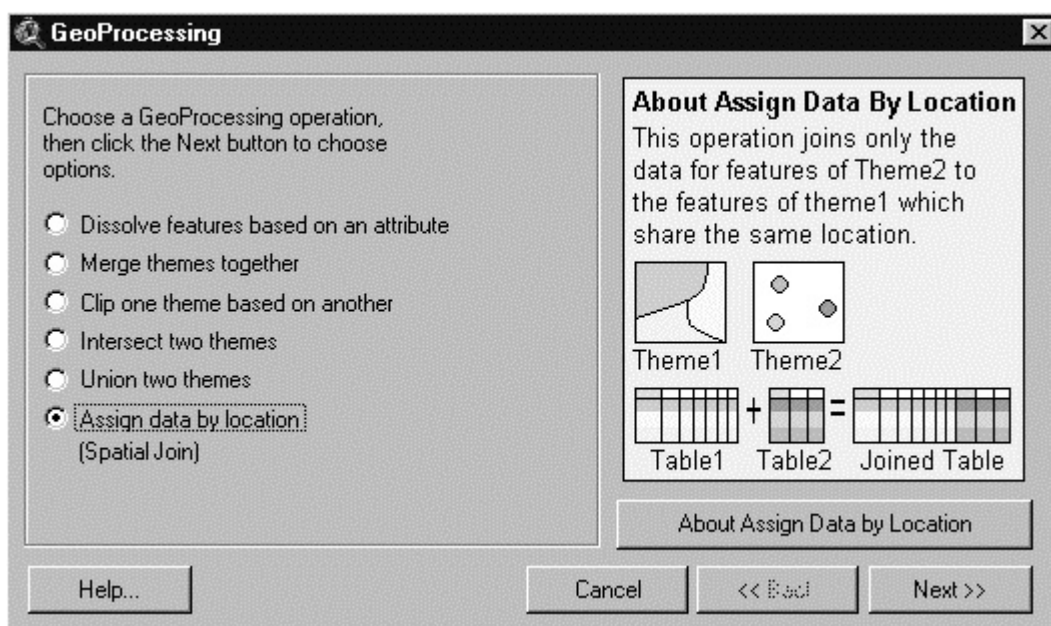
Use Assign data by location when you want to use a spatial relationship to join data from the attribute table of one theme to the attribute table of another theme.

Depending on the type of data you have, the join will be one of three types of spatial relationships: 'nearest', 'inside', or 'part of'.

**Nearest:** If you're assigning data from a point theme to another point theme OR you're assigning data from a point theme to a line theme, a 'Distance' field is automatically added to the theme you're assigning data to, along with any other data in that theme. This 'Distance' field contains the distance to the nearest feature.

**Inside:** If you're assigning data from a polygon theme to a point, line, or polygon theme, the data will be joined to the point, line, or polygon that is contained by each of the polygons.

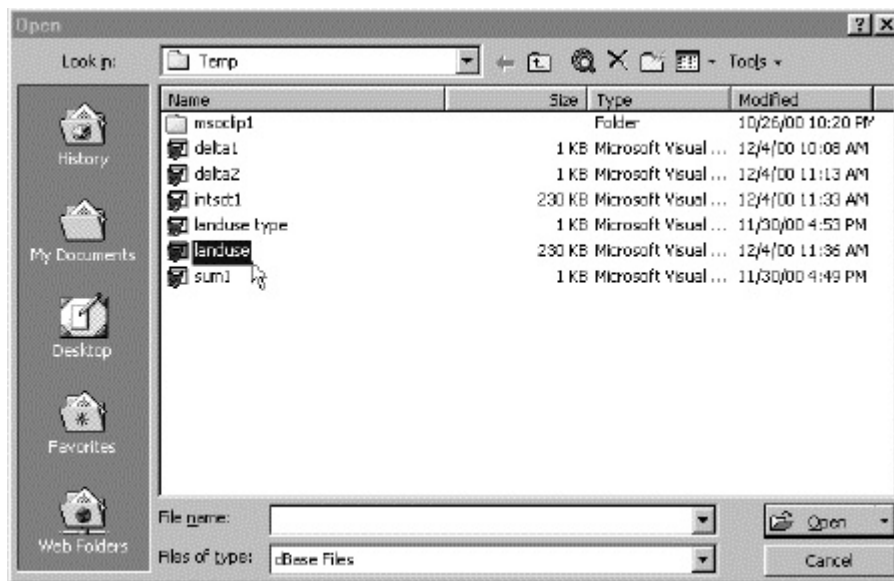
**Part of:** If you're assigning data from a line theme to another line theme, data will be assigned from lines that are 'part of' (a sub-set of) the lines you're assigning data to.



### 1.1.8 Management of a Table with Microsoft<sup>®</sup> Excel

To manage ArcView data in to the Microsoft<sup>®</sup> Excel, you can export data from ArcView to Excel and make report.

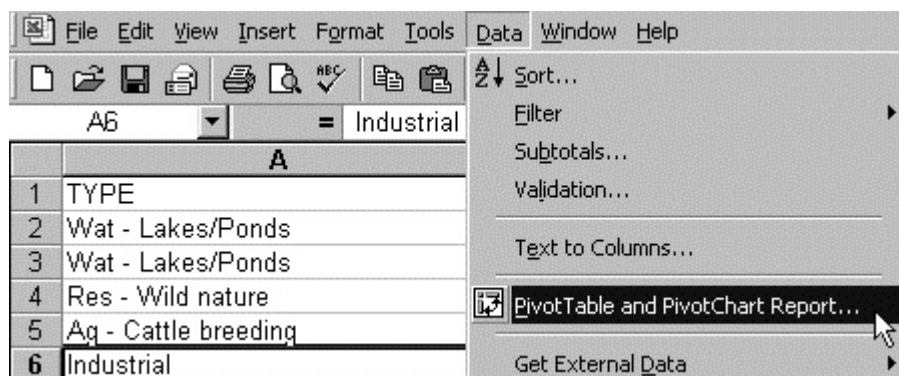
1. In this example will use the data of land use by district to make a next report: Area of type of land use by each district.
2. Export the ArcView table data in to DBF format.
3. Open the exported file in Excel. Specified the location and change the [Files type] in to dBase files.



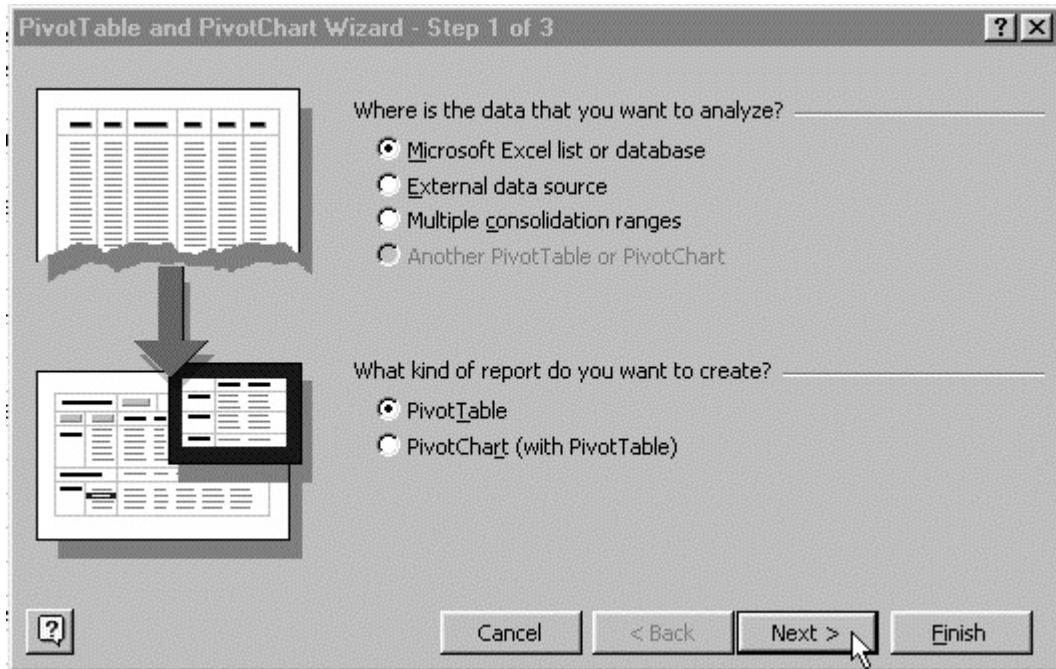
4. Now you have a data file in Excel to manage, as you want.

	A	B	C	D	E	F
1	TYPE	ID	ID	NAME	AREA_M2	
2	Wat - Lakes/Ponds	1	11	Azizbeyov	14305.42	
3	Wat - Lakes/Ponds	2	11	Azizbeyov	19639.93	
4	Res - Wild nature	3	11	Azizbeyov	3877913.85	
5	Aq - Cattle breeding	4	11	Azizbeyov	166062.04	
6	Industrial	5	11	Azizbeyov	104379.02	
7	Park and green area	6	11	Azizbeyov	134382.37	
8	Industrial	7	11	Azizbeyov	132824.74	
9	Industrial	8	11	Azizbeyov	65659.45	
10	Institutional and public	9	11	Azizbeyov	62554.04	
11	Residential	10	11	Azizbeyov	71594.62	
12	Ind - Oil fields	11	11	Azizhevov	14258.89	

5. From the [Data] menu select [Pivot table report and pivot chart report]



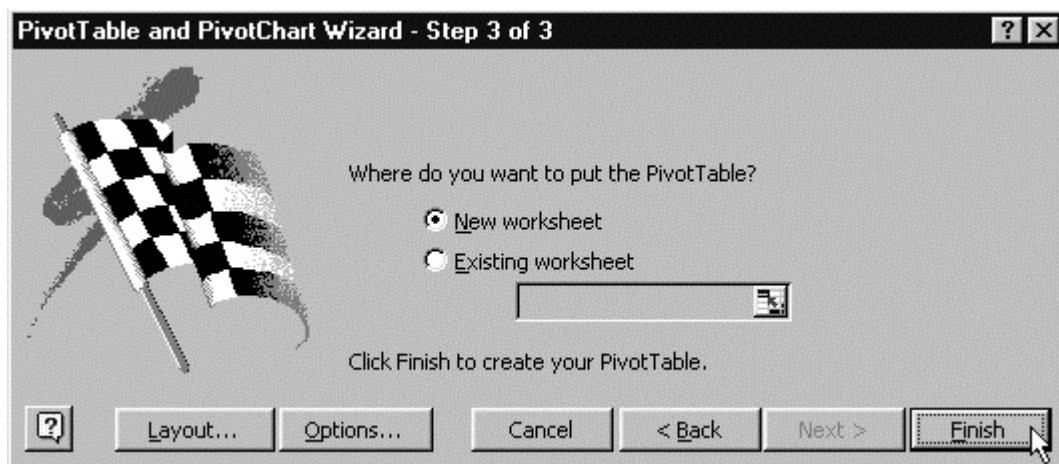
6. In the [PivotTable and PivotChart Wizard] step 1 dialog box, select the type of the data to analyze. In this case [Microsoft Excel list or database] and click in the [Next] button.



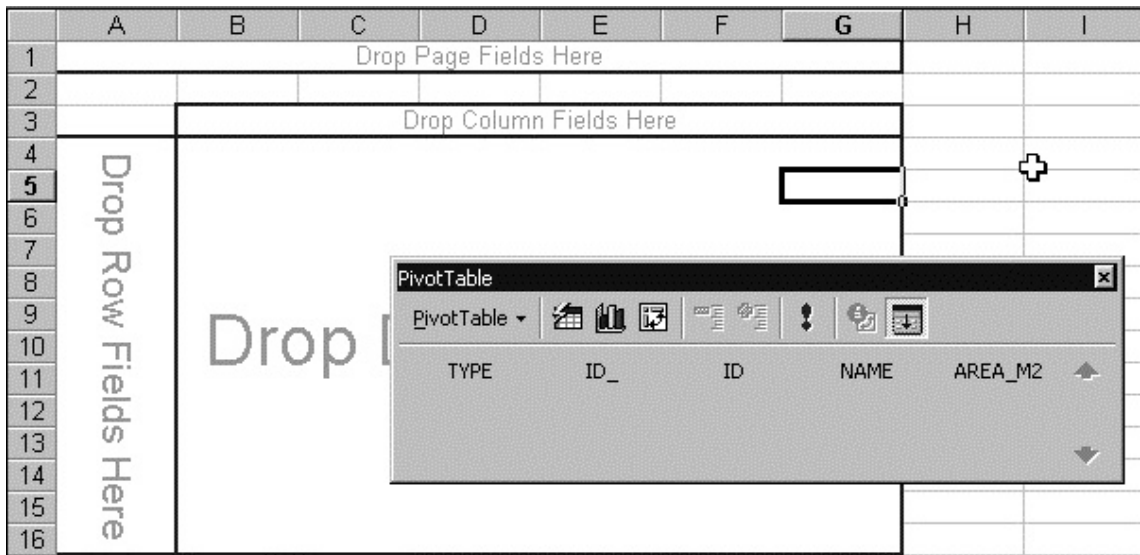
7. In this step select the range of the data, Excel automatically select the entire database. Click the [Next] button.



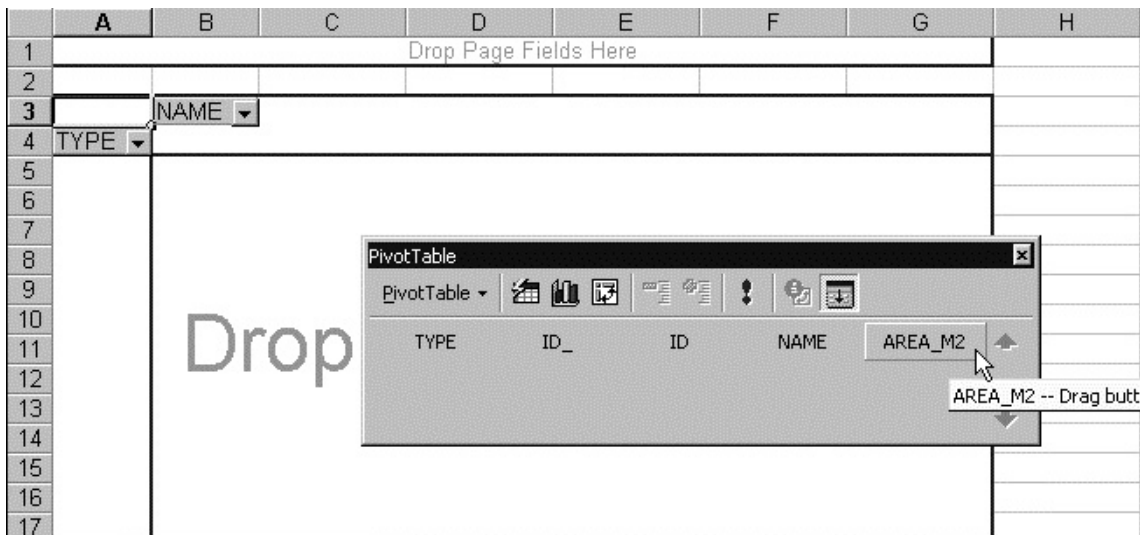
8. In this step select the location of the pivot table. You can select the entire worksheet or a new worksheet. Click the [Finish] button.



9. Excel creates the pivot table to manage database and create any type of table.



- Drop in the row fields Type (Land use type), in the column fields name (District name) and in the center the area\_m2 to calculate the area of each type of land use by district.



- Finally you can obtain the follow table.

	A	B	C	D	E	F	G	H	I
1	Drop Page Fields Here								
2									
3	Sum of AREA_M2	NAME							
4	TYPE	Azizbeyov	Binaqadi	Garadag	Khatai	Narimanov	Nasimi	Nizami	Sabaijl
5	Ag - Cattle breeding	4,039,182.0		145,329.9					
6	Ag - Crops	18,606,283.1	8,523,288.3	75,083.1		353,867.7		87,684.9	
7	Ag - Orchards/Vineyards	27,787,841.2	2,944,307.0		1,461,869.1				
8	Cemeteries	1,605,979.7	87,606.0	656,204.6	114,159.5	775,876.2		173,586.5	105,695.5
9	Commercial	938,243.0	5,258.5	25,916.9	26,836.6	87,394.9	130,324.2	75,143.9	50,121.9
10	Forest plantation	1,962,782.8	5,754,367.6	1,666,632.3	933,573.9		17,987.3	221,596.4	1,813,535.8
11	Ind - Oil fields	20,056,371.5	40,076,389.8	34,219,836.6	2,471,945.6				6,261,053.9
12	Ind - Quarries	667,246.6		3,647,121.9					
13	Industrial	3,382,349.6	5,955,362.3	19,212,898.7	12,735,681.8	7,679,490.5	641,402.1	8,928,275.0	1,291,164.0
14	Institutional and public	1,039,707.2	1,798,594.0	4,212,254.6	2,086,462.7	1,878,963.5	1,454,692.2	582,366.3	1,576,429.5
15	Open space	221,370,886.8	16,042,585.7	940,606,696.4	3,106,722.2		59,685.9	153,551.9	6,076,604.5
16	Park and green area	219,791.4	377,253.2		404,812.8	639,342.7	288,208.6	1,991,004.6	953,517.4
17	Recreational	44,268,533.9	24,176,071.0	23,595,281.9					466,127.0
18	Res - Historical/Cultural								227,874.7
19	Res - Wild nature	3,877,913.9		23,870,130.4					
20	Residential	29,417,687.6	12,752,493.0	12,877,483.6	12,538,104.4	5,979,949.8	6,364,430.8	5,983,303.9	5,538,896.9
21	Transport	9,119,944.0	1,420,267.7	2,468,361.9	163,604.6	2,371,446.8	1,520,674.1	780,563.7	96,369.0
22	Wat - Lakes/Ponds	2,315,926.2	10,652,282.6	16,182,256.2	38,932.0	101,907.2			15,117.8
23	Wat - Reservoirs	70,844.1	44,274.1	237,634.6	202,678.7			70,238.8	
24	Grand Total	390,747,514.2	130,610,400.7	1,083,699,123.4	36,285,383.7	19,868,239.4	10,477,405.2	19,047,315.9	24,472,507.9

- Format the number and the border to print. (For more detail about pivot table please refer to Excel help files)

### 1.1.9 Spatial analysis

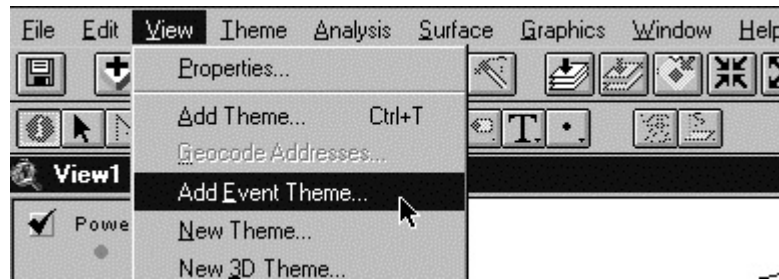
#### a. Creating themes from external data

In this example will use the data of air pollution concentration. The database contain X, Y coordinate and the concentration in each point calculate by other application (air.dbf).

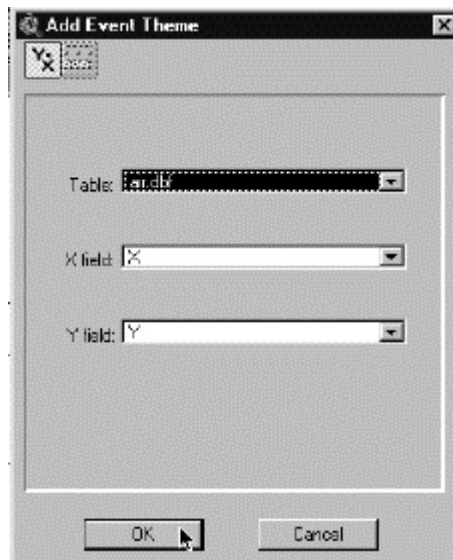
- Add the external database.

X	Y	Conc
414500	4480000	1.10829
414500	4481000	1.07449
414500	4482000	1.60870
414500	4483000	1.92998
414500	4484000	1.91666
414500	4485000	1.82779
414500	4486000	2.07464
414500	4487000	2.08374
414500	4488000	1.85481
414500	4489000	1.46609
414500	4490000	1.47818

- From the [View] menu, select [AddEvent Theme...], to convert the database to themes file.



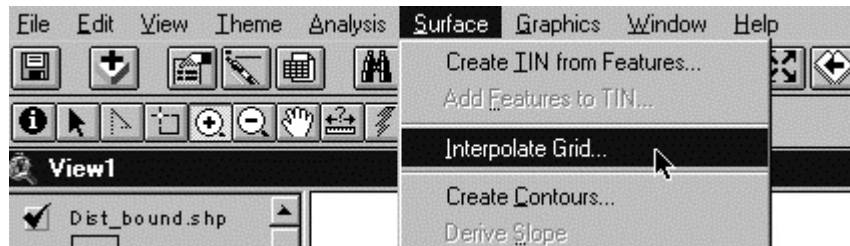
3. In the [Add Event Theme] dialog box, Select the new table, X field (the column that contain the X coordinate) and Y field (the column that contain the Y coordinate). Click the [OK] button.



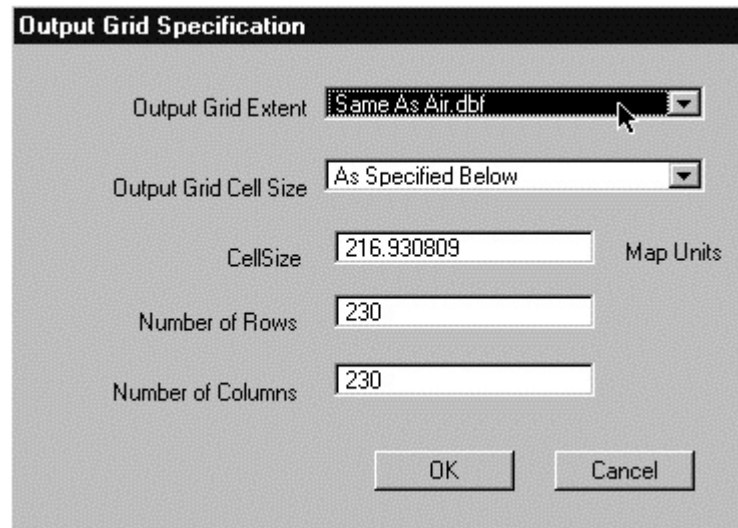
4. ArcView create the new point theme. Activate the new theme in the view.



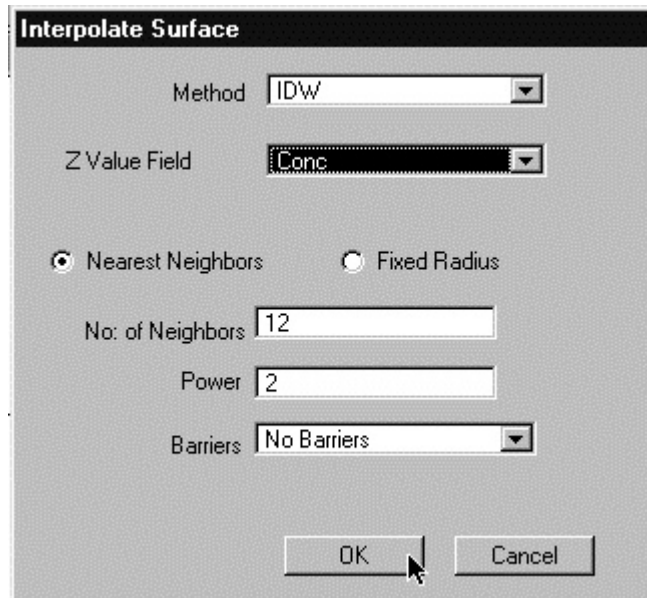
5. In this step will create the map of air pollution concentration of each point. From the [Surface] menu, select [Interpolate Grid].



6. In the [Output Grid Specification], select as follow. For more detail you can change each value in this step.

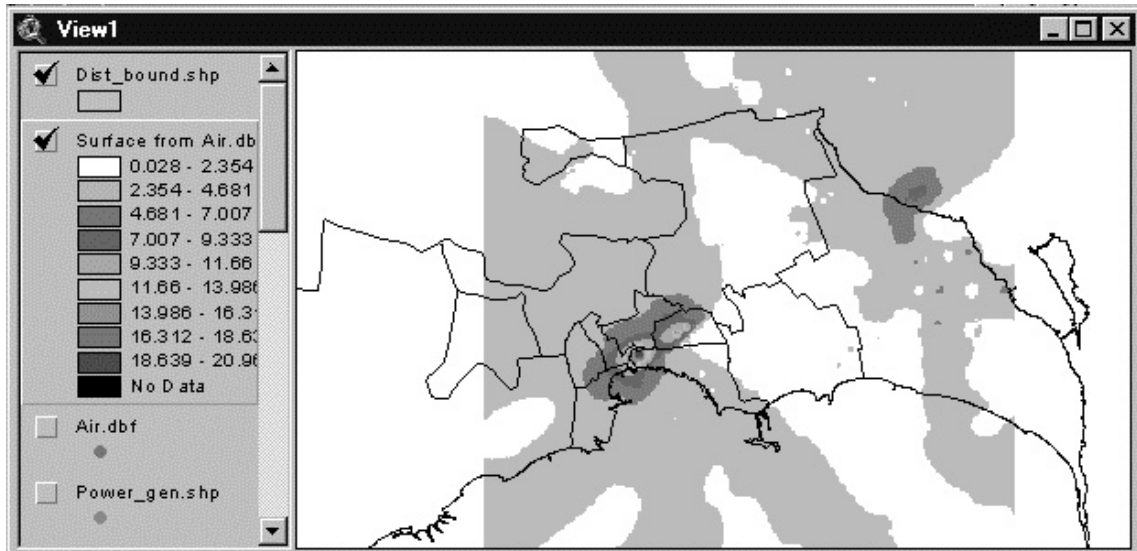


7. In the [Interpolate Surface] dialog box, select the method and indicate the Z value Field (In this case select **Conc**, that contain the concentration value)



8. ArcView create new theme with concentration value that you can display as follow.





## 1.2 Database Management

### 1.2.1 Hardware

As regards hardware have settled 1 server and 2 Workstations, printers and other devices:

#### 1. Server

- Dell PowerEdge 2300
- Pentium® III 500Mhz Processors
- RAM Memory 512MB
- Monitor 14'
- 4 SCSI HD 18MB
- FDD 1.44
- CDR/ 4X
- CD 24X
- Tape Back Up
- Keyboard/Mouse

#### 2. Workstations

- Dell OptiPlex GX1
- Pentium® III 500Mhz Processors
- Memory RAM 512MB
- Monitor 21'
- 2 HD SCSI 8MB
- FDD 1.44
- CD 24X
- Keyboard/Mouse

#### Others devices

- 1 Plotter HP Design Jet 750C+
- 1 Printer HP DeskJet 1120 (A3, 600dpi colour, 7ppp)
- 1 Scanner Mustek ScanExpress SCSI A3SP

- 1 Digitizer Calcomp Drawing Board III 34480-H4 (A0 format)
- 3 UPS PowerCom

### **1.2.2 Software**

Software as below was set up:

#### 1. Server

- Windows® NT® Server 4.0
- Microsoft® Office 2000

#### 2. Workstations

- Windows® 98 Second Edition
- Microsoft® Office 2000 Professional
- Arc View® 3.2
- Arc View® Spatial Analyst
- Arc View® 3D Analyst

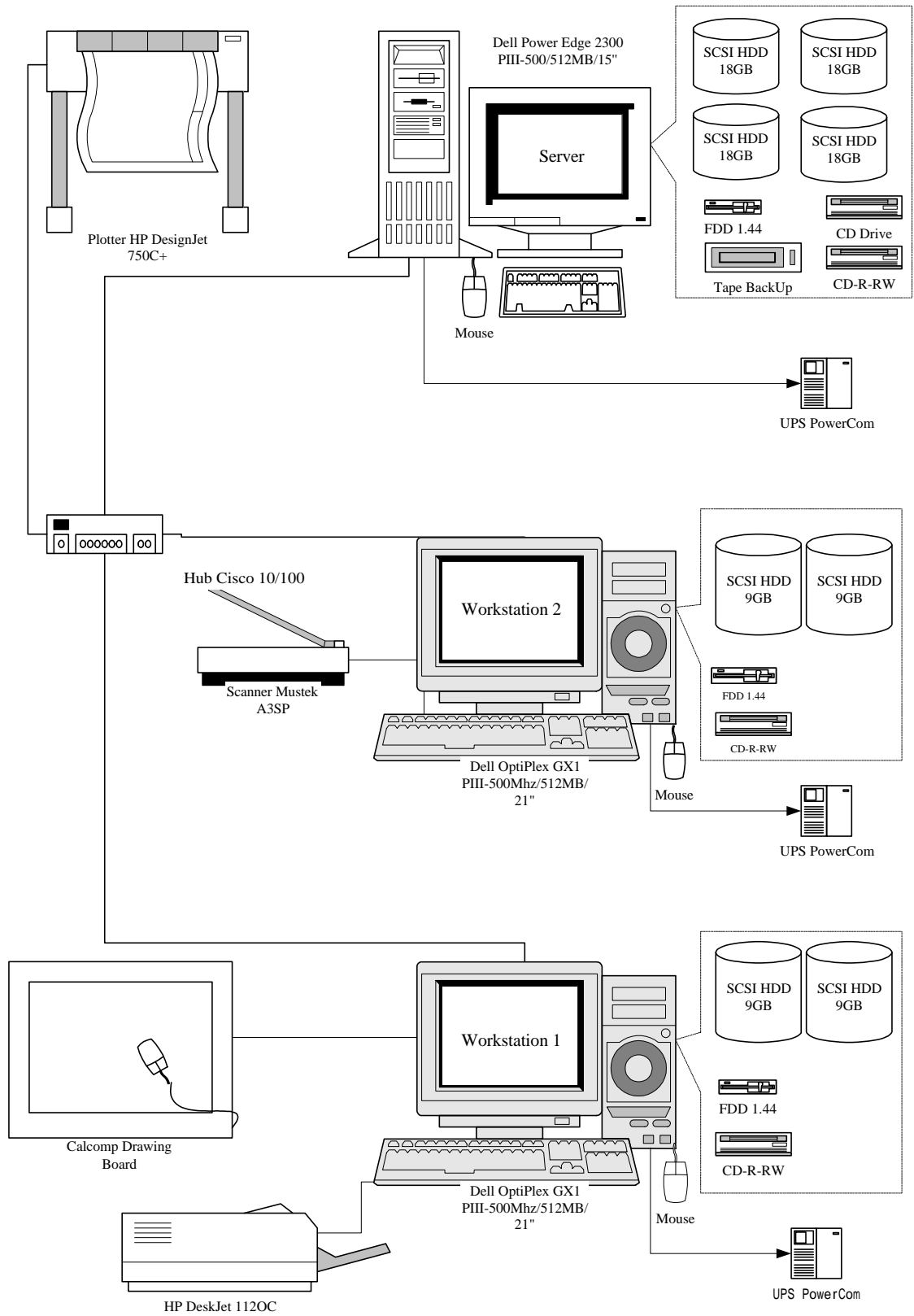


Figure 1-1: GIS Structure at the BCE

### 1.2.3 Using a computer

All the computers mentioned previously are connected in LAN (Local Area Network), so that compatibility of the resources is been able to increase the productivity. In the next figure, you can appreciate the configuration of the LAN, which is of the type “Star”, with 8 ports hubs, in which can increasing the number of workstations according to the necessity. The LAN is of the type Client/Server where the Server works with Windows NT 4.0, and the Workstations with Windows 98. Necessarily for the effective use of this operating system, that allows a strict control of the users and the security of the stored data, and for what valuable data of GIS were managed, they will have to be defined following people or users:

- **LAN Administrator:** Is the person authorized by the institution for manage the whole LAN and it will be the responsible one of administering:
  - Users account of the workstation.
  - Manage the permission of the sharing files and folder.
  - The security of the data and hardware.
  - Backup of the data.
  - Configuring the hardware.
- **Users:** they are *people* that will be authorized by the administrator to use the workstations and access to the data.

#### a. To begin to use the computers, follow the next steps

1. Turn on the Server (Administrator)
  - a. Turn on the UPS connected to the Server
  - b. Turn on the Server and wait until Windows<sup>®</sup> NT start the session.
  - c. Make sure that the Hub is turn on.
2. After the Server is started, turn on the workstations (Users)
  - a. To start the workstations, make sure that the Server is ready.
  - b. To start the session in the LAN, the users should be registered in the Server and authorized by the administrator.
  - c. Input the user name and the password and then start the session.

### 1.2.4 Administering Windows NT Server (Administrators)

Windows NT is frequently marketed as an operating system that requires little or no system administration, this is an ideal honored more in the breach than in reality. Well designed system administration tools can go a long way toward making Windows NT systems management easy and painless under normal circumstances and some of the Windows NT tools come reasonably close to this objective but realistically, you can expect the unexpected to occur all too frequently.

System administrators are distinguished from ordinary users, power users, and operators in that they know what to do when things go wrong. While all these classes of users are comfortable using the system under normal circumstances, only system administrators have to know what to do when things are anything but normal. This doesn't mean you have to know the solution instantly for every problem you encounter. Sometimes you will, but more often what you bring to the situation is a

strategy for figuring out what has gone wrong and the tools for fixing it once you have done so.

Successful system administrators are continually aware that computers are used by people and organisations and that managing them cannot be extricated from this social context. System administration often involves a tension between authority and responsibility on the one hand and service and cooperation on the other. The extremes seem easier to maintain than any middle ground; fascistic dictators who rule "their network" with an iron hand, unhindered by the needs of users, find their opposite in the harried system managers who jump from one user request to the next, in continual interrupt mode. The trick is to find a balance between being accessible to users and their needs, and sometimes even their mere wants, while maintaining your authority and sticking to the policies put into place for the overall system welfare. The goal is to provide an environment where users can get what they need to do done, in as easy and efficient a manner as possible, given the constraints of security, other users' needs, the inherent capabilities of the system, and the realities and constraints of the human community in which all of them are located.

**a. The system administrator's job**

Those area some of network administrator's job:

- Installing and configuring computer systems and networks, updating them as necessary, and keeping them running properly on a day-to-day basis.
- Managing users and user accounts, including both the computer-related aspects of creating and maintaining user accounts and systems, and responding to user requests, questions, and problems.
- Taking care of the peripheral devices attached to the various computer systems (printers, tape drives, uninterruptible power supplies) as well as adding or removing them as needed.
- Overseeing regular system backups, which can range from performing backups yourself to designing and implementing a backup plan to be carried out by others under your supervision.
- Ensuring that the systems and networks for which you are responsible are secure and that valuable or sensitive data is protected from undesired access.
- Monitoring system and network activity in order to quickly detect any problems related to system security, performance, or general functioning that may arise, and then responding appropriately to anything you may find.

### **1.2.5 Windows NT Server Network**

A LAN is a group of PCs that have been connected, to make possible the communication and to share resources. The LAN based on windows NT Server are of the type "Client/Server", that provides a constant security and consistent for the connectivity, that is relatively easy to put into practice and to maintain.

Windows NT Server requires at least ones "File Server" in the LAN, in which the Windows NT operating system is executed. The clients or connected PC's to the LAN can execute another type of operative systems, as Windows NT Workstation, Windows 95, OS/2, Macintosh, Unix etc.

From the point of view of an administrator, one of the main characteristics is that you allow it centralised administration of the account of the users and the problems related with the security.

Some characteristics of a secure Operating System

- To limit the access to the domain to specific users.
- To limit the access to the domain during certain hours.
- To limit the access, for user or for group, to resources of the LAN like files, folders and printers.
- To limit that control type has witch users for files and directory.
- To rake that action they took in different files or directory or what access it was granted or even attempted.

But with regard to the security one has to keep in mind following. When you purchase a padlock from the hardware store, only provides the protection when you gives an appropriate uses to the padlock, that is to say that although you has a padlock if you forgets to close the padlock anyone can enter. The same thing happens to the operating systems, although the operating system gives you options of security, if the administrator doesn't carry out a security plan, It won't work.

### **1.2.6 Connection of Workstations**

In this section it will be focused to the connection of Windows 98 as Workstation of the network.

#### **a. Installation of the network components**

To setup a PC with Windows 98, as Workstation should settle the following net components.

- Network adapters or Network card
- Network clients
- Network protocols
- Network services

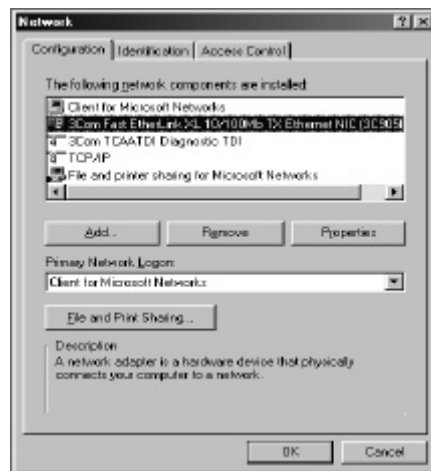
#### **a.1 Network card**

It is the hardware that serves for the physical connection from the PC to the network, for such a reason, it is indispensable. Therefore if doesn't have installed one will buy it and to install it as the representative of the manufacturer indicates it. To install the network cards it is relatively easy, since Windows 98 have support Plug-and-Play that recognizes a new device in the system. Once installed or if already has installed it verifies as follows.

1. Select [Network Neighborhood] and click the right button of the mouse and choose [Properties].



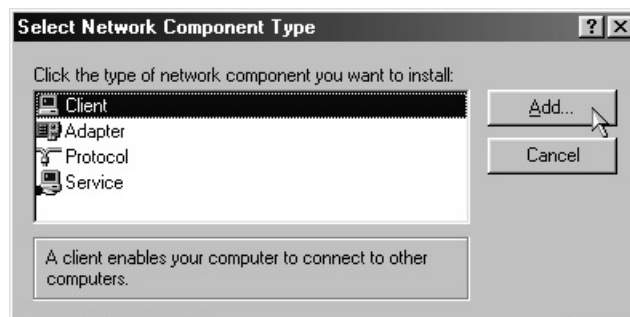
2. Verify in the following screen that the network card is installed.



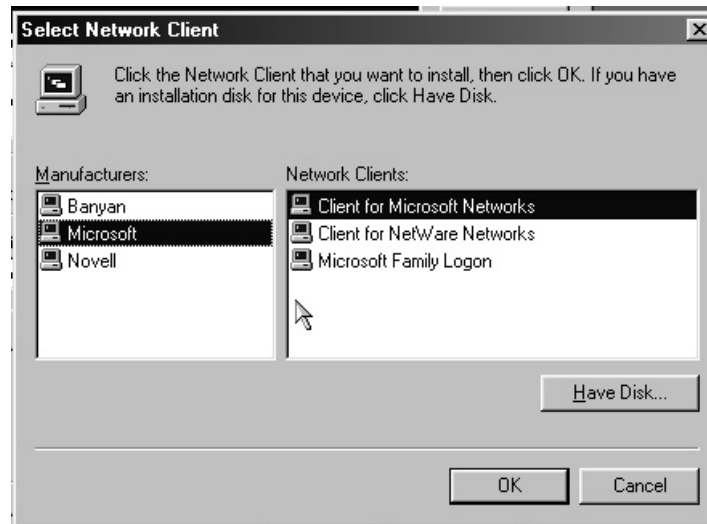
### a.2 Network clients

They are the types or makers of network that it supports. If in the [Network] dialog box, any [Network Client] type is not installed, follow the next steps

1. In the [Network] dialogs box, click [Add].
2. In the [Select Network Component Type] dialog box, select [Client] and click in [Add].



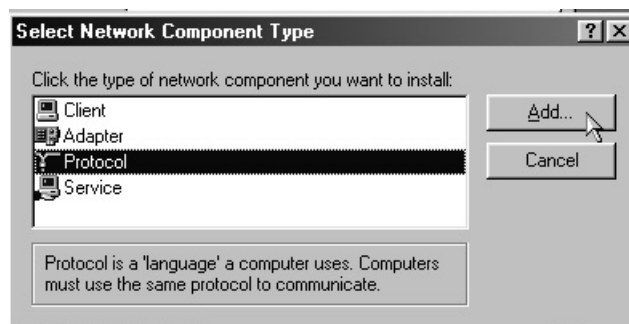
3. In the [Select Network Client] dialog box, choose in the manufacturers [Microsoft] and in the network clients [Client for Microsoft Networks] and click in [OK]



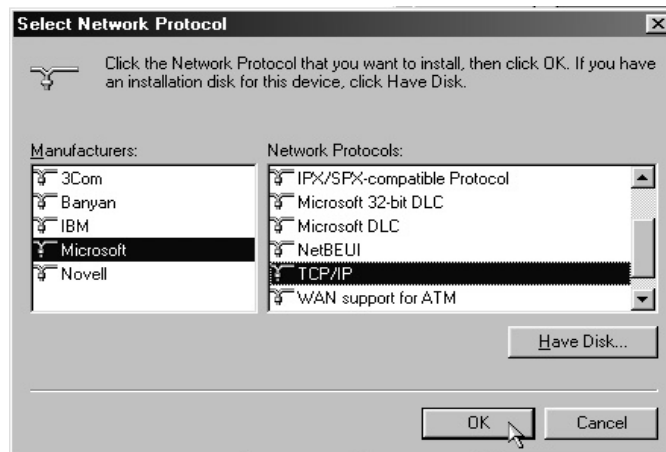
### a.3 Network protocol

This is that determines how the computers will communicate on the network. There is a variety of protocols, but for this network will use TCP/IP. To configure it, follows the next steps.

1. In the [Network] dialog box click [Add].
2. In the [Select Network Component Type] dialog box, select [Protocol] and click in [Add].



3. In the [Select Network Protocol] dialog box, chooses [Microsoft] in the manufacturing type and in Network Protocols [TCP/IP] and click in [OK]

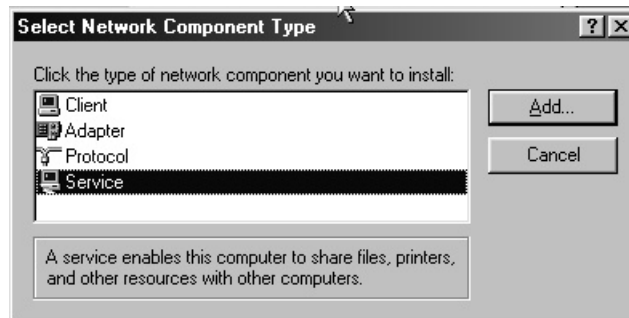




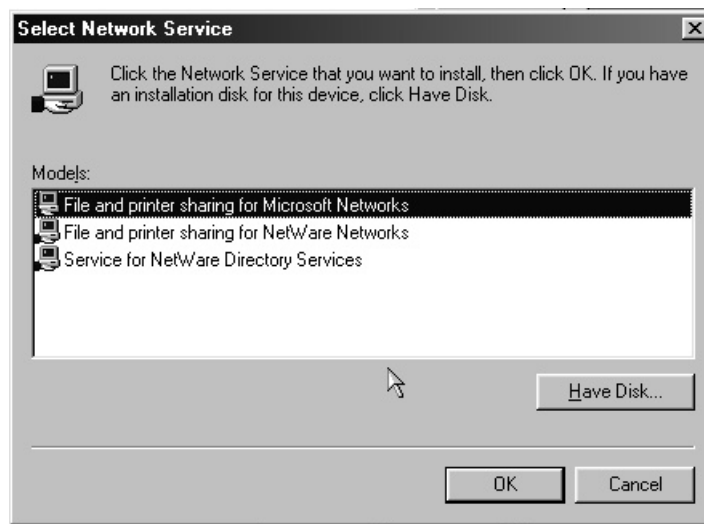
#### a.4 Network services

They are that determine which services will be shared. If you wants to share files and printers, it should install the network service. To configure it follows the next steps

1. In the [Network] dialog box, click [Add].
2. In the [Select Network Component Type] dialog box, select [Service] and click in [Add].



3. In the [Select Network Service] dialog box, select [File and printer sharing for Microsoft Networks] and click in [OK]



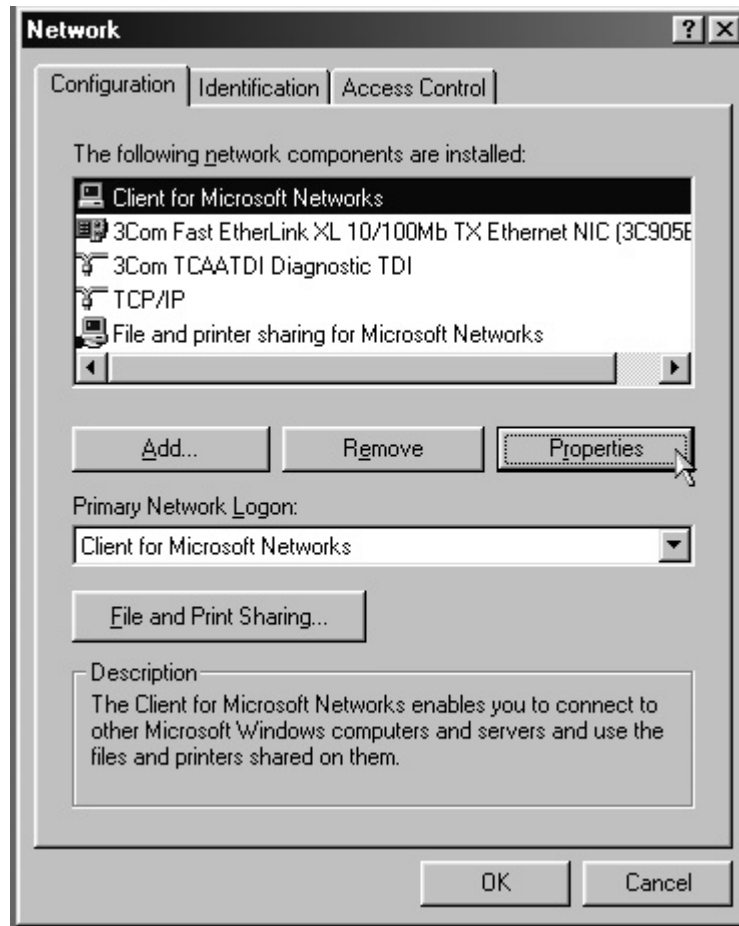
#### b. Configuration of the network components

After installs all the components, you will need to configure the following components so that can be connected to the Windows NT Server.

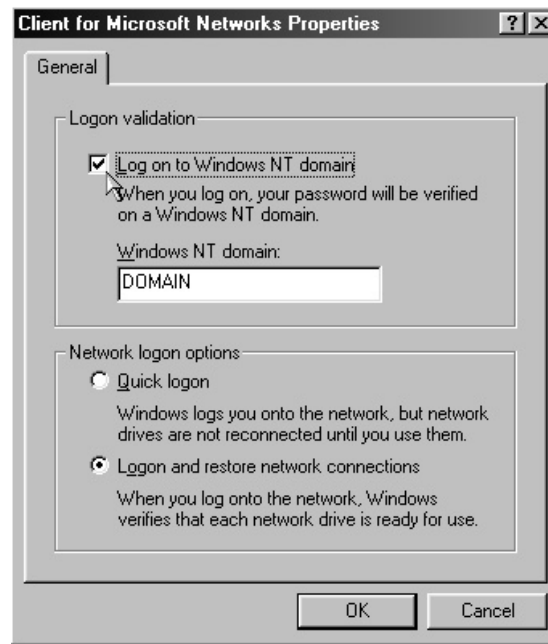
##### b.1 Client for Microsoft networks

To configure this component, follow the next steps

1. In the [Network] dialog box select, [Client for Microsof Network] and then click in [Properties].



2. In the [Client for Microsoft Network Properties] click in [Log on to Windows NT domain] to enable this option and in [Windows NT domain] type the name of the domain of the Server, in this case “DOMAIN”, because it was configured this way.

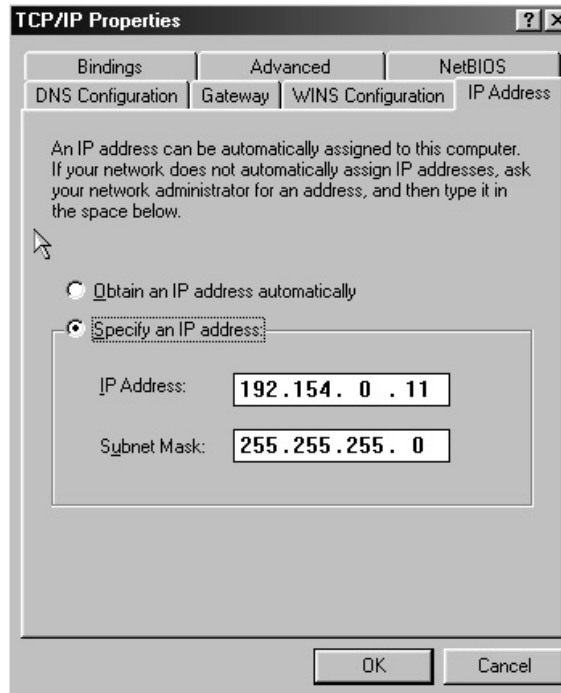


3. Click in “OK”, to finish the configuration.

## b.2 Configuring the protocol TCP/IP

To configure this component, follow the next steps.

1. In the [Network] dialog box select, [TCP/IP] and click in [Properties].
2. In the [TCP/IP] dialog box, select the [IP Address] windows. Click in [Specify an IP address], to enable this option and then type [IP address] and the [Subnet Mask].

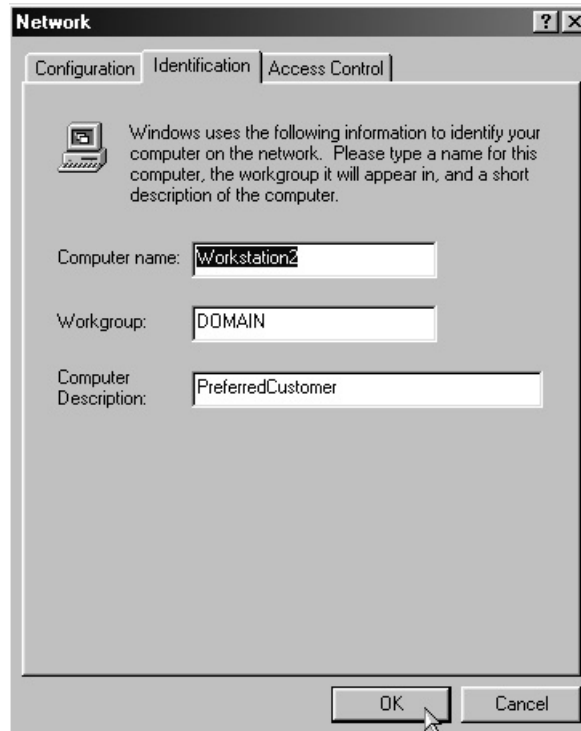


3. With regard to the address of IP, each network should to decide for an IP address. In this network the follows will be used as IP address:  
IP Address for work stations 192.154.0.11 up to 192.154.0.99  
Subnet Mask 255.255.255.0  
With regard to these addresses they will have to leave modifying according to growing the network.
4. Click in [OK], to finish the configuration.

## b.3 Configuring the identification in the network

So that you can work inside the network it will configure the identification of the computer, follow the next steps.

1. In [Network] dialog box select, the [Identification] windows. In [Computer Name] type the name that will identify the Computer inside the network, in [Workgroup] type the same domain that configured in the Server, in this case "DOMAIN" and then type the description of the computer in [Computer Description]



2. Click in “OK”, and then restart the computer so that all the changes have effect.

**c. How to register in the Windows NT Network**

Once it has been added and configured the components, it will restart the computer and then follow the next steps.

1. When the computer starts, the registration dialog box will appear in the screen.
2. Before registering makes sure that the Server is turn on, and the [Username] is registered in the domain of the network.
3. In the registration dialog box, type the [User Name], the password [Password] and the domain of the Server [Domain], in this case “DOMAIN.”

**1.2.7 Administering the Windows NT Server**

Part of all network administrator work; it is the administration of who access to the server. This task also forms the base of the security of their system. In fact, to grant access to a system is the first point of verification of any plan of security. Windows NT includes an Administration of users with complete characteristics that it allows you to create and to administer users' account, the same as users' groups.

**a. Understanding of the domains**

A domain is the main base of a Microsoft NT Network. In a basic way a domain is a group of computers and related network resources. At least one of the computers should be Windows NT, but it could have many more servers in the domain. Because the domain is a logical organisation it doesn't have geographical limits. This means that a single domain could be in the same room, in the same building or disseminated along the city or all over the world.

If it is familiarized with Internet it can confuse a Microsoft network domain with a domain of Internet. Although these can be parallel organisations of computers, both are not exactly the same thing. In the world of Internet their domain identifies it from the rest of the world, as long as a Microsoft network domain is used strictly to handle users and the resources to those that users can have access.

To establish a domain it needs at least one Windows NT Server. This system acts as the Primary Domain Controller (PDC) of the domain. This system acts as the place of all the information related with the users and the resources for the domain.

## b. Understanding the users and groups

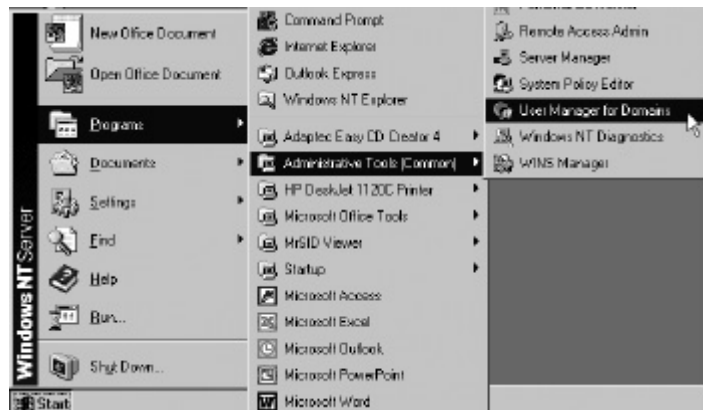
Inside a domain of the Windows NT network are available four specific elements:

- **Servers:** These are computers that execute Windows NT Server and they make that the information and the resources are available for the domain.
- **Workstations:** These are the computers that, when executing a variety of operating systems, they have access to the information (and in occasions they provide it) that is available in the networks.
- **Users:** These are individuals, people that are entitled to use the workstations or the Servers to have access to the resources of the net. The users for the general one are limited regarding the access that you can have in the network. The users are assigned in a account of the Server and each one obtains a name and a password, with each can access to the network.
- **Groups:** These are combined administrative of users. The groups allow the categorisation and they simplify the administration of the users. The account of the individual users can be assigned to different groups of users. When belonging to user's group, automatically the account has certain access to data and resources of the network.

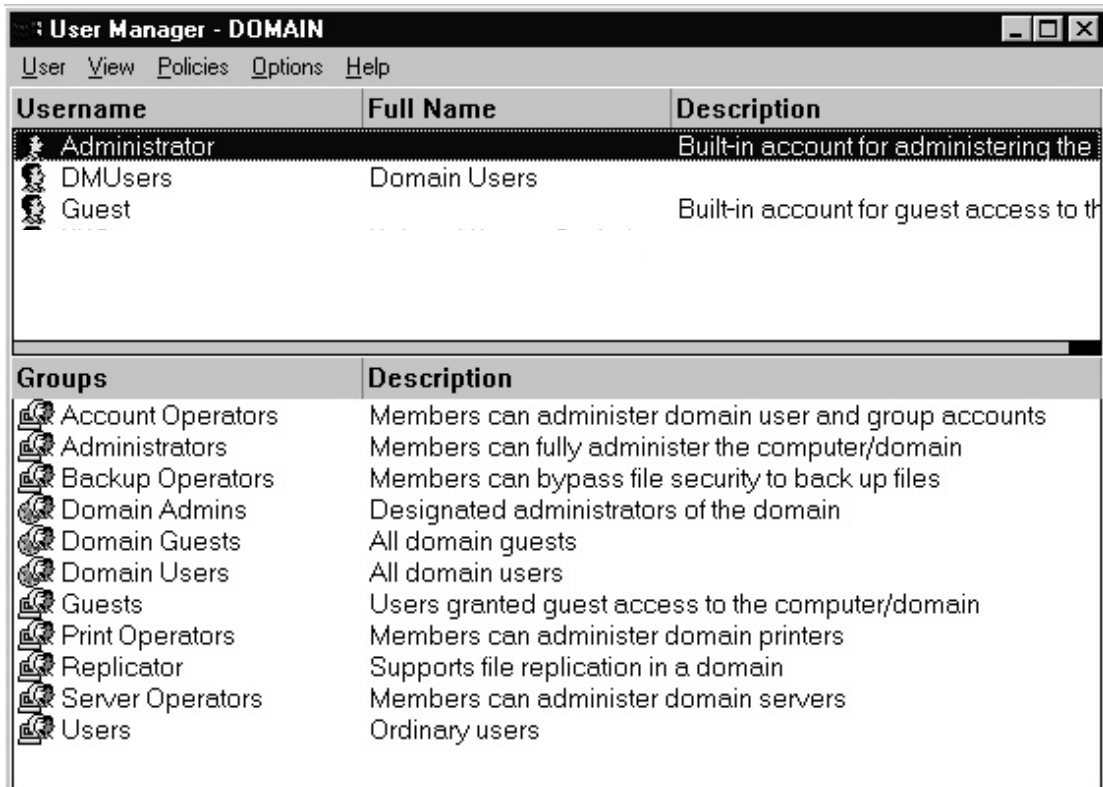
## c. Administering users manager for domain

One of the responsibilities of the network administrator is to settle down directive for the account. To administer the users account it will use the tool [User Manager for Domain].

1. Select [Programs], in the [Start] menu.



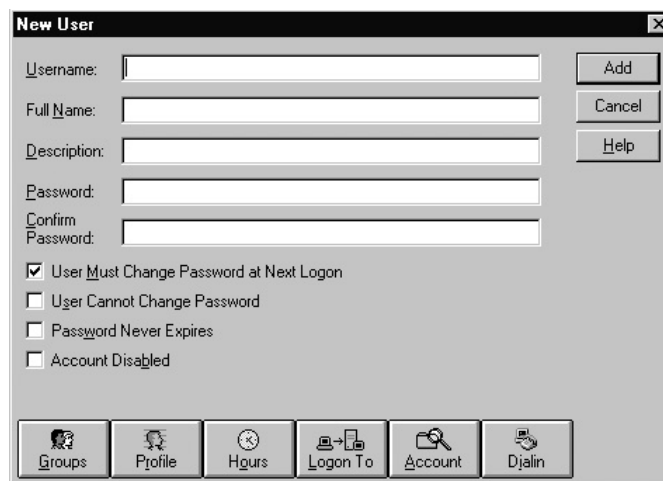
2. Select [Administrative Tools (Common)], and then [User Manager for Domain] and then appear the next dialog box [User manager-Domain].



#### d. Administering the users account

As network administrator, one of their big works is to maintain a precise and up-to-date database of users. It should be necessary to maintain the security of their place and it should be up-to-date so that they are easier their administrative tasks.

1. Select [Programs], in the [Start] menu, and select [Administrative Tools Common].
2. In the [User Manager-Domain] windows, select [New User] in the [User] menu, and then appear the next [New user] dialog box, where will add a new user.



When add a new user account, is not a lot of information that is necessary. As minimum it needs to assign the user's name [Username], the password [Password] and to confirm the [Confirm Password]. Besides the minimum information it can add the rest of the additional information.

**Users Must Change Password at Next Logon.** If this option is selected, the user will modify when he registers for the first time in the network. This means that the password that is provided in the dialogue box of [New User] it is temporary, effective only to register for the first time. With purpose of security it is good decision to select this option.

**User Cannot Change Password.** If this option is selected the user won't be able to change his own password. If the password expires, it will be changed here in user's administrator.

**Password Never Expires.** If this option is selected the user will never need to change the password. This option annuls the directive ones for the account where it specified since time was effective the password.

**Account Disable.** This option can be used to disable a account temporarily. In an automatic way this option is selected if the user has designated temporally and the time of expiration of the account has been exceeded.

3. In the inferior part of the dialog box of [New User] they are some button, which allow specifying additional information to the account.
4. After specifying the user's information, make click in [Add] to add a new user.

#### e. **Administering user's groups**

Groups contain users or other groups; give members the permissions that belong to the group provide easier management of users. There are three main groups used in Windows NT Server.

- **Local Groups:** Are used to assign permissions in the local domain. Can contain users and Global groups, including Global groups from other trusted domains.
- **Global Groups:** Contains user accounts only. Used to export user accounts to other domains, where they can be imported into Local Groups on trusting domains
- **Special Groups:** Used by Windows NT Server for system access, and do not contain user or group accounts.

#### e.1 **Global groups**

Global groups contain users from the local domain. They are also used to export users to another trusting domain. Global groups do not have rights to perform any administrative tasks. For instance, the built-in global group Domain Admins can only perform administrative tasks if it is made a member of the local group Administrators.

#### e.1.1 **The built-in global groups**

The following table lists the Global groups built-in to Windows NT Server.

Global Group Name	Members	Who can modify?	Initially member of
Domain Administrator	Administrator	Administrators	Administrators
Domain Guests	Guest	Administrators Account Operators	Guests
Domain Users	Administrator	Administrators Account Operators	Users

### e.1.2 How to use groups in domains

Let's consider some recommendations concerning the use of Global and Local group memberships as outlined by Microsoft.

Function	Group to use
Export users to another domain	Global
Assign permissions and rights to local domain resources	Local
Give rights to users from another domain	Local
Combine groups	Local
users need access to Windows NT Workstations or NT servers in a domain	Global

### e.1.3 Add global groups

1. To add a new group of users it simply selects the option in the menu [Users] of the dialog box [User Manager Domain].
2. If it needs to add a global group select [New Global Group].
3. To define the global group it simply provides a name for the group and an optional description, select the account of users that you want as the members of the group.
4. To add members select the user's name in the list [Not Members], and then make click in Add, so that they are [Members].
5. When it finishes defining the group click in [OK]. The new global group will appear in the inferior part of the [User manager].

## e.2 Local groups

Local groups are limited to the domain [or computer] they are created on. They are created using User Manager, and a number of pre-existing Local groups have been provided.

Local groups created on a Windows NT Server [non BDC or PDC] or Windows NT workstation are limited to that computer only. In contrast, a Local group created on a domain controller can be used on any server, which is a member of that domain, but cannot be used outside the domain.

### e.2.1 The built-in local groups

Microsoft recommends that you use the existing Local groups where possible. The following table lists the Local groups built-in to Windows NT Server.



<b>Available on</b>	<b>Local Group Name</b>	<b>Members</b>	<b>Who can modify?</b>	<b>Rights</b>
DC	Account Operators (AO)	None	Administrators Account Operators Server Operators	Create, Delete, Modify user accounts and groups. Cannot modify the Administrator or Server Operator groups
W+S+DC	Administrators (AD)	Domain Administrator	Administrators	Create, Delete, Manage user accounts and groups. Share directories and printers. Grant resource permissions. Install OS files and programs.
W+S+DC	Backup Operators (BO)	None	Administrators	Backup and Restore servers. Logon locally. Shut down the server.
W+S+DC	Guests (G)	Guest	Administrators Account Operators	
W+S	Power Users			
DC	Print Operators (PO)	None	Administrators	Share and remove sharing printers. Manage printers. Logon locally. Shut down servers.
W+S+DC	Replicator	None	Administrators Account Operators Server Operators	Used with the Directory Replication Service.
DC	Server Operators (SO)	None	Administrators	Share and remove sharing resources. Format the server disks. Logon locally. Backup and restore servers. Shut down servers. Lock and unlock servers.
W+S+DC	Users (U)	Domain Users	Administrators Account Operators	

W=NT Workstation  
S=Windows NT Server  
DC=Domain Controller

## e.2.2 Default rights for built-in local groups on Windows NT Server

The following rights are visible in User Manager for Domains.

<b>Rights</b>	<b>AD</b>	<b>AO</b>	<b>BO</b>	<b>E</b>	<b>G</b>	<b>PO</b>	<b>SO</b>	<b>U</b>
Access this computer from the network	Yes			Yes				
Backup Files and directories	Yes		Yes				Yes	
Change the system time	Yes						Yes	
Force shutdown from remote location	Yes						Yes	
Logon locally	Yes	Yes	Yes			Yes	Yes	
Manage auditing and security log	Yes							
Shut down the system	Yes	Yes	Yes			Yes	Yes	
Restore files and directories	Yes		Yes				Yes	
Take ownership of files	Yes							

The following rights are NOT visible in User Manager for Domains [defaults which you cannot change].

<b>Rights</b>	<b>AD</b>	<b>AO</b>	<b>BO</b>	<b>E</b>	<b>G</b>	<b>PO</b>	<b>SO</b>	<b>U</b>
Assign user rights	Yes							
Create and manage user accounts	Yes	Yes						
Create and manage global groups	Yes	Yes						
Create and manage local groups	Yes	Yes						Yes
Create common groups	Yes						Yes	
Format the servers hard disk	Yes						Yes	
Keep local profile	Yes	Yes	Yes			Yes	Yes	
Lock the server	Yes			Yes			Yes	
Share and stop sharing directories	Yes						Yes	
Share and stop sharing printers	Yes					Yes	Yes	
Unlock the server lock	Yes						Yes	

If you unlock a server that has been locked by another user, any work in progress will be lost.

Users will only be able to add local groups if they have access to User manager for Domains.

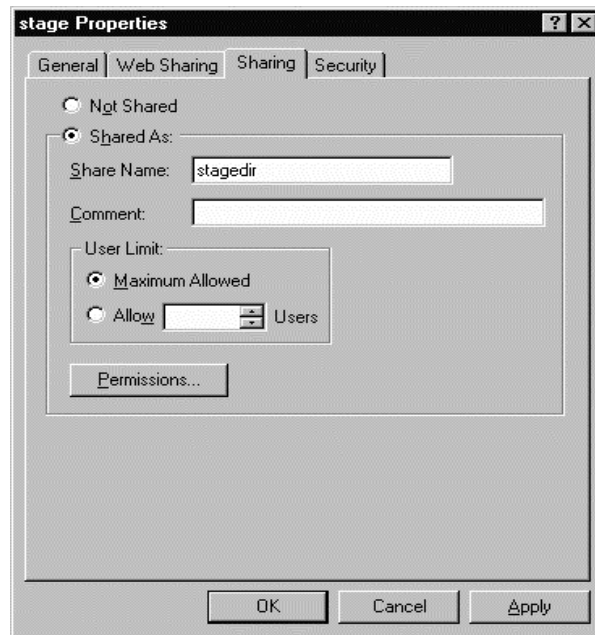
Everyone has the right to lock a NT Server, but does not have the right to logon locally.

### **e.2.3 Add a local group**

1. To add a local group of users, selects (File, New, Local Group).
2. The information that provides to create a local group is almost the same one that used to create a global group, but a difference exists in the form of making it.
3. When it adds the initial members to the first local group makes click in [Add] and then the [User Manager], it shows the new dialog box that has a list of all the global groups and users' account in the system.
4. The local groups allow you to define a global group as members, to add the members it simply selects the names in the superior part of the dialog box and then make click in [Add].
5. Click in [OK] and the names that it specified are added to the new local group as initial members.
6. When it finishes defining the local group, click in [OK].

### **f. Sharing files and folders**

1. Creating a share under Windows NT is quite easy, simply find the folder you want to share, right-click, and select the menu option labeled "Sharing".



2. A dialog box will pop up with a tab entitled "Sharing" selected. This is the exact same panel that comes up if you right-click a folder and select "Properties" - the only difference is that the "Sharing" tab is pre-selected for you. Click on the "Shared As" radio button. The "Share Name" field will automatically be filled in with the same name as the folder, but you can change it.

### f.1 Share and permissions

Many Windows NT administrators I've met are very confused about how share permissions work. The basic problem is that there are *two* types of permissions involved - share and file permissions. First, some definitions:

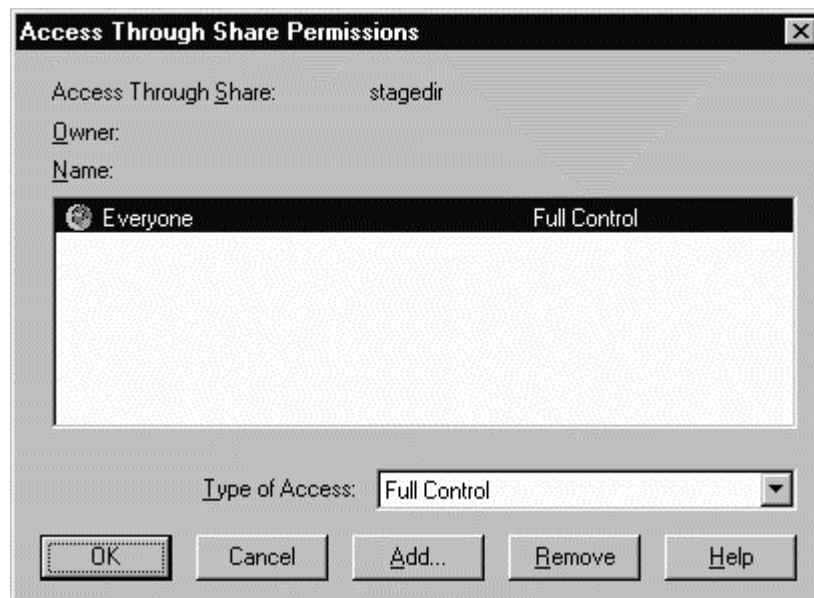
- **Share Permissions:** These are the permissions for who is allowed to connect to that share, and what they are allowed to do in that share (i.e., only read files, change files, create and delete files, etc.). Share permissions only apply when connecting to shares over a network. Shares are not used at all when connecting to files on the computer you are currently on (Microsoft calls this "logged on locally").
- **File Permissions:** These are Windows NT security file permissions, which apply to files at all times (whether connecting remotely or locally). These permissions specify who can access that file or folder, and what they can do to it (i.e., only read files, change files, create and delete files, etc.). To set these permissions, you must be using NTFS. If the drive/partition is formatted as FAT, file permissions cannot be set.

When a person attempts to connect to a share to read a file, NT does the following (and denies access if any check fails):

- Checks to see if that user has permission to connect to the share
- Checks to see if that user has read access to the share
- Checks to see if that user has file permissions to that file in the share
- Checks to see if that user has read access to that file in the share

As you can see, a lot of checks are done. Basically, Windows NT is going to apply the *most-restrictive rules* when granting access to files.

By default, when you create a share Windows NT sets the share permissions to "Everyone/Full Control". Go back into the Sharing properties of the share created previously, and this time click the "Permissions" button. It should look like this:



I call this default "pass through share security", because it is simply letting anyone on your network connect to this share (whether in your domain or not!), and granting them full control over the files there. Remember, though, that if you are using NTFS, they must also have file-level permissions to really access the files.

If you are familiar with file-level permissions (and you certainly should be), you'll notice that this panel is nearly identical to the one used for setting file-level permissions. Using it, you can define who is allowed to access this share.

### ***Examples.***

For example, say you have a folder named "test1" with three files in it, FILE1, FILE2, and FILE3.

You set up a share granting EVERYONE full control. However, on each file you set it to be full control for administrators, and No Access for domain users. What happens when a user connects to that share? They can connect, and see the file names, but attempts to do anything result in an 'access denied' on the file.

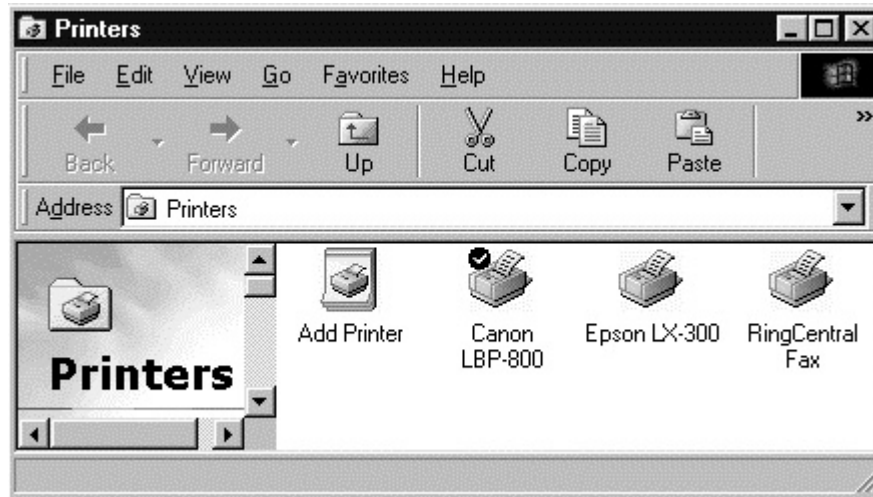
If you then changed FILE2 to be full control by everyone, than anyone could use it - but not files FILE1 and FILE3. This works the other way around, too. Assume you then set all three files to Full Control by Everyone via file permissions. You then change the SHARE permissions to only allow Read access by Domain Administrators (no other access). Here's what would happen:

- Domain administrators can connect to the share. When connected to the share, they can ONLY read the files. (Note that if they log on locally to the system, they don't need to use a share, and they have Full Control)

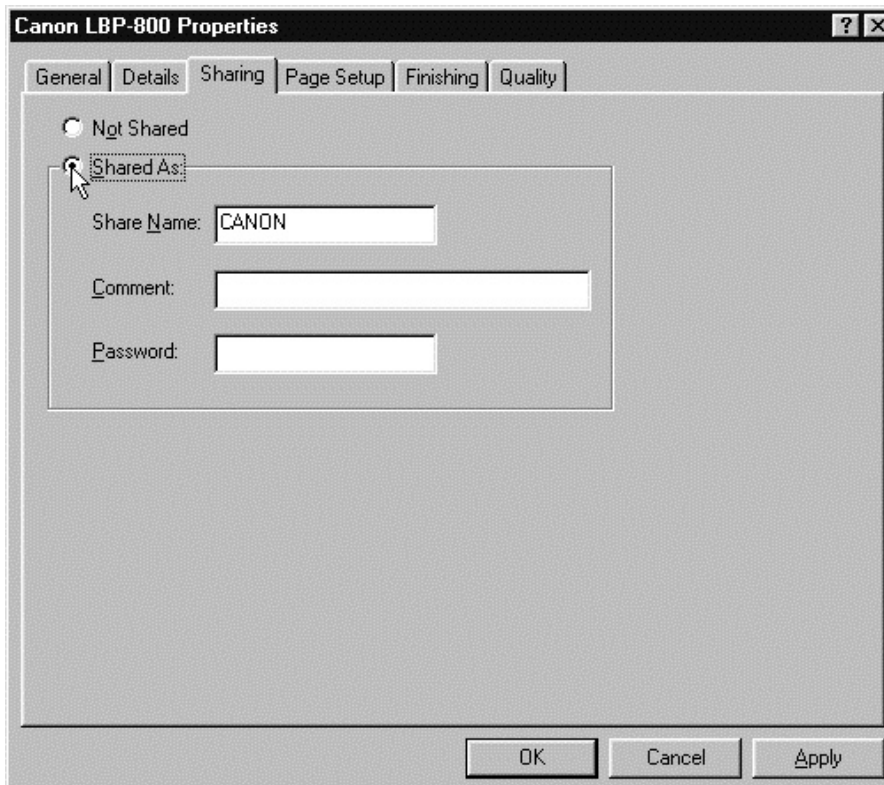
- Domain users can't connect to the share at all. Like Domain Administrator, they have full control over the files IF they are logged on locally to the computer, since the files are set as Full Control.

**g. Sharing printers**

1. Select [Setting] from de [Start] menu, then select [Printer].



2. In the [Printer] folder, select the printer to use in the LAN, the click the right mouse button, and then select [Properties].



3. In the printer [Properties] dialog box, select the [Shared as] option and then type the [Share Name], and click [OK]
4. Now this printer is available for all in the LAN.