

# Tap Built-in Functionality for Better Performance

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Take advantage of core ArcView GIS functionality by using spatial indexes to enhance performance and spatial joins to extend analysis capability. Because both these operations rely on the spatial relationship between features, they involve the use of feature tables (FTabs), a specific type of virtual table (VTab). A brief description of FTabs precedes a more in-depth discussion of spatial indexes and joins.

## Geography Makes the Difference

The Shape field, which points to geometry of the feature associated with each record, is the characteristic that distinguishes an FTab from other VTabs that maintain records for other GUI types in ArcView GIS. Features in a single FTab must be of the same basic shape type. The types of shapes supported are point, polyline, polygon, and multipoint. The feature's geometry is read by accessing the value of the Shape field itself. The following Avenue code will display the shape for the first record of the first theme in the active view.

```
theView = av.GetActiveDoc
theTheme = theView.GetThemes.Get(0)
theFTab = theTheme.GetFTab
shapeField = theFTab.FindField("Shape")
recNum = 0
shp = theFTab.ReturnValue(shapeField, recNum)
MsgBox.Info(shp.AsString, "Shape for record"++recNum.AsString)
```

Generally the in-memory FTab and Shape field do not contain the feature theme's actual attributes and geometry. The FTab and Shape field point to the actual values contained on disk or in the database. Dynamic segmentation, the exception to this rule, never uses values stored in a Shape field but calculates the value at run time.

## Order Speeds Operations

An index is a kind of cross-reference for data in ArcView GIS. Ordering the values in a field speeds access to that data. Indexing on the Shape field of an FTab creates a spatial index. Spatial indexes speed all theme drawings and improve performance for operations such as Identify, spatial joins, and theme-on-theme selections. Drawing a view provides an example of why this is so. If a view's extent does not fully contain the feature theme's extent, a spatial index will be used by ArcView GIS to select first the features that fall within the view's extent. Only those selected features are drawn. A spatial index is easily created by using the interface method and following these steps.

1. Open the table for a feature theme.
2. Highlight the Shape field by clicking on it in the table display. The Shape is typically the first field in the FTab's table display.
3. Select Field>Create Index from the menu. If the Remove Index option is available from the Field menu, the current FTab already contains a spatial index.

Two files, each with the theme name as a prefix and a .sbn or .sbx as the suffix, are generated and stored in the same directory as the source data for the theme. These files are the spatial index. The spatial index contains an ordered set of minimum bounding rectangles, one for each feature in the data set. The methods that access the spatial index are optimized to initially search the set of rectangles. When rectangles that meet the search criteria are found, the indexing methods perform a more detailed search on a particular feature's geometry. Indexes can be removed by choosing Field>Remove Index.

## A Spatial Kind of Join

A feature theme's attribute table can be associated with additional tabular data by joining or linking the two tables based on a common field. Joins are good for establishing one-to-one or many-to-one relationships. However, one-to-many relationships are better handled by linking rather than joining tables. All joins involve a destination table and a source table. Upon

FTabs

Spatial Join

Shape field

Indexes

FTabs

completion of the join, the destination table will display the fields from both tables and the source table will be closed.

Spatial joins provide powerful spatial analysis capabilities. In a spatial join, the Shape fields of two FTab are used as the common field. The join is created based on the spatial relationship between the shapes of the features. Spatial joins describe three types of relationships between themes—nearest, inside, and part of.

In the case of a point-in-polygon spatial join, a point FTab is spatially joined to a polygon FTab. There are restrictions placed on the methods of joining different combinations of shapes. The following table shows the type of relationship allowed between the kinds of themes used for spatial joins. The nearest join method adds a Distance field containing the distance to the nearest feature in the source table to the destination table.

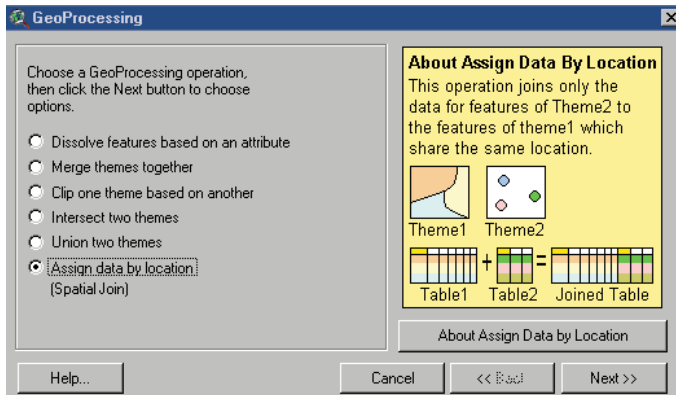
	Point	Line	Polygon
Point	Nearest	Nearest	Inside
Line	Nearest	Part of	Inside
Polygon	NA	NA	Inside

Use Menu Choices to Spatially Join Two Tables

1. With the view active, open the tables of the themes to be joined.
2. Make the source table active. Select the Shape field in the source table.
3. Make the destination table active. Select the Shape field in the destination table.
4. Choose Table>Join from the menu. The source table is joined to the destination table and closes automatically.

Use the Geoprocessing Wizard for Spatial Joins

1. From the File menu, choose File>Extensions.
2. In the Extension dialog box, check on the Geoprocessing extension and click OK to load the extension.
3. From a view containing the themes to be joined, choose View>Geoprocessing Wizard from the menu.
4. In the first dialog box in the wizard, select the Assign Data by Location (Spatial Join) option and follow the steps described within the wizard to create a spatial join.



*The geoprocessing wizard, available through the geoprocessing extension that comes with ArcView GIS, can be used to perform spatial joins.*

Though the destination table can have joins, ArcView GIS will not allow a table containing a join to be used as a source file. To get around this restriction, export the source table with joins to a new table, add that table to the project, and perform the join.

Joining tables has no effect on the related files. ArcView GIS saves a project with a joined table by saving the definition of the join. When the project is reopened, ArcView GIS rejoins any joined tables by reading the

files or reexecuting the SQL queries they are based on. Spatial joins, like all table joins, can easily be removed by choosing Table>Remove All Joins from the menu.

Learn more about spatial indexes and joins from the ArcView GIS help files, or from *Inside ArcView GIS*, Third Edition by Scott Hutchinson and Larry Daniel or *ArcView GIS Exercise Book* by Pat Hohl and Brad Mayo, both available from the GIS Store ([www.esri.com/gisstore](http://www.esri.com/gisstore)). ■