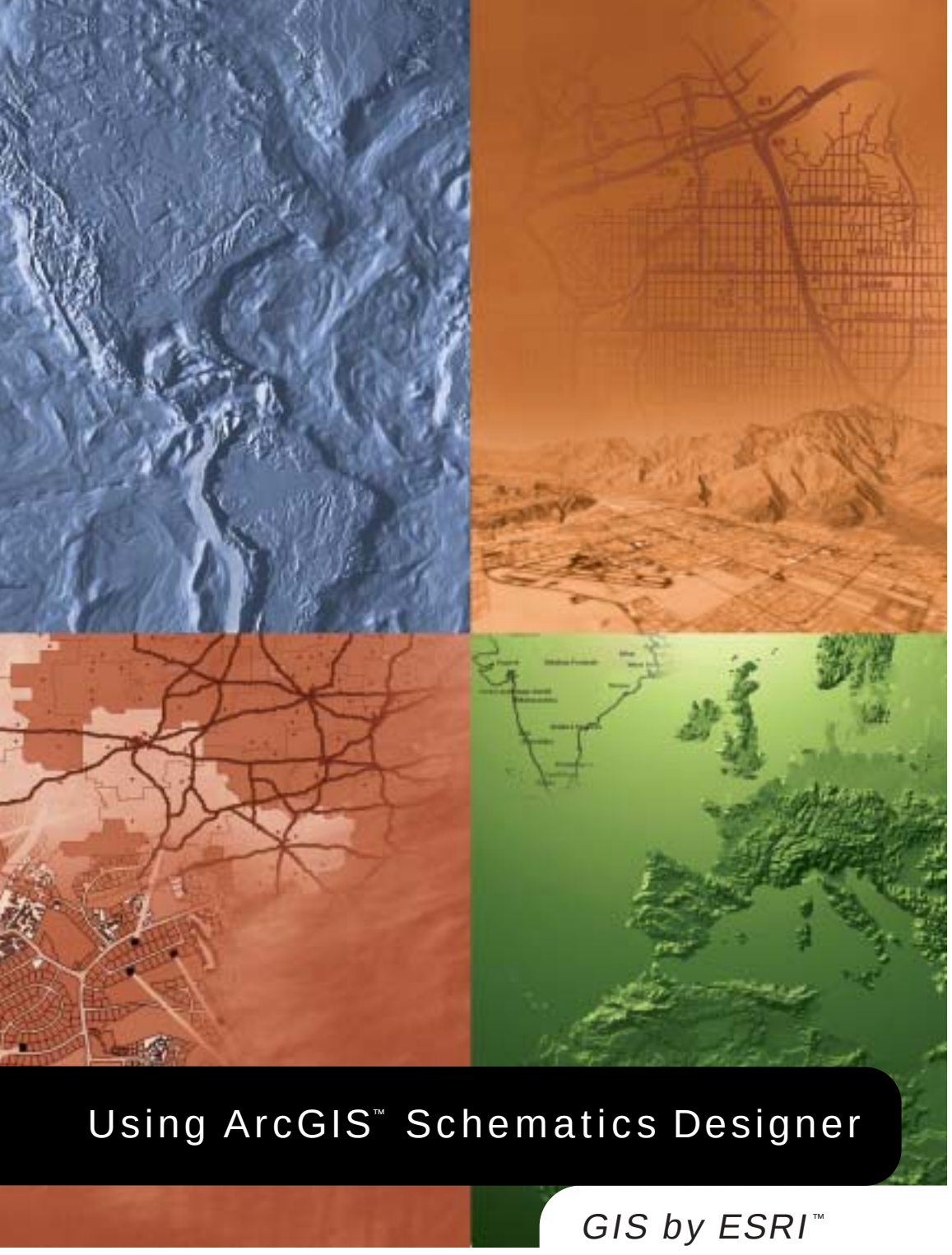


Using ArcGIS™ Schematics Designer

GIS by ESRI™

Table of Contents

ArcGIS Schematics SDK Quick-Start Tutorial

ESRI® ArcGIS™ Schematics SDK is a Windows®-based solution that meets network managers' needs for graphically visualizing and manipulating their network data. This software solution can be integrated in all compatible Microsoft® COM development environments.

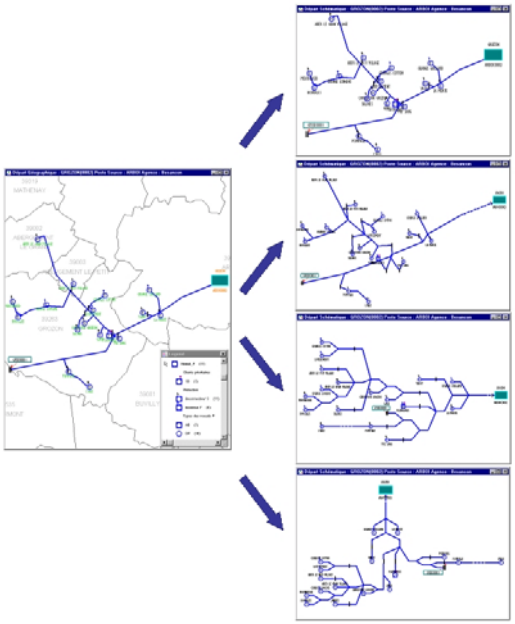
ArcGIS Schematics SDK delivers powerful tools that let you automatically generate a graphic representation of your network using its associated database information. You can analyze networks in geographical, geoschematic, and schematic layouts. It is also a high-end development platform that you can use to rapidly build a variety of graphic custom applications for your network information system. With its advanced functionality, network graphs and diagrams can be produced on the fly.

Powered by its workspace parameters file architecture and its data-driven graphics philosophy, ArcGIS Schematics SDK offers a high degree of flexibility. It is not limited by the evolutions of the data model and by changing database locations.

Included with the ArcGIS Schematics SDK components is ArcGIS Schematics Designer, a graphical user interface (GUI)-based design tool that supports configuration and customization of ArcGIS Schematics SDK.

Also included with ArcGIS Schematics SDK is a set of standard schematic layout algorithms ready to use with network data. ArcGIS Schematics SDK can be customized to support user-specific layout algorithms.

The following screenshots are a set of example schematic views that can be generated using ArcGIS Schematics SDK.



Through an example personal database, this tutorial guide allows you to rapidly get acquainted with the ArcGIS Schematics SDK, visualize the database information, and use some of the powerful ArcGIS Schematics SDK layout tools to generate various schematic representations of the network data.

Using your own definition and connection scheme (i.e., its own workspace parameters ".ini" file built with ArcGIS Schematics Designer), you can quickly connect to your database from within the integrated ArcGIS Schematics SDK.

➢ Installing ArcGIS Schematics SDK

Installation of ArcGIS Schematics SDK will create all of the necessary references to the ArcGIS Schematics SDK components.

The template ".ini" file (C:\Schematics_SDK\Samples\WorkspaceExample\Session\Workspace_Example.ini, by default) will also be created in the installation process. This workspace parameter file has been designed with ArcGIS Schematics Designer and may be tested through the ArcGIS Schematics SDK, such as any ArcGIS Schematics workspace parameters file. This example template file shows different sets of behaviors, connection schemes, and customization choices for the production of schematic network diagrams.

➢ About the DBExample database

The Workspace_Example workspace parameters file has been designed to graphically display the network data described in the DBExample.mdb personal database. The installation process may have copied this database in the C:\Schematics_SDK\Samples\WorkspaceExample\Database\DBExample.mdb folder (default location).

This personal database is composed of four tables:

- **"Feeder" table**, which has the following 3 fields:
  - OBJECTID: feeder identifier (Integer)
  - X: feeder X-coordinate value (Double)
  - Y: feeder Y-coordinate value (Double)
- **"Station" table**, which has the following 6 fields:
  - OBJECTID: station identifier (Integer)
  - Feeder: feeder identifier the station belongs to (Integer)
  - X: station X-coordinate value (Double)
  - Y: station Y-coordinate value (Double)
  - NodeType: station type (a variable coded as "A", "B", "C", "D", "E", or "F")
  - NodeSize: station size (Double)
- **"HV_Links" table**, which has the following 7 fields:
  - OBJECTID: HV_Link identifier (Integer)
  - FromNodeType: node type the link origin node is connected to (String)
  - FromNodeOID: link origin node identifier (Integer)
  - ToNodeType: node type the link end node is connected to (String)
  - ToNodeOID: link end node identifier (Integer)
  - GeoLength: geographical link length (Double)
  - ListPoints: list of link point coordinates that compose the link path
- **"LV_Links" table**, which has the following 9 fields:
  - OBJECTID: LV_Link identifier (Integer)
  - FromNodeType: node type the link origin node is connected to (String)
  - FromNodeOID: link origin node identifier (Integer)
  - ToNodeType: node type the link end node is connected to (String)
  - ToNodeOID: link end node identifier (Integer)
  - LinkRate: ratio value associated with the LV_link (Double)
  - LinkType: link type, a variable coded as "S", "M", or "B" (String)
  - GeoLength: geographical link length (Double)
  - ListPoints: list of link point coordinates that compose the link path

➢ Opening the Workspace—Example Session

Launch NgDeveloper.exe (by default, C:\Schematics_SDK\Bin\NgDeveloper.exe).

Click the File menu and click Open Schematic Session. Choose the " C:\Schematics_SDK\Samples\WorkspaceExample\Session\Workspace_Example.ini" workspace parameters file. This will create all of the necessary session data to view and manipulate the network data stored in the "DBExample" personal database.

The Workspace_Example parameters file manages two types of documents:

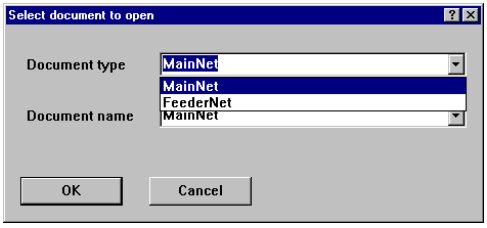
- MainNet contains the complete network stored in the database.
- FeederNet allows the display of data related to a single given part of the network (i.e., related to a given feeder).

➢ Opening a Schematic Document

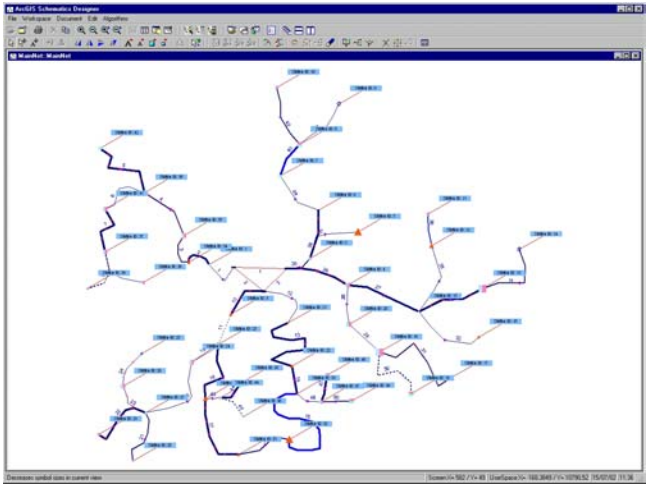
The Workspace_Example parameters file manages two types of documents:

- MainNet contains the complete network stored in the database.
- The second type of document allows you to display data related to a single given part of the network (i.e., related to a given feeder).

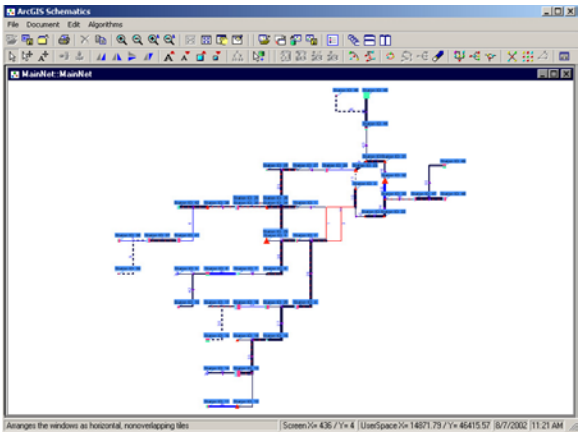
To open a schematic document, click the Document menu and click Open Document Form. The default Select document to open ArcGIS Schematics SDK dialog box opens.



Choose one of the two document types available from the Document Type dropdown list and select the desired document name from the Document name dropdown list. Next, select one of the Tile Views tools from the toolbar to arrange your schematic window and click the Fit All button to fit all the schematic objects displayed in the currently opened view.



Finally, use the ArcGIS Schematics SDK layout tools from the toolbar to arrange your network layout.



➢ Saving a Schematic Document

If your document is saved by using the Save Document command, the position of the nodes and links from the network layout as displayed are retained in the GraphicFolder directory in the ArcGIS Schematics SDK graphic database format. This database is independent from the applicative database (i.e., independent from the DBExample database, here). When a saved document is reopened, the graphic database is synchronized with the application's database, and the modifications (objects created or removed) introduced in the latter are then reflected.

➢ Quick Start Summary

1. Launch the ArcGIS Schematics SDK (NgDeveloper.exe).
2. Click the File menu and click Schematic Session. Click C:\Schematics_SDK\Samples\WorkspaceExample\Session\Workspace_Example.ini.
3. Open one of the predefined schematic documents managed by the opened workspace parameter file.
4. Increase the symbol sizes as required and select the desired layout types.
5. If you want to store your current network layout, save your document before closing it. If not, your document will be reopened with the default coordinates (those stored in the DBExample database); all changes introduced in the document since it was created (node and link positions) will not be taken into account.

About ArcGIS Schematics SDK toolbars

Press F1 while moving your mouse on any ArcGIS Schematics SDK menu to open the Using ArcGIS Schematics SDK 2.2 Toolbars online Help: the corresponding ArcGIS Schematics SDK command help page will automatically load.

Introducing ArcGIS Schematics Designer

➢ ArcGIS Schematics Designer Overview

ArcGIS Schematics Designer is an essential component of the ArcGIS Schematics product line.

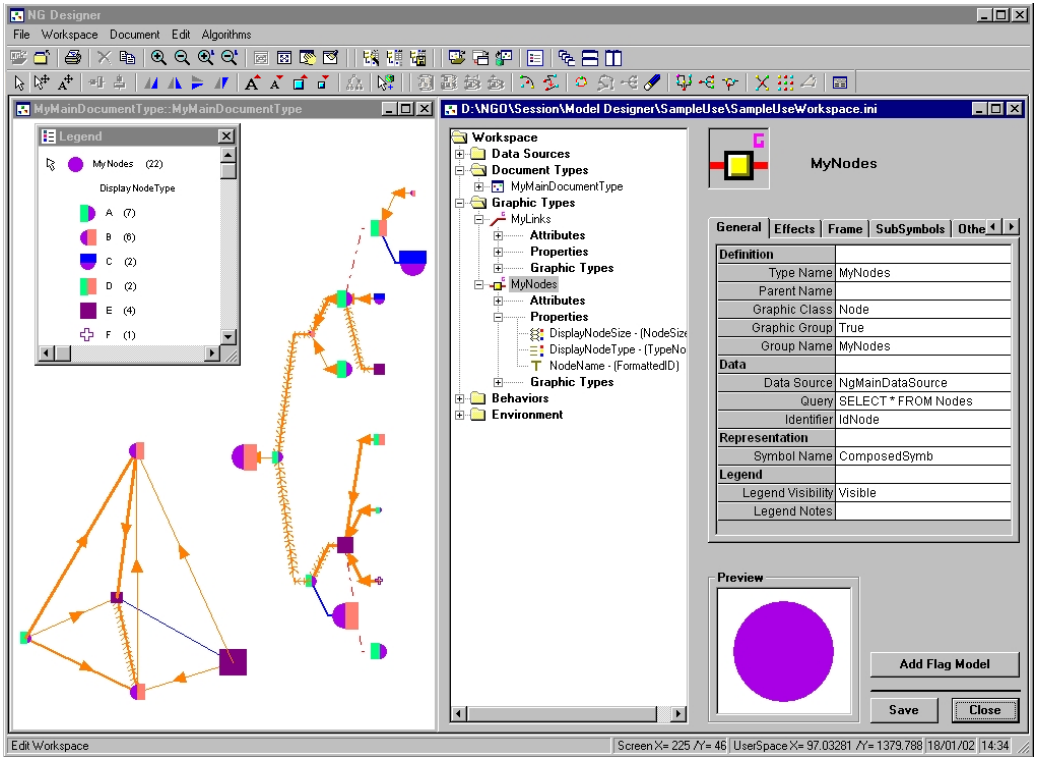
With this valuable and user friendly modelization interface, you will be able to:

>> **Create a schematic workspace** parameters file to:

- bring back graphic objects stored in the database,
- create properties to represent them graphically,
- define the document type in which they will be displayed,
- specify the application behaviors...

>> **Edit and update any schematic workspace** parameters file created in previous versions

>> **Test instantly your schematic workspace** parameters file: any change is automatically taken into account and can be graphically visualized.



➢ ArcGIS Schematics Designer Menus

- The "**File**" menu allows you to access the main session management commands:

  - "Open Schematic Session", to open a new schematic session

  - "Close Schematic Session", to close the currently open schematic session

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  - "Print View", to print the currently active schematic view window content

  ---

  - "Remove objects", to delete the selected graphic objects

  - "Copy to Clipboard", to copy the selected graphic objects to the Clipboard

  ---

  - "Zoom In Mode", to enable the "standard zoom in" mode

  - "Zoom Out Mode", to enable the "standard zoom out" mode

  - "Logical Zoom In Mode", to enable the "logical zoom in" mode

  - "Logical Zoom Out Mode", to enable the "logical zoom out" mode

  ---

  - "Fit Selected Set", to fit all the selected set graphic objects into the active view

  - "Fit All Graphic Objects", to fit all visible objects into the active view

  - "Pan Mode", to enable the pan mode

  - "Repaint", to refresh the objects in the active view

  - "Quit", to close ArcGIS Schematics Designer. If your current workspace's parameters file has been modified without being saved, you will be asked to save it.

- The "**Workspace**" menu allows you to access the three following workspace commands:

  - "New Workspace", to create a new workspace (i.e., for creating a new workspace parameters file)

  - "Edit Workspace", to edit the workspace parameters associated with the active schematic session

  - "Save Workspace", to save the currently open workspace parameters file

- The "**Document**" menu includes all the documents and views management commands:

  - "Open Document Form", to open a document

  - "New View", to open a new view for the active document

  - "Refresh Document", to update the currently open document

  ---

  - "Show/Hide Legend", to turn legend display on or off for the active document

  ---

  - "Cascade Views", to arrange all open schematic view windows as overlapping tiles

  - "Tile Views Horizontally", to arrange all open schematic view windows as nonoverlapping horizontal tiles

  - "Tile Views Vertically", to arrange all open schematic view windows as nonoverlapping vertical tiles

The "**Edit**" menu allows you to access text or symbol attribute modification commands, graphic object alignment commands, and copy and delete commands:

- "Selection Mode", to enable the "Selection" mode

- "Edit/Move Mode", to enable the "Select and Move" mode

- "Align Horizontally", to align the selected nodes horizontally

- "Align Vertically", to align the selected nodes vertically

- "No Mirroring", to cancel the symmetry effects applied to the currently active view

- "Y Axis Mirroring", to vertically mirror the objects in the currently active view

- "X Axis Mirroring", to horizontally mirror the objects in the currently active view

- "XY Axis Mirroring", to vertically and horizontally mirror the objects in the currently active view

---

- "Increase Text Sizes", to enlarge text sizes

- "Decrease Text Sizes", to decrease text sizes

- "Increase Symbol Sizes", to enlarge symbol sizes

- "Decrease Symbol Sizes", to decrease symbol sizes

- "Select Hierarchy", to select a hierarchy of objects starting from a parent node

---

- "Open Create Object Form", to enable the digitize mode for graphic object creation

- The "**Algorithms**" menu allows you to access the functions for running smart graph layout algorithms:

- "Collapse Hierarchy", to collapse objects hierarchically, from a given node

- "Collapse Selected Set", to collapse a selected set of ArcGIS Schematics graphic objects

- "Expand by Level", to expand a set of collapsed nodes by one-level increments

- "Expand All", to expand a selected collapse root node level-wise

---

- "Bypass Nodes", to reposition the links in a selected set so as to prevent them from crossing nodes

- "Remove Link Points", to remove all link points from selected links

---

- "Find Loops", to find existing loops for the graph in the active view

- "Find Shortest Path", to find the shortest path route between two selected nodes in the active schematic view

- "Find Tree", to find the tree associated with the selected node in the active schematic view

- "Remove Algorithms Graphic Effects", to remove all highlighting effects from the loops, path, or tree found by an algorithm

---

- "Orthogonal Layout", to lay out the nodes and links orthogonally in the active schematic view

- "Hierarchical Layout", to lay out the nodes and links hierarchically in the active schematic view

- "Backbone Layout", to lay out the loops around a chosen backbone geometry in the active schematic view

---

- "Separate Nodes", to separate nodes that are visually very close or near to overlapping in the active schematic view

- "Grid Layout", to lay out the nodes so they snap onto an active magnetic grid in the active schematic view

- "Rotate Tree", to rotate the tree associated with the node selected in the active schematic view

---

- "Open Algo Parameters Form", to open the Algorithms Parameters dialog box

➢ ArcGIS Schematics Designer "Standard" Toolbar

Main Commands

 "Open Schematic Session" button

 "Close Schematic Session" button

---

 "Print View" button

---

 "Remove objects" button

 "Copy to Clipboard" button

---

 "Zoom In Mode" button

 "Zoom Out Mode" button

 "Logical Zoom In Mode" button

 "Logical Zoom Out Mode" button

---

 "Fit Selected Set" button

 "Fit All Graphic Objects" button

 "Pan Mode" button

 "Repaint" button

---

Workspace Commands

 "Create a new workspace" button

 "Edit the current workspace" button

 "Save the workspace on disk" button

---

Document and View Commands

 "Open Document Form" button

 "New View" button

 "Refresh Document" button

 "Show/Hide Legend" button

 "Cascade Views" button

 "Tile Views Horizontally" button

 "Tile Views Vertically" button

➢ ArcGIS Schematics Designer "Tools" Toolbar

Selecting and Editing Commands

 "Selection Mode" button

 "Edit/Move Mode" button

 "Move Labels Mode" button

---

 "Align Horizontally" button

 "Align Vertically" button

---

 "No Mirroring" button

 "Y Axis Mirroring" button

 "X Axis Mirroring" button

 "XY Axis Mirroring" button

---

 "Increase Text Sizes" button

 "Decrease Text Sizes" button

 "Increase Symbol Sizes" button

 "Decrease Symbol Sizes" button

---

 "Select Hierarchy" button

---

 "Open Create Object Form" button

Algorithm Commands

 "Collapse Hierarchy" button

 "Collapse Selected Set" button

 "Expand by Level" button

 "Expand All" button

---

 "Bypass Nodes" button

 "Remove Link Points" button

---

 "Find Loops" button

 "Find Shortest Path" button

 "Find Tree" button

 "Remove Algorithms Graphic Effects" button

---

 "Orthogonal Layout" button

 "Hierarchical Layout" button

 "Backbone Layout" button

---

 "Separate Nodes" button

 "Grid Layout" button

 "Rotate Tree" button

---

 "Open Algo Parameters Form" button

ArcGIS Schematics Designer Main Concepts

What Is a Workspace?

The workspace is the core object in your schematic application. It acts as the central point where access is gained to other objects in the system. The workspace provides access to the schematic components your application manages as data sources, document types, graphic types, etc.

A workspace and its associated characteristics can be created and defined through ArcGIS Schematics Designer or by Visual Basic® (VB) programming.

What Is a Document Type?

A network is made up of nodes and links. These nodes and links are displayed in different generic structures called "documents". A document is a collection of schematic views and is related to a single workspace.

A document type is a document model, and it brings together a set of documents that have common characteristics. A document type can inherit from another document type.

To define a document type, you typically declare:
- Its name
- Eventually, the name of its parent document type

You can complete your document definition by defining:
- The query returning all the documents of this type
- The fields used to build up each document identifier for this document type
- One or more attributes associated with this document type

A document type and its characteristics can be created and defined through ArcGIS Schematics Designer or by VB programming.

What Is a Graphic Object Type?

A graphic object type brings together a set of graphic objects that have common characteristics. A graphic object type can inherit from another graphic object type.
When you define a graphic object type, you typically declare:
- The name of this graphic object type
- The class of the graphic objects (node, link, drawing)
- Eventually, the name of its parent graphic object type

You can complete your graphic object type definition by defining:
- The query returning all the graphic objects of this type
- The fields used to build up each graphic object identifier for this type
- One or more attributes associated with this graphic object type
- One or more properties associated with this graphic object type
- One or more “user-datasets” associated with this graphic object type

A graphic type and its characteristics can be created and defined through ArcGIS Schematics Designer or by VB programming.

What Is a Group?

A graphic group is a set of graphic objects that have the same graphic effects. A group is associated with a graphic type. Properties that have an impact on the graphic representation of a network are defined as groups.

When you create a new graphic type, you have to decide if your new graphic object type will be associated with a graphic group or not. Even if you can redefine graphic types as a group at any time, this decision is important. It determines what you will later be authorized to define for your graphic type: when your graphic type is a group, you can define any graphic effects, and you can create any property on it. If your graphic type is not a group, it is impossible!

By default, if a graphic type inherits from another graphic type, and if it is not a group, it inherits the graphic effects and the properties defined for the first of its ancestor graphic object types, which is a group itself.

What Is a Node?

A node is a vertex in a network graph. It is represented by a symbol and may be assigned various graphic (color, fill style, etc.), geometric (scaling, rotation, etc.) or visual (visibility, highlighting, etc.) attributes.

Nodes can have geographic, semi-geographic, or graph coordinates. The coordinate system is independent of the graphic display window. Several nodes may be aligned along the same horizontal or vertical axis.

If the network is thickly populated, several nodes may be compacted into a single compaction node.

Two nodes can have a binding—logical and hierarchical—relationship, which means that certain rules will apply when these nodes are manipulated (e.g., moving or deleting a parent node will cause the associated child node to be moved or deleted accordingly).

What Is a Link?

A link is an edge in a network graph. A link can go through a number of "link points" that modify its path. It is represented either by a direct single line segment or by several line segments passing through one or several link points. The path between two link points may be graphically broken.

All types of patterns may be drawn up along a link path that may also have any given line style (dot, dash, etc.) and width.

A link can have a direction: arrows placed on its start and end points show this.

If a link path goes through one or several nodes, it can be modified so as to allow the nodes to be automatically bypassed.

What Is a Drawing?

Drawings are used to introduce additional graphic or text information relating to the network being represented: title block, frames, messages, and graphic scenery.

A drawing can be a basic (line, rectangle, circle, polygon, and text) or a complex graphic object made up of several basic graphic objects.

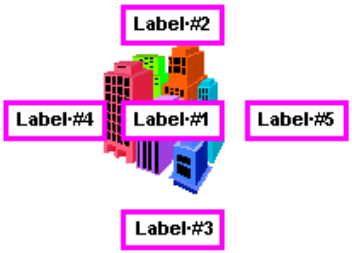
A drawing is created using a CGM-compliant graphic file.

What Is a Property?

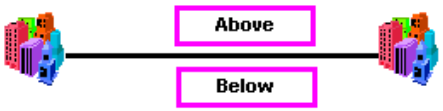
Properties are used to define the characteristics of a group of objects that have an impact in the graphic representation of a network. The overall state a network is in is determined by the values taken by the existing set of properties at a given time.

A property is associated with a single group.

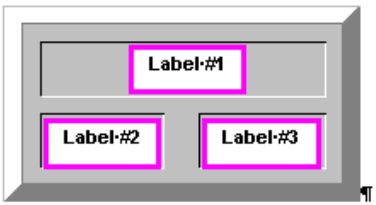
Any property can be represented by a label displayed either directly on the objects it applies to or inside a flag associated with these objects. The position of the text is determined either relatively to the objects (above/below, for links) or by a port number (for nodes or flags).



Node·Label·Ports



Link·Label·Ports



Flag·Label·Ports

A property created for the sole purpose of displaying a label on an object or inside the flag associated with it is said to be "**textual**".

To associate graphic effects with a property, the possible values of the property must first be specified. If these values belong to a finite set of numbers or of alphanumeric codes, the property is said to be "**discrete**". If the values are simply numeric and indifferent (i.e., they belong to a range of values), the property is said to be "**bounded**".

To assign specific graphic effects to that property, a filter must be defined for each of its possible values. Along with the textual, discrete, and bounded properties, a fourth property—the "**direct**" property—is also available for directly applying a given graphic effect depending on the values taken up by the property itself (e.g., scale factor, symbology, etc.).

The use of properties depends on whether or not its related graphic type is associated with a group. In fact, properties must only be created on a group. For a graphic type that is not a group, you can use properties defined on its ancestors (if they exist) in order to graphically highlight characteristics, but you cannot define new properties for such a graphic type.

So, **for a graphic type that is a group**, the "Create Property" menu lets you create any property, but **for a graphic type that is not a group**, you must use the "Associate property" menu that only lets you

associate a property defined for one of the ancestor graphic types with an existing attribute.

What Is a Property Filter?

A **discrete filter** refers to a specific value of a property. It can be assigned a name that may be displayed on its related objects.

One or several graphic effects matching the property value can be specified for each filter. The graphic effects thus defined apply to all the network objects that are then assigned this property value. In the following example, all the links in the network whose "Road Type" property value is equal to "IS" will be represented by a red dotted line.

Example: The "Road Type" Property and its Filters

Filter Name	Property Value	Type of Graphic Effect	Value of the Graphic Effect
MOTORWAY	"M"	Color	Orange
		Line Width	Twice as thick
INTERSTATE	"IS"	Color	Red
		Line Style	Dotted
STATE	"S"	Color	Yellow

A **bounded filter** corresponds to a range of values a property can take. Besides specifying the lower and higher bounds of the value range, the filter can be assigned a name that can be displayed on the object it is related to.

One or several graphic effects matching the range of values defined for the property can be specified for each filter. The graphic effects thus defined apply to all the network objects that are then assigned a value within the corresponding value range. In the following example, all the links in the network whose "Traffic" property value is equal to "125" will be represented by a pattern composed of two red circles.

Example: The "Traffic" Property and its Filters

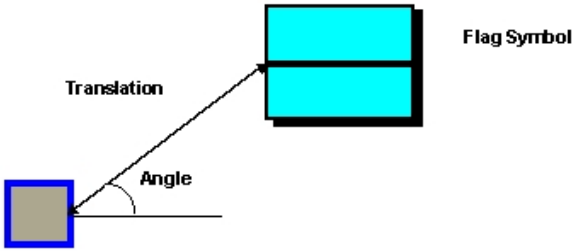
Filter Name	Property Lower Bound	Property Higher Bound	Type of Graphic Effect	Value of the Graphic Effect
LIGHT	0	10	Thickness	Twice as thick
			Color	Green
AVERAGE	10	50	Thickness	Three times as thick
				Blue
HEAVY	50	500	Pattern	

What Is a Flag Model?

A flag model is a generic object used to generate flags that will be placed automatically on network objects.

Each flag model contains the symbol used to represent a given flag, plus automatic placement—angle and translation—attributes.

To create a flag for an object, all you need to do is identify the flag model you want to use.



What Is a Flag?

A flag is a graphic object attached to a network object and containing labels associated with that object.

A flag is automatically inserted on, and attached to, an object according to the rules defined in the model it is based on. You can create your own flag models.

A flag can be associated with any kind of network graphic object (node, link, and drawing). To insert a flag on several objects, you must associate its base model with the corresponding object group.

Different flags based on different models can be associated with the very same object.

When an object is moved, its associated flag is automatically moved. However, moving a flag does not move the object but causes its connecting pole to be redrawn.

What Is a Pattern Model?

A pattern is a symbol that is repeated one or several times along a link path route.

The pattern is drawn on the link according to the rules defined in the model it is based on.

There are three types of pattern styles: continuous, discrete, and origin/endpoint patterns; directed patterns follow the link direction, going from its origin point to its endpoint.

What Is a Behavior?

When you define a behavior you specify how the application will respond to end user action on one of the application objects (i.e., following an event on one such object).
A behavior brings together four elements:

- *EventName*: an event name (action by end user)
- *TypeName*: an object type name
- *MetaType*: a metatype of objects
- *Command*: a command (response from the application)

which reads: such event (LeftClick, RightClick, etc.) on such object type of such metatype will trigger such command.

Some definitions:

- **EventName**: It is the name of an event to be responded to. Possible event names depend on the object MetaType. This event name can be a user event name or a predefined ArcGIS Schematics Designer event name. For more details about ArcGIS Schematics Designer predefined event names, see "List of ArcGIS Schematics Designer predefined event-names" Help page.

- **MetaType**: It is the object Metatype to be impacted as Document, View, Graphic, LegendGroup, LegendProperty, or LegendPropertyFilter.
  . The Document metatype encompasses all documents of the application, whatever their type.
  . The View metatype encompasses all of the views created by the application (a document includes one or several views).
  . The Graphic metatype encompasses all graphic objects defined in the application whatever their graphic class (Node, Link, Drawing).
  . The LegendGroup encompasses legend entries associated with object groups.
  . The LegendProperty encompasses legend entries associated with properties.
  . The PropertyFilter encompasses legend entries associated with property filters.
- **TypeName**: It is the identifier for the graphic object type, used to filter command triggering. The object type must be defined for the currently open workspace. If the command is to apply to all object types of the MetaType metatype, this identifier is not required. If the metatype is equal to View, the TypeName parameter is set to the name of the document type associated with the views. This document type must be defined for the currently open workspace.
- **Command**: It is the ArcGIS Schematics Designer command to be triggered. This command must be defined for the currently open workspace. ArcGIS Schematics Designer offers a full set of predefined commands, each with its own area of action, which means that it will apply to a given metatype only.

ArcGIS Schematics Designer Example

➢ Introduction to the ArcGIS Schematics Designer Example

To exemplify ArcGIS Schematics Designer main concepts and functionalities, we are going to build an example based on the database described below:

> About the database used

The ArcGIS Schematics Designer example is exemplified with a database composed of four tables:

- **"Nodes" table**, with the following six fields:
  - IdNode: node identifier (string)
  - SizeN: node size (number)
  - Type: node type (a variable coded as "A", "B", "C", "D", "E", or "F")
  - SubNet: name of the subnet the node belongs to (a variable coded as "subnet1" or "subnet2")
  - X: coordinate value (number) of the X node
  - Y: coordinate value (number) of the Y node
- **"Links" table**, with the following six fields:
  - IdLink: link identifier (string)
  - IdNode1: link origin node identifier (string)
  - IdNode2: link end node identifier (string)
  - Rate: ratio value associated with the link (number)
  - Type: link type (a variable coded as "small", "medium", or "big")
  - Length: link length (number)
- **"NewLinks" table**, with the following three fields:
  - IdNewLink: link identifier (string)
  - OrigNode: identifier of the link origin node (string)
  - ExtrNode: identifier of the link end node (string)
- **"SubNet" table**, with the single following field:
  - IDSubNet: subnet identifier (a discrete variable coded as "subnet1" or "subnet2" [string]).

> Description of the sample workspace parameters we will build

We want to graphically display the network data described in this database. The "Links" and "NewLinks" tables list all the links of the network. The "Nodes" table concerns all the nodes. And the "SubNet" table contains the available subnets the data describes.

We want to build two types of documents:

- One will contain the complete network

and

- The other will allow us to display data related to a single given part of the network (i.e., related to a given subnet).

> Main Steps Description

(1) Creating Schematic Documents

Step 1: Creating the Workspace

Step 2: Defining the Workspace Parameters

Step 3: Defining Your Data Source

Step 4: Creating Your First Document Type

Step 5: Creating Your First Node Graphic Type

Step 6: Defining Your First Association

Step 7: Creating Your First Link Graphic Type

Step 8: Creating Mandatory Attributes for the Link Graphic Type

Step 9: Associating the New Link Type and Displaying Your Network

(2) Animating Schematic Documents

Step 10: Creating Textual Properties to Display Node and Link Identifiers

Step 11: Using a Composed CGM Symbol to Display the Node Group

Step 12: Animating the Network Nodes According to the Node's "Type" Database Field

Step 13: Animating the Network Links According to the Link's "Type" Database Field

Step 14: Animating the Network Nodes According to the Node's "SizeN" Database Field

Step 15: Creating a Flag Model and Using it to Modify the "NodeName" Property Display

Step 16: Creating Pattern Models That Will be Used Afterwards to Represent a New Link Property

Step 17: Using Pattern Models to Highlight the Links According to the "Rate" Database Field

Step 18: Creating a New Document Type for the Different Subnetworks

Step 19: Creating a New Node Type to Filter Out Nodes According to Their Subnetworks

Step 20: Creating a New Link Type to Filter Out the Links According to Their Subnetworks

Step 21: Redefining the Inherited "NodeName" and "LinkName" Properties Displayed on the Subnetwork Documents

Step 22: Using Database Coordinates to Display Your Nodes

(3) Defining Behaviors

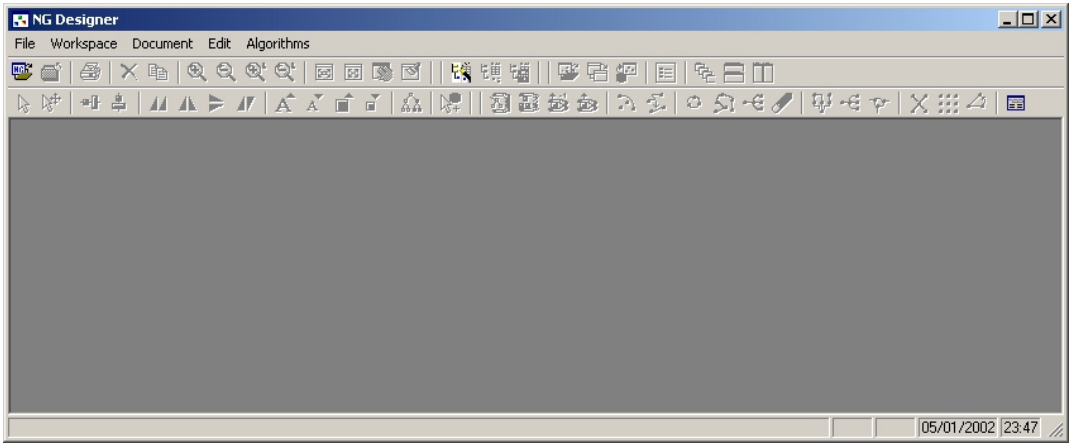
Step 23: Defining the Behaviors That Will Impact the Views

Step 24: Redefining the Default "LeftDblClick" Behavior Impacting a Legend Property Filter Entry

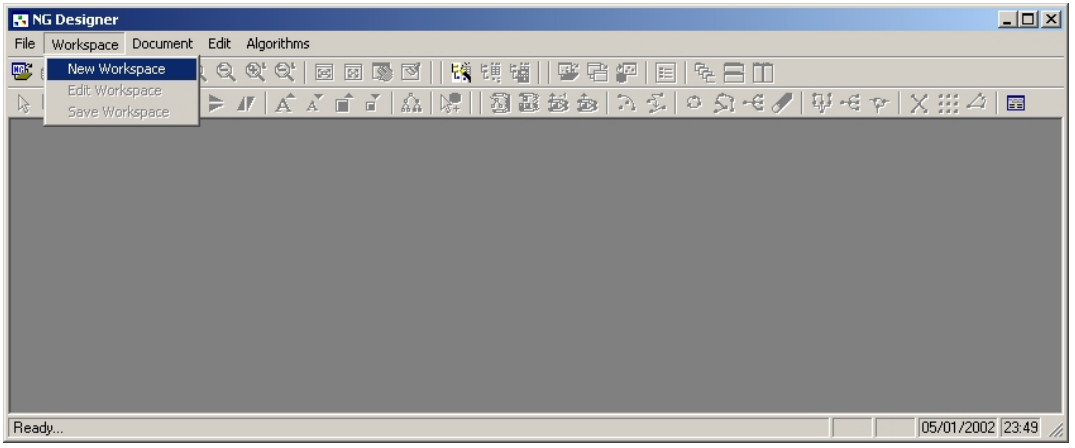
Step 25: Defining the Behaviors That Will Impact Graphic Object Types

➢ Step 1: Creating the Workspace

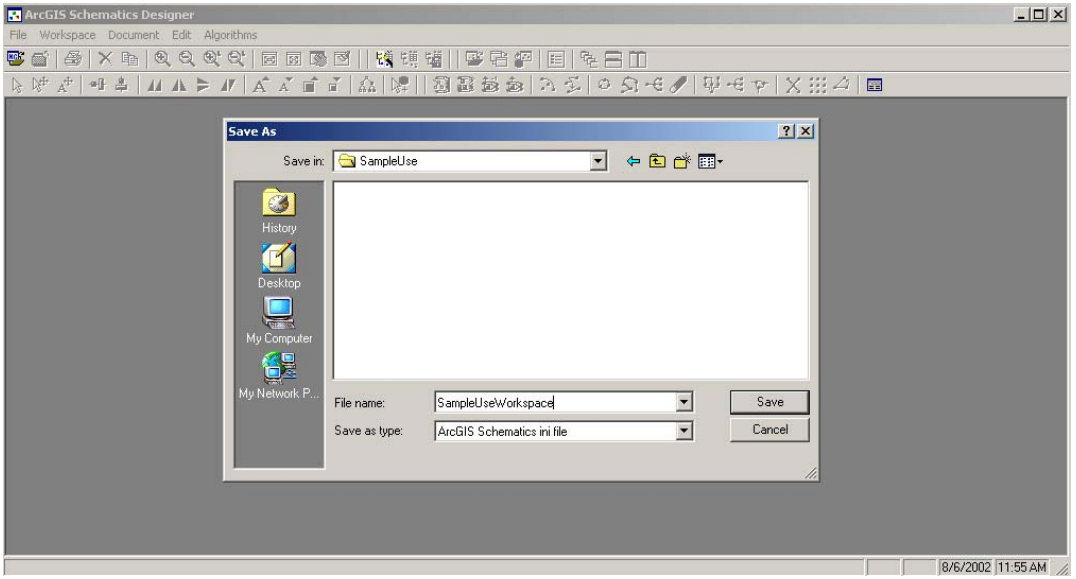
Open ArcGIS Schematics Designer:



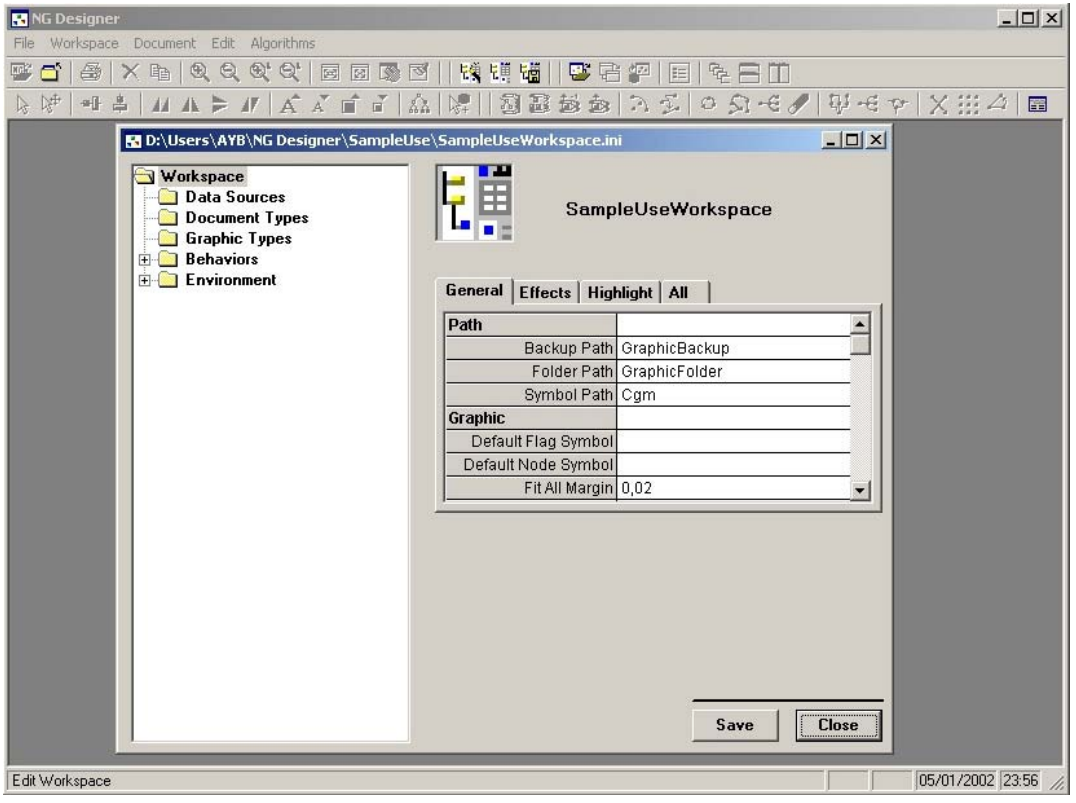
Click the "Workspace" menu and click "New Workspace" as follows:



The predefined "Save As" Microsoft Windows dialog box automatically opens. Select the folder in which your workspace parameters file are to be saved, enter a name for your workspace file, and validate:

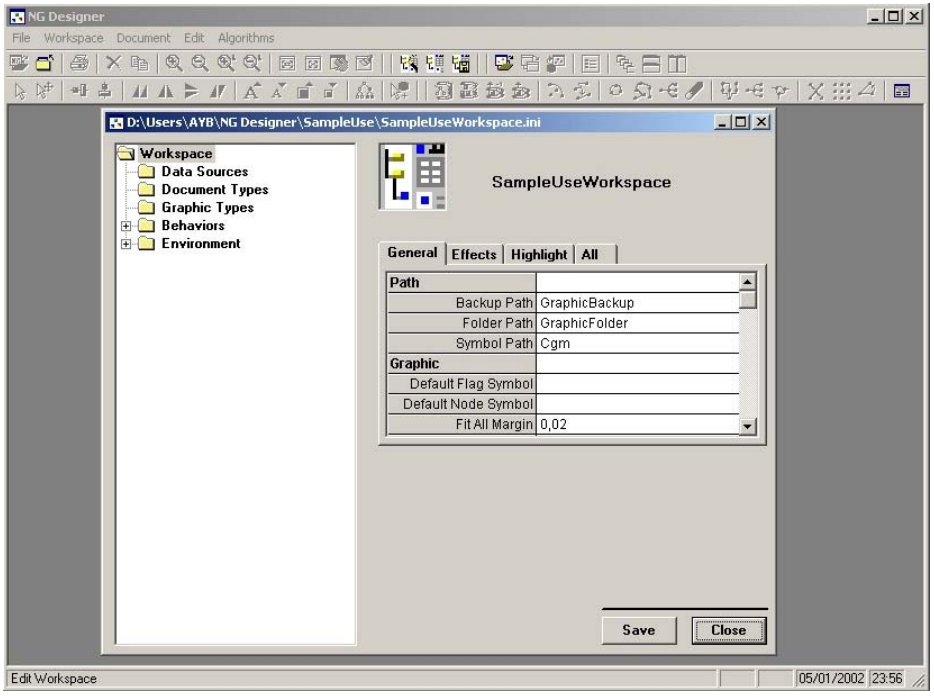


The ArcGIS Schematics Designer Editor window appears as follows:



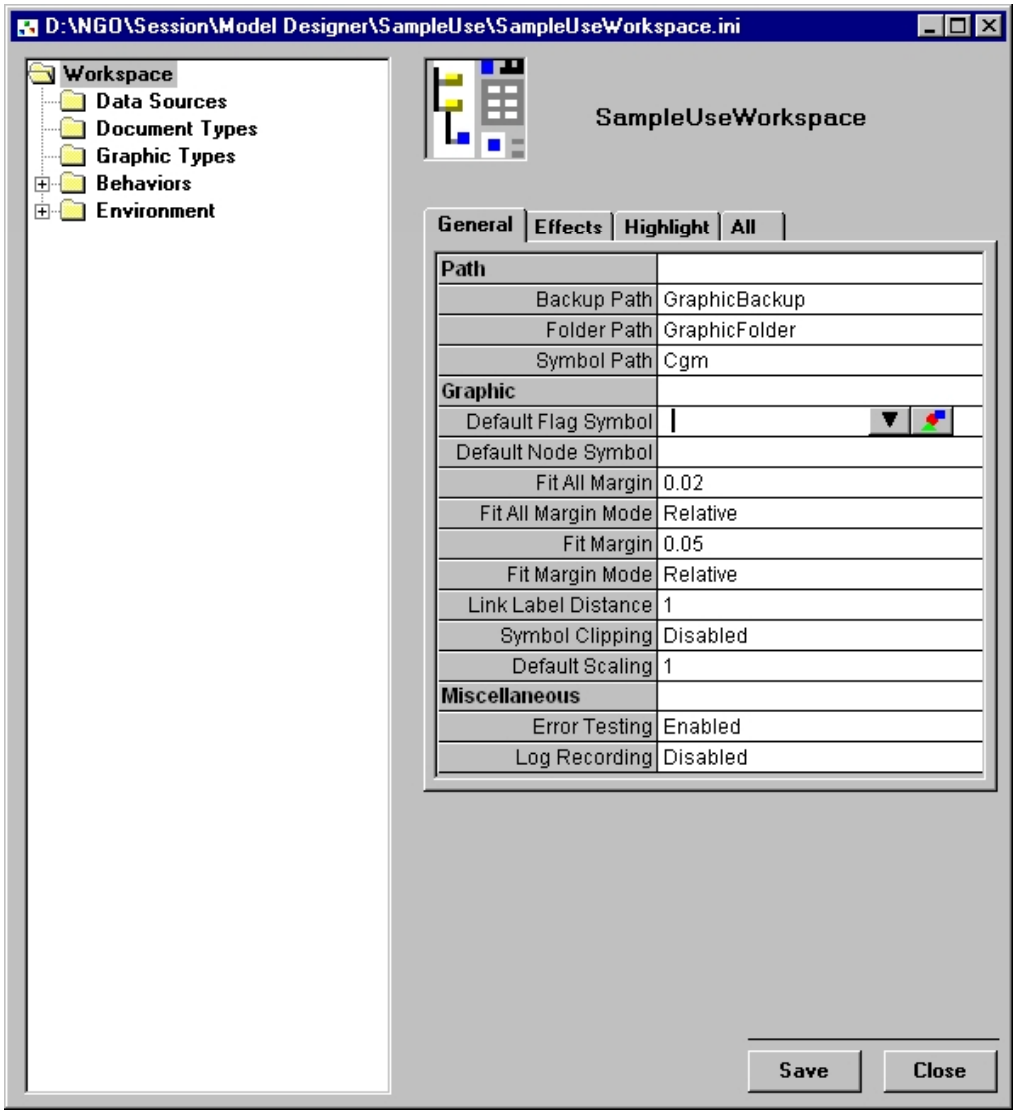
➢ Step 2: Defining the Workspace Parameters

When a new workspace is created, the ArcGIS Schematics Designer Editor window appears as:



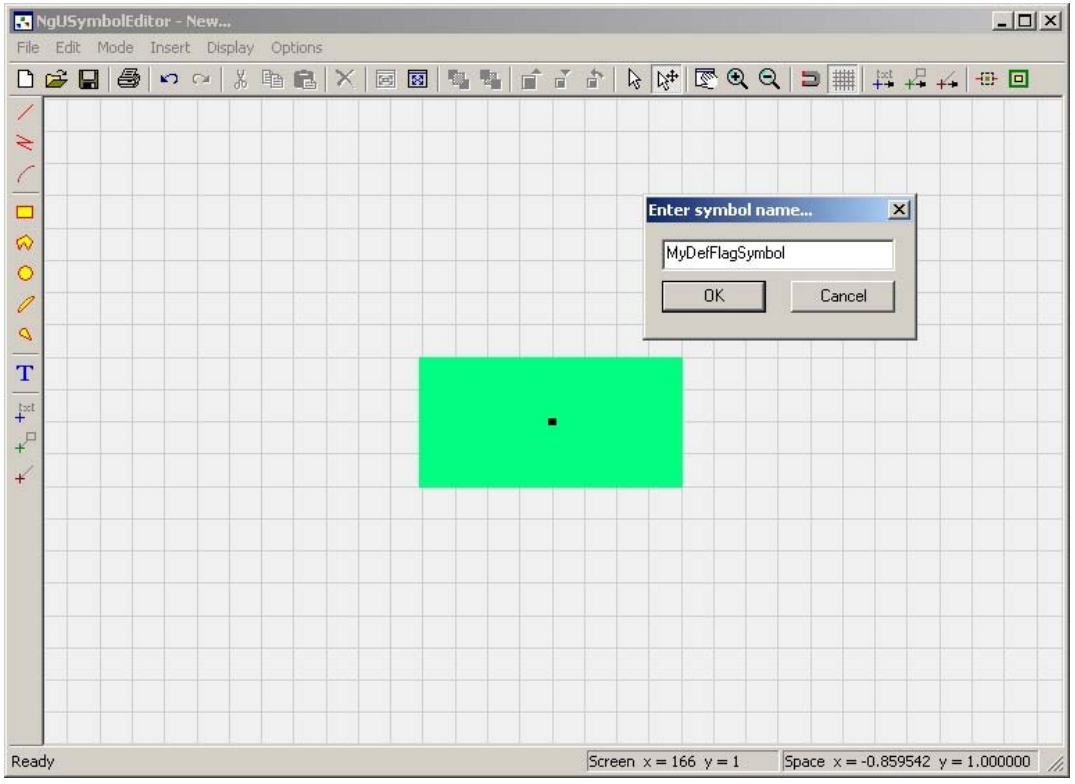
- Defining the Default Symbol for Flag Models

Clicking anywhere on the "Default Flag Symbol" field displays the  button:



Click this button to launch the CGM symbol editor and vector drawing tool (NgUSymbolEditor).

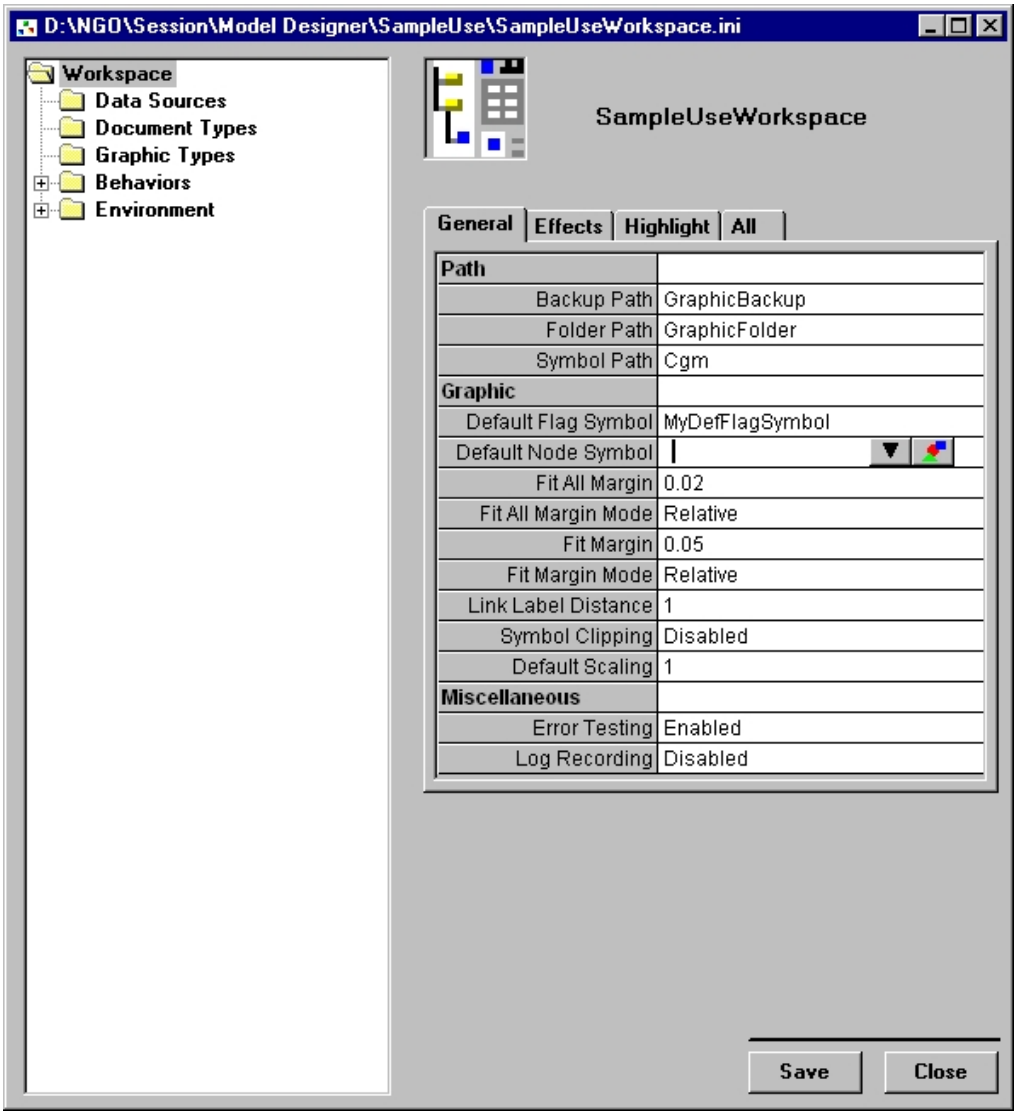
Use the NgUSymbolEditor drawing tools to build your CGM symbol as you wish. Select the "Save As..." item from the "File" menu, enter the name that will reference your first subsymbol, then exit the NgUSymbolEditor:



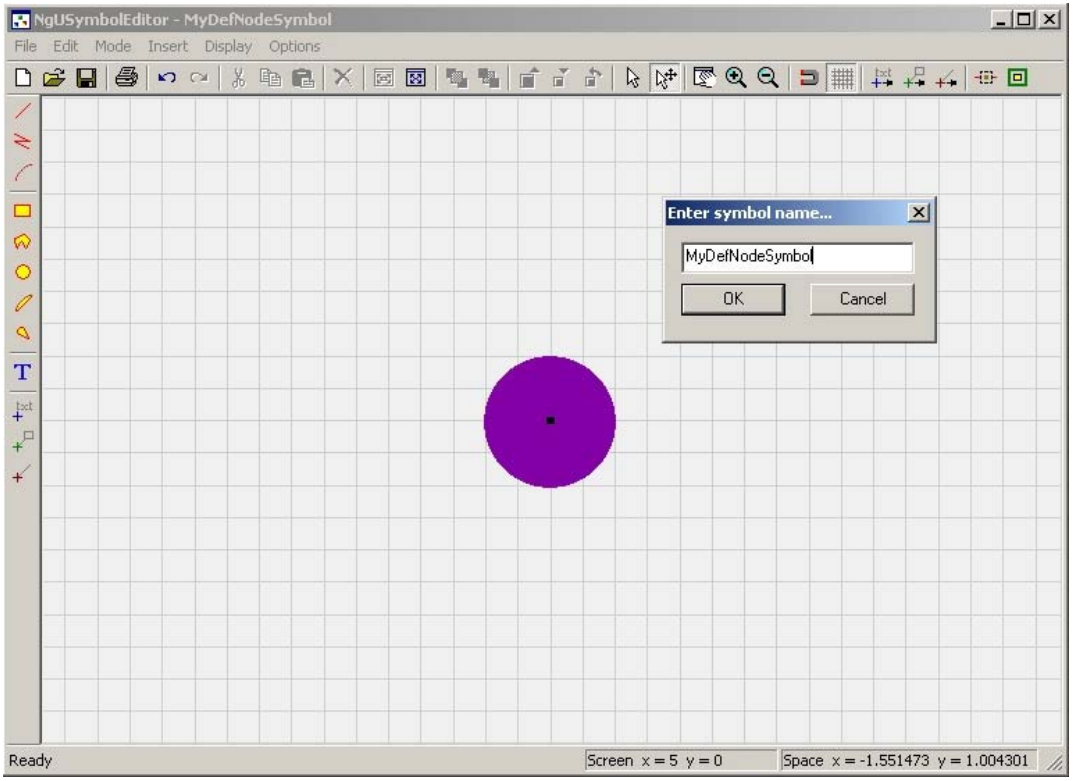
The "Default Flag Symbol" field is automatically completed by the name of the symbol you have created.

- Defining the Default Symbol for Nodes

Click the Default Node Symbol field and click this button  to launch the CGM symbol editor and vector drawing tool (NgUSymbolEditor):



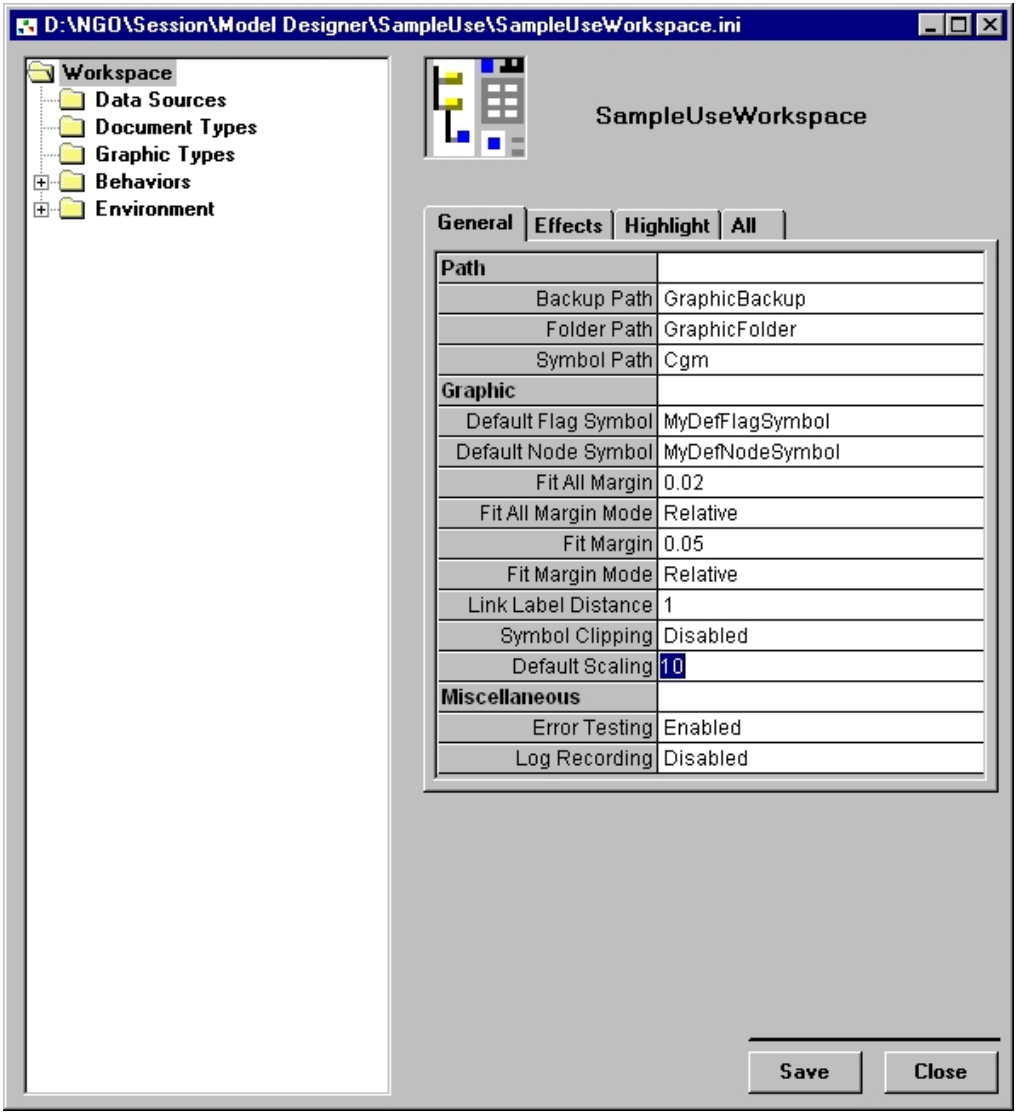
Use the NgUSymbolEditor drawing tools to build your CGM symbol as you wish. Enter a name for the current symbol and exit the NgUSymbolEditor:



The "Default Node Symbol" field is automatically completed by the name of the symbol you have just created.

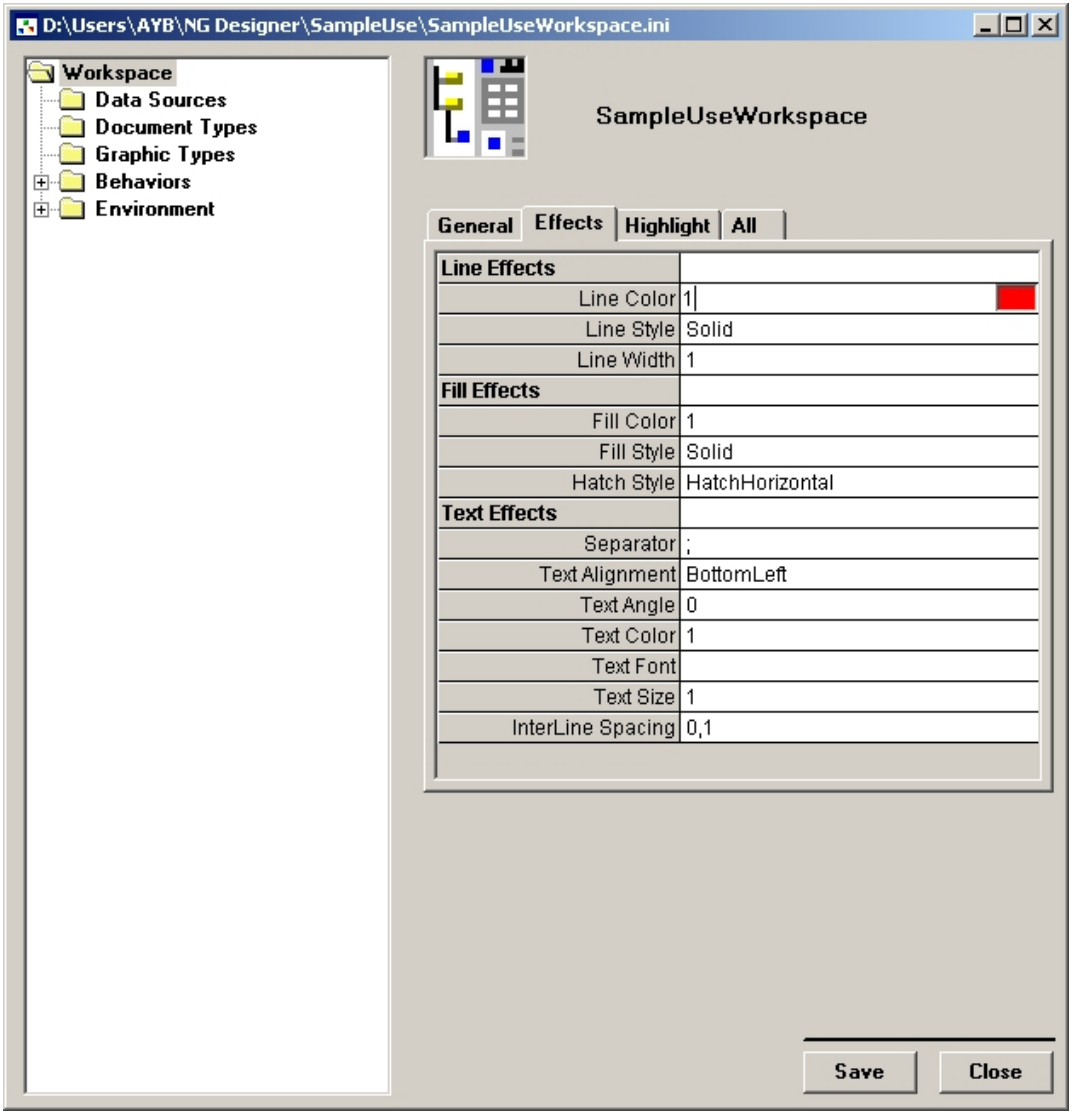
- Defining the Workspace Default Scaling Factor

Click the "Default Scaling" field and enter a value:

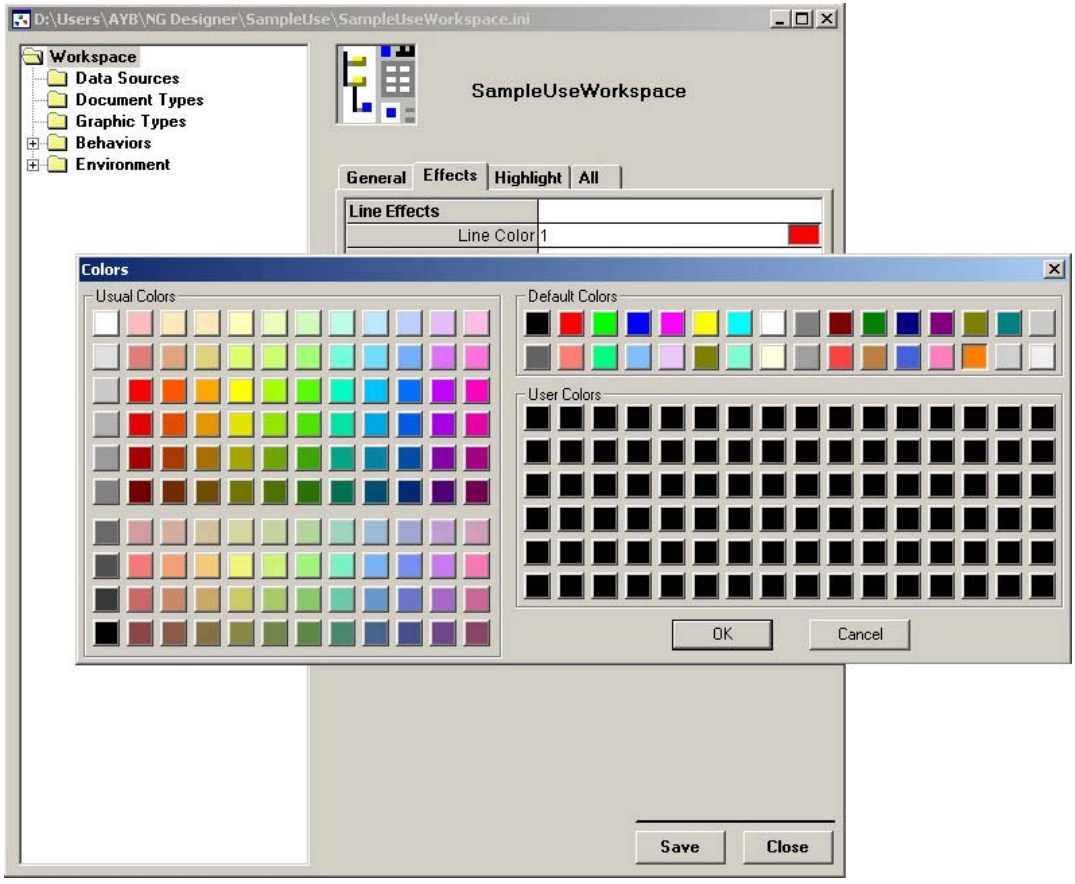


- Defining the Workspace Line Color Effects

Click the "Effects" tab and click anywhere in the "Line Color" field to display a color box:

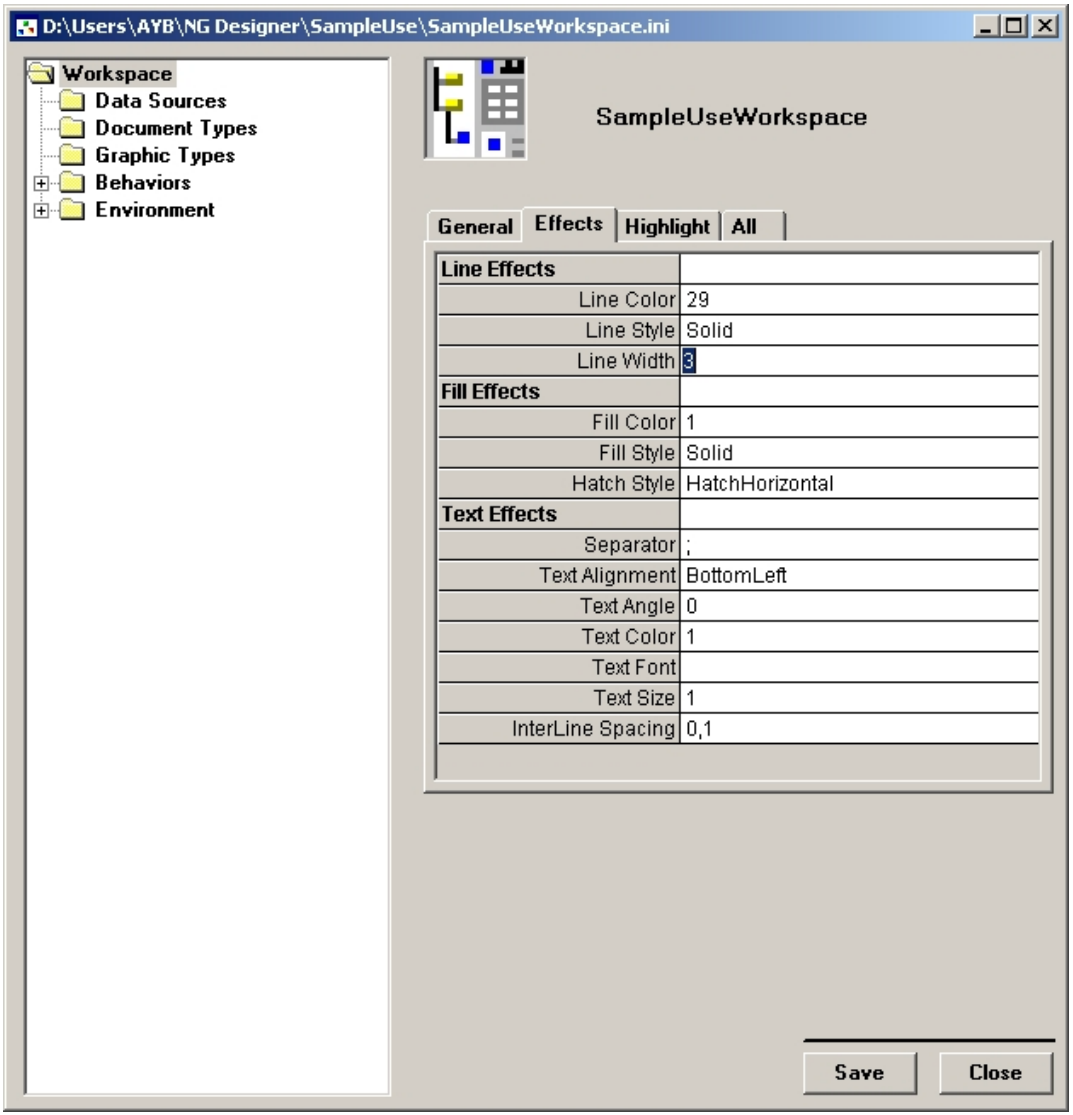


Click the color box to launch the Table Colors Editor. Select or define a color and validate:

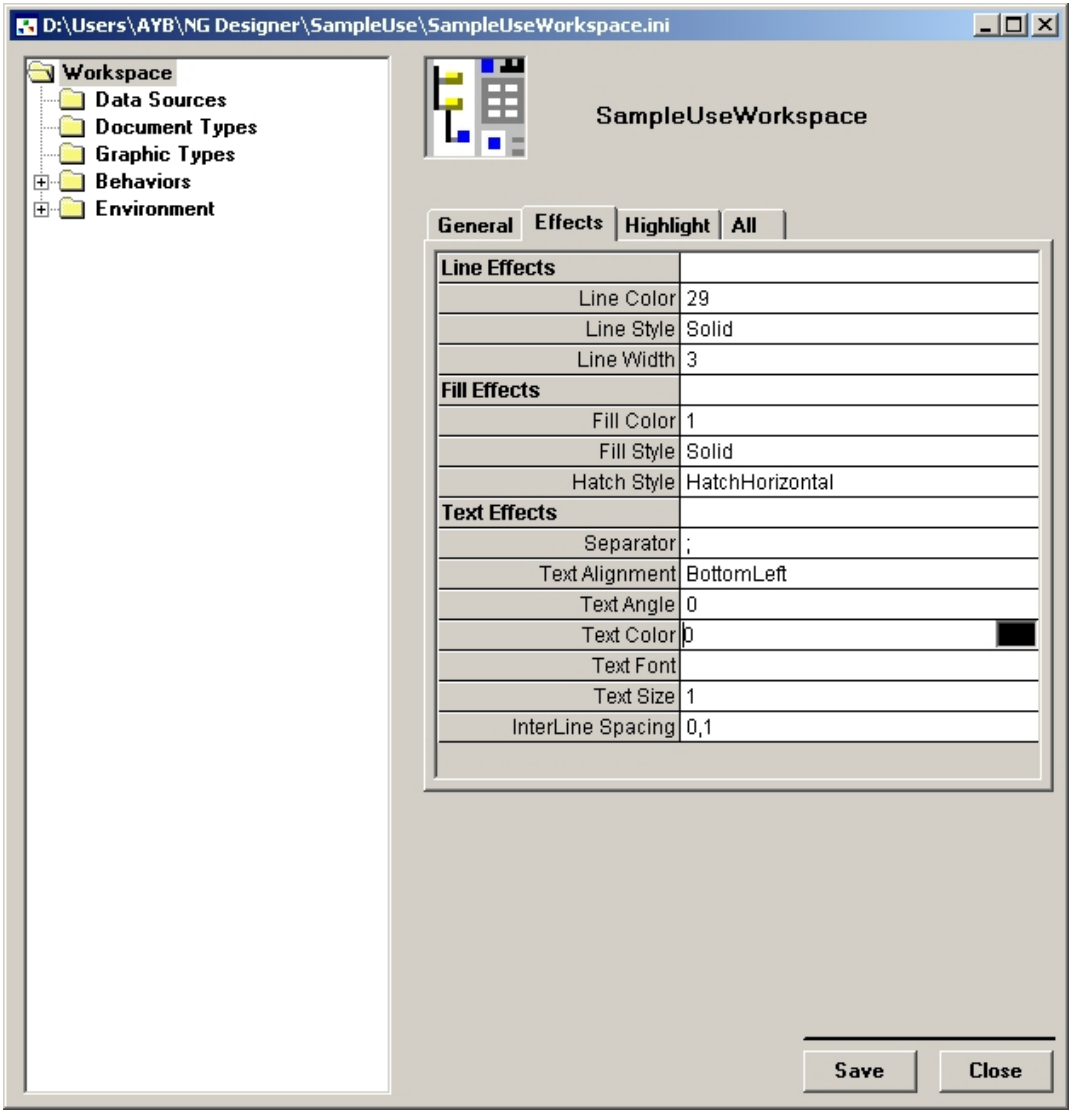


- Defining the Workspace Line Width Effects

Click the "Line Width" field and modify the default line width value with the one you want:

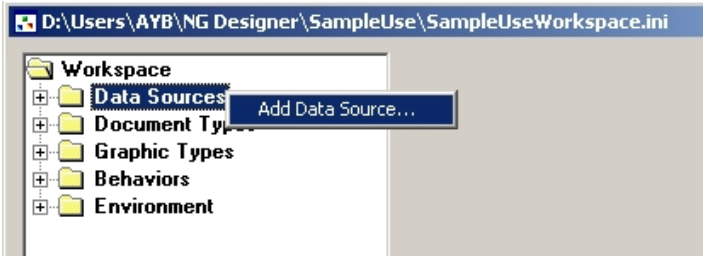


Click the "Text Color" parameter field to display a color box and click it to launch the Table Colors Editor if you want to change the text color default value:

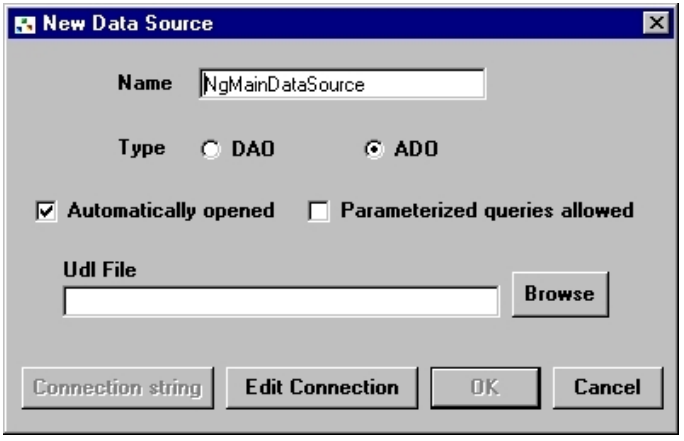


➢ Step 3: Defining Your Data Source

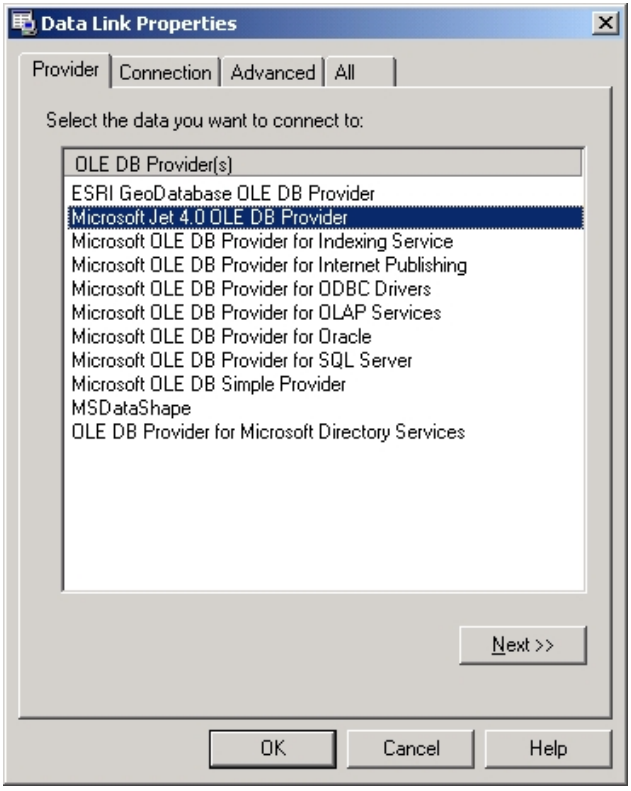
Right-click the "Data Sources" tree entry and click "Add Data Source" from the popup menu:



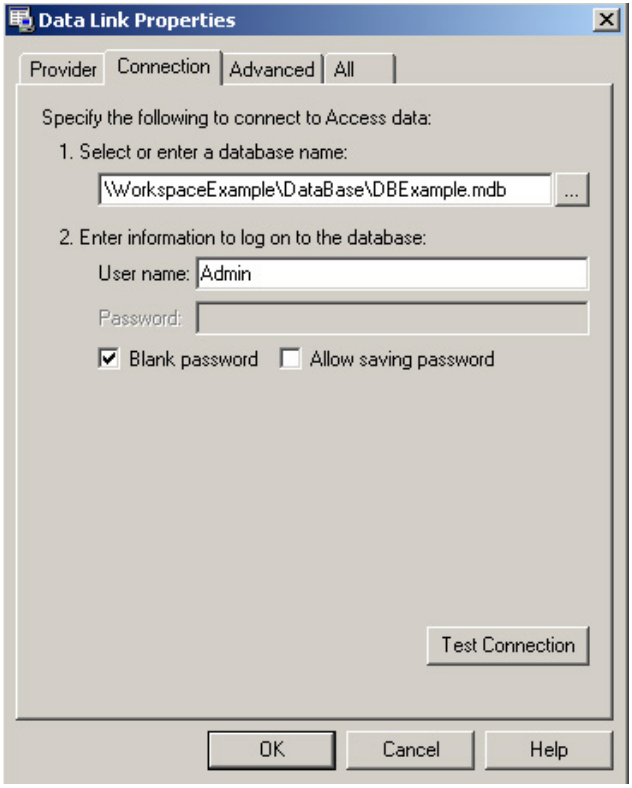
The "New Data Source" dialog box automatically opens. Enter a name in the "Name" field to reference your data source:



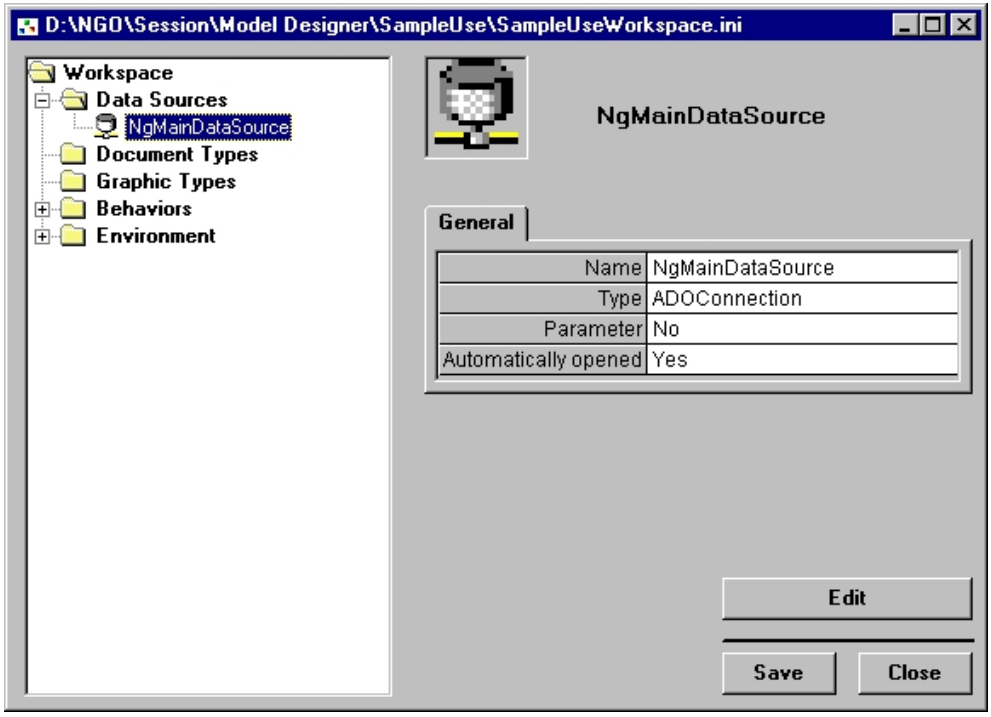
Click the "Edit Connection" button to open the UDL Editor Microsoft component. In the "Provider" tab, select a provider from the list:



From the "Connection" tab, browse your database file, check your connection by clicking the "Test Connection" button, and validate:

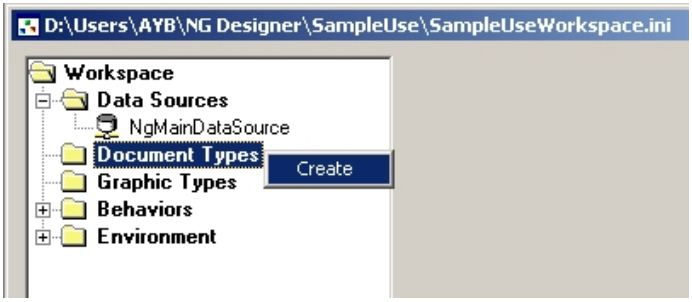


The new data source tree entry is automatically created below the "Data Sources" entry:

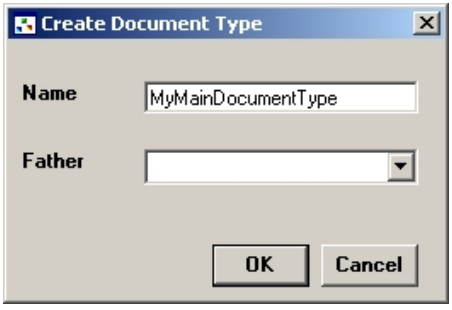


➢ Step 4: Creating Your First Document Type

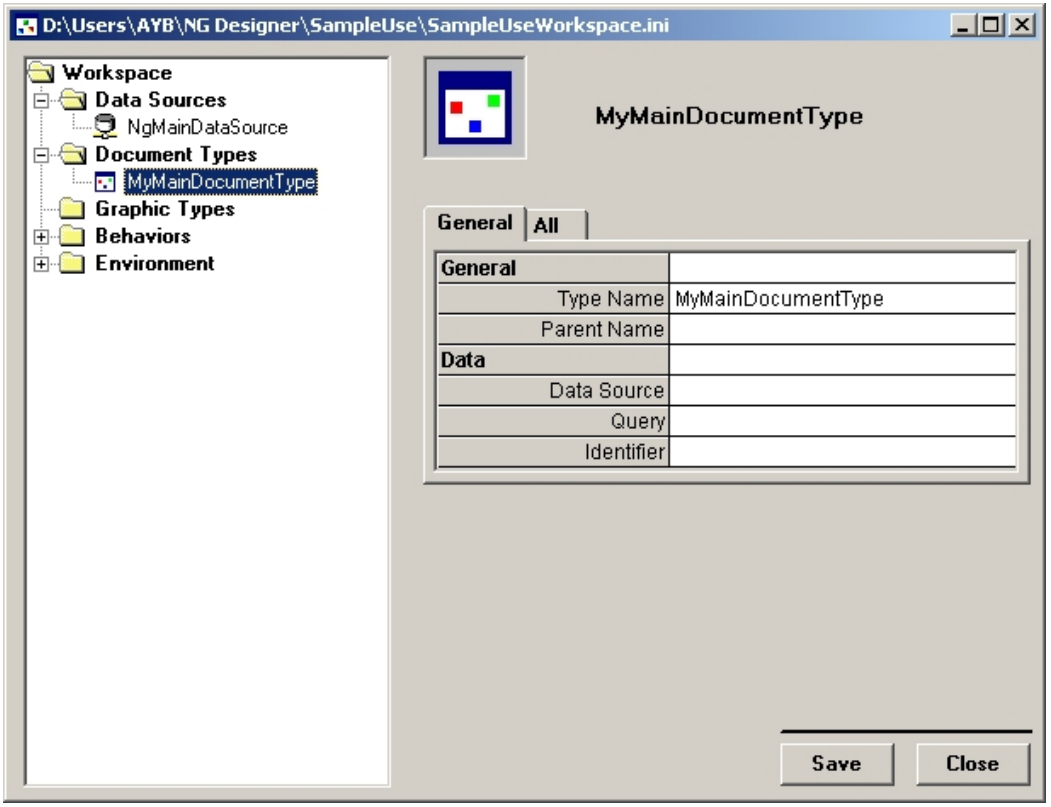
Right-click the "Document Types" tree entry and click "Create":



The ArcGIS Schematics Designer "Create Document Type" dialog box opens. Enter the name that will be used to reference your first document type and click OK:



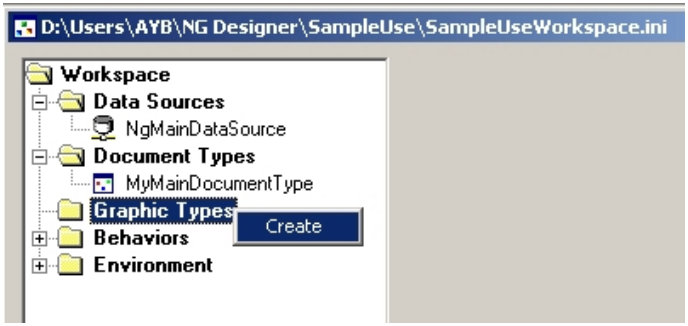
The new document type tree entry is automatically created below the "Document Types" entry:



For the first document type, we define no other parameter.

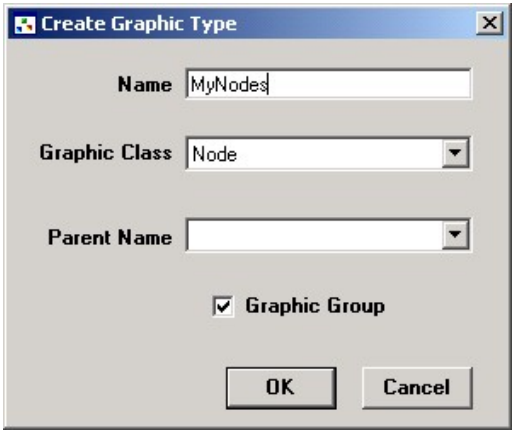
➢ Step 5: Creating Your First Node Graphic Type

Right-click the "Graphic Types" tree entry and click "Create":



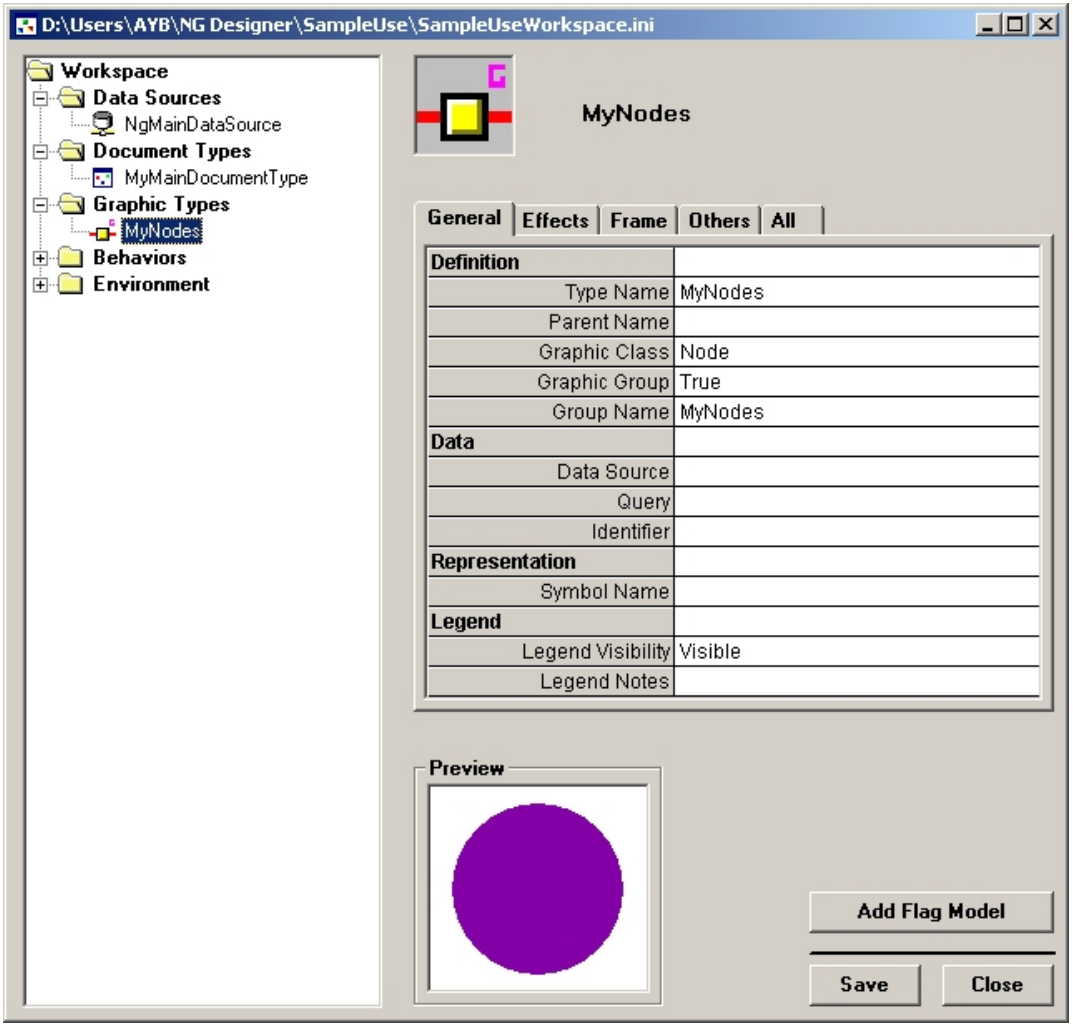
The ArcGIS Schematics Designer "Create Graphic Type" dialog box opens. Enter the name that will be used to reference your first node graphic type.

In the "Graphic Class" field, click "Node" from the dropdown list, and click OK:



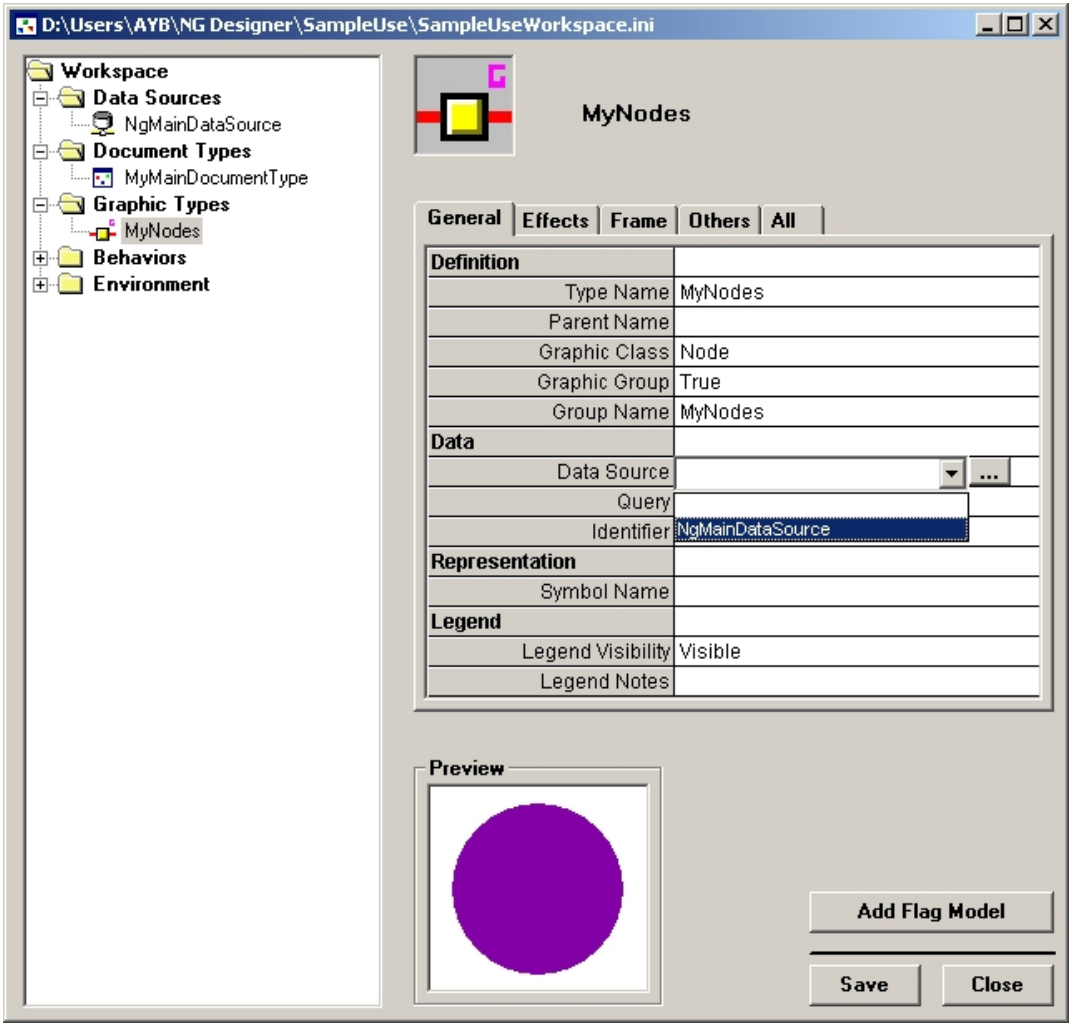
The new node graphic type tree entry is automatically created below the "Graphic Types" entry.

The preview window shows the symbol that will be used by default to represent all nodes of this type. Here, it is the workspace's default node symbol:

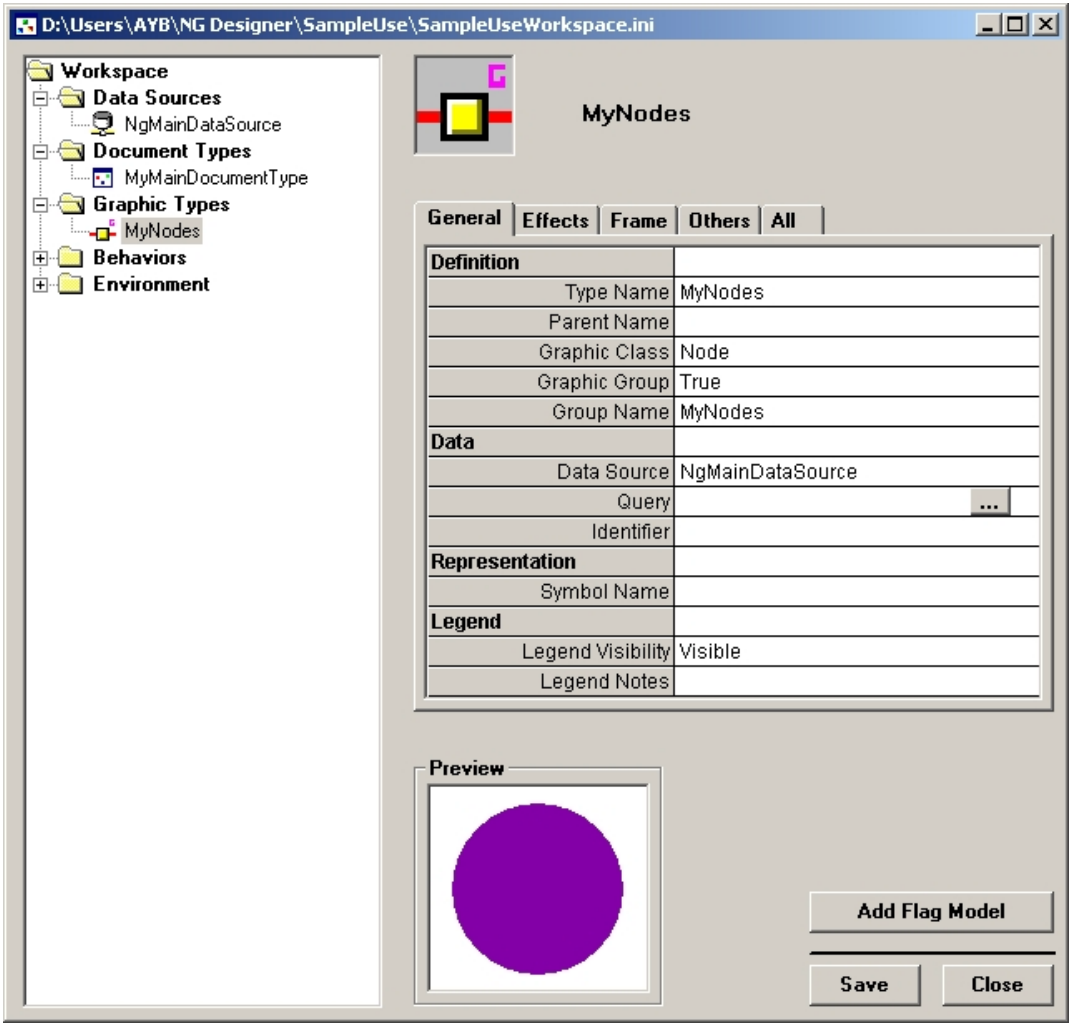


-Defining "Data" Parameters

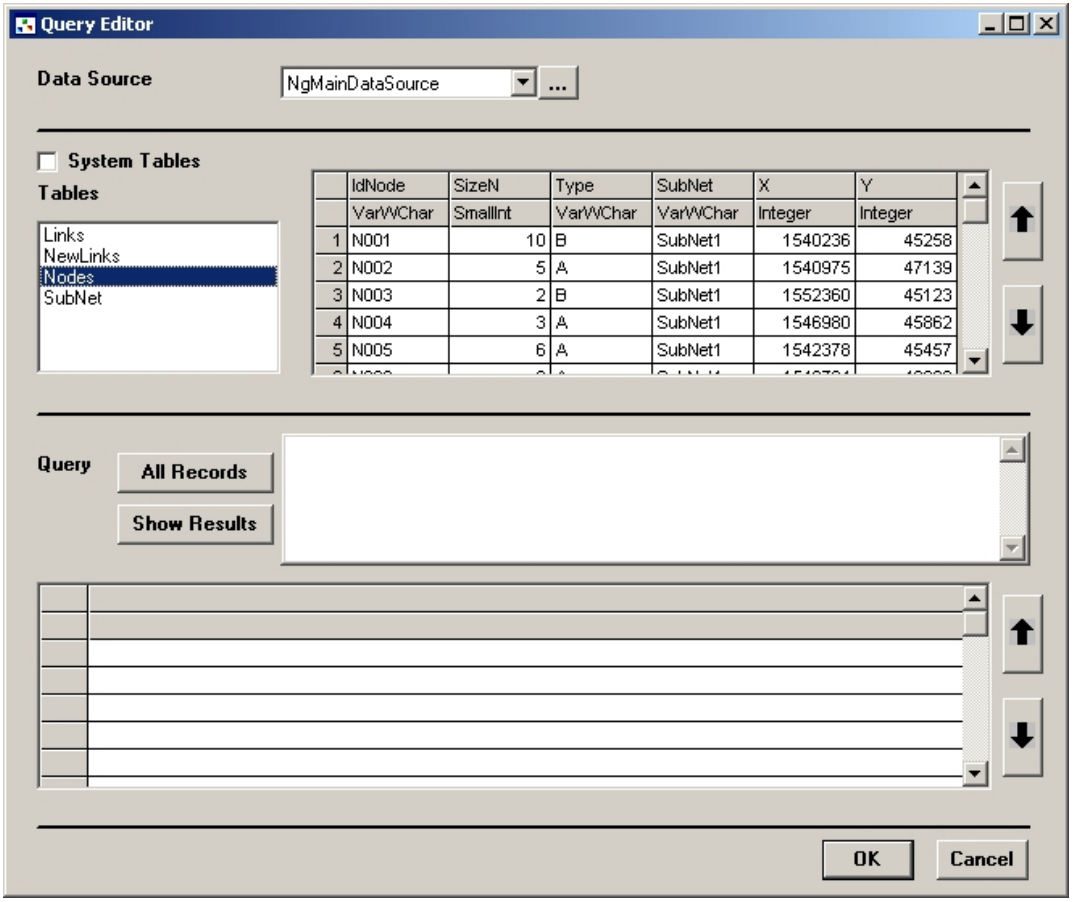
(1) Select the data source name from the "Data Source" dropdown list. Here, we selected the single data source name existing: "NgMainDataSource".



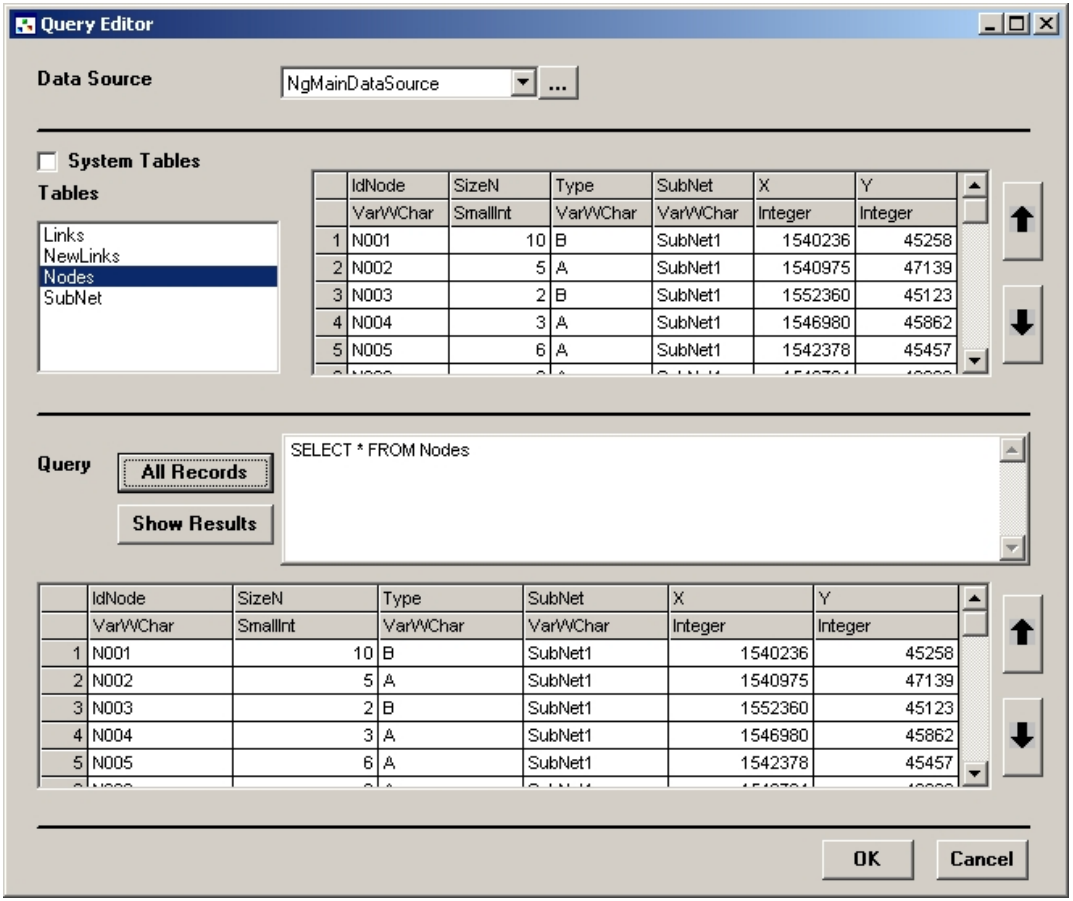
(2) Click the "Query" parameter field, then click the ... button:



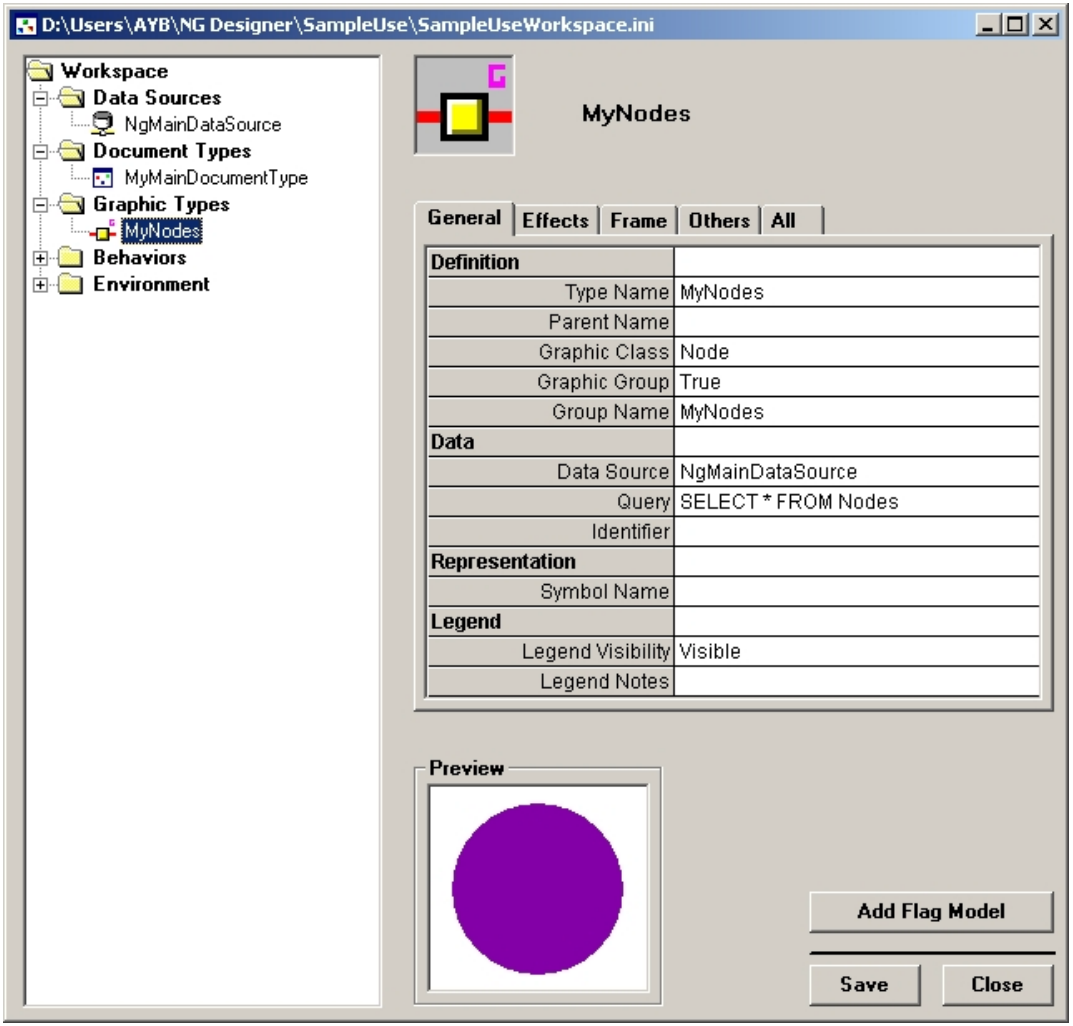
(3) The ArcGIS Schematics Designer "Query Editor" automatically opens. In our example, as the nodes query will be related to the "Nodes" table, we select the table called "Nodes" from the "Tables" list:



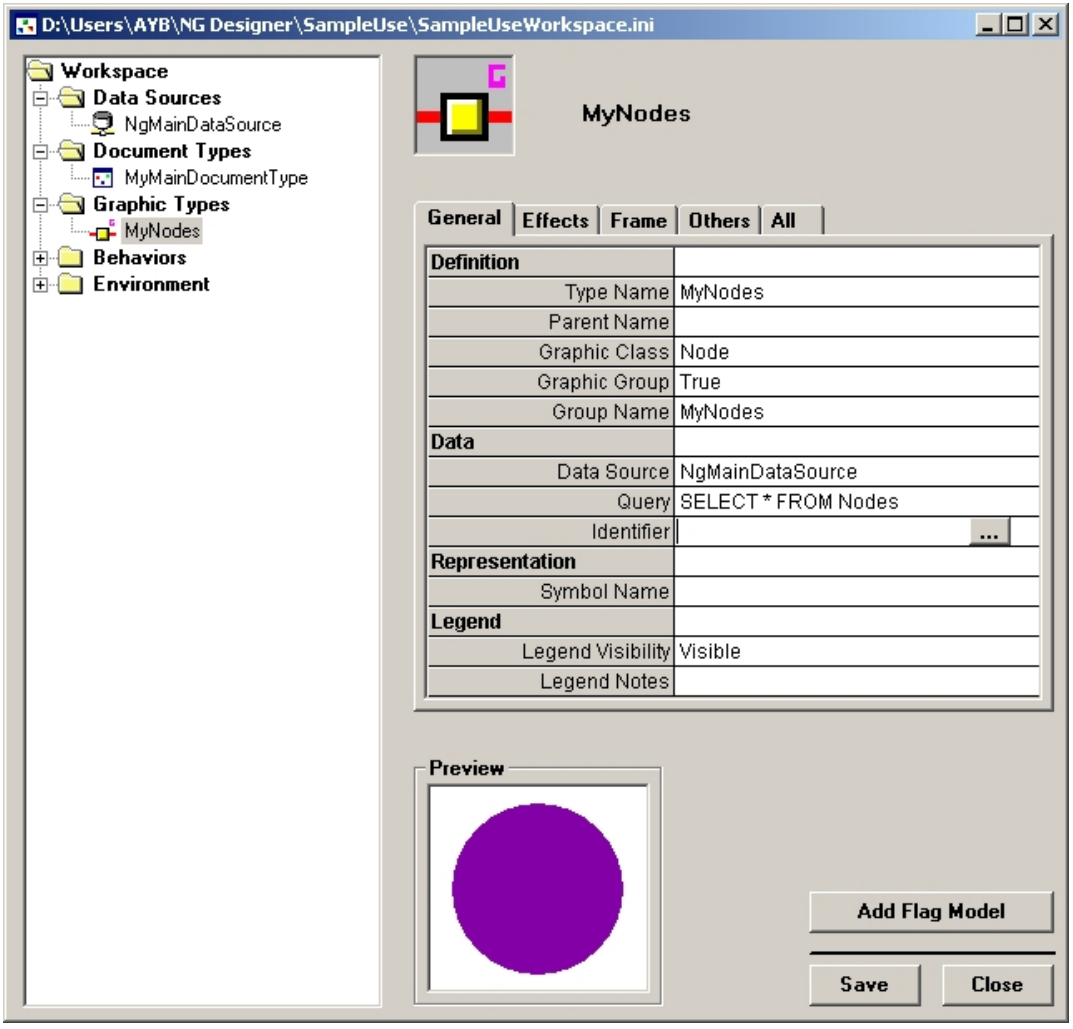
(4) Next, we automatically define our query clicking the "All Records" button: the current graphic type concerns all the nodes in the database:



(5) Click OK to validate these parameters. The just defined query is automatically displayed in the "Query" parameter field:

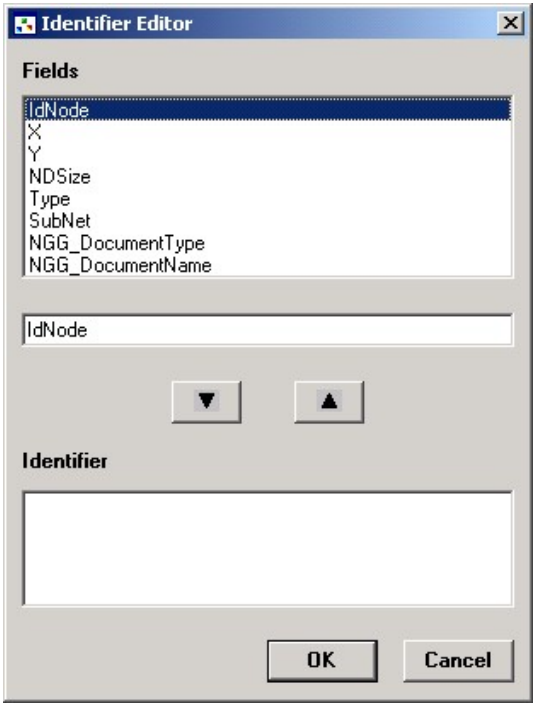


(6) Click the "Identifier" parameter field and click the ... button:

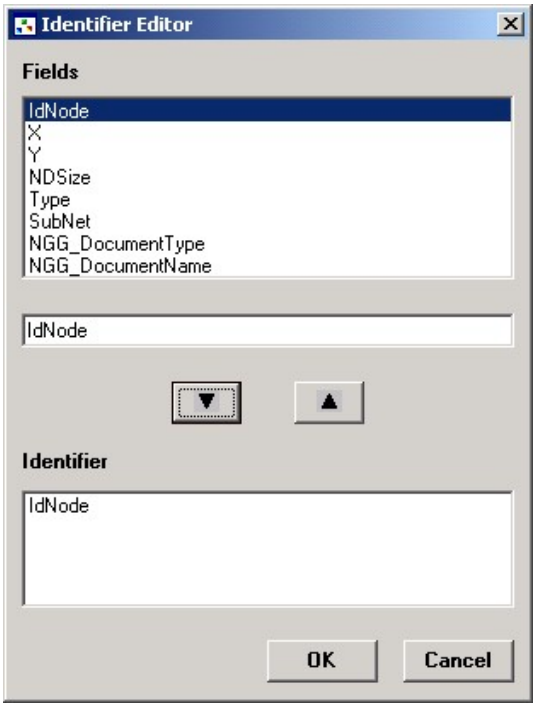


(7) The ArcGIS Schematics Designer "Identifier Editor" automatically opens. Select the fields that will be used to identify the graphic objects of this type: as the "IdNode" field is the primary key in the "Nodes" table, we select this field to identify each node of this type.

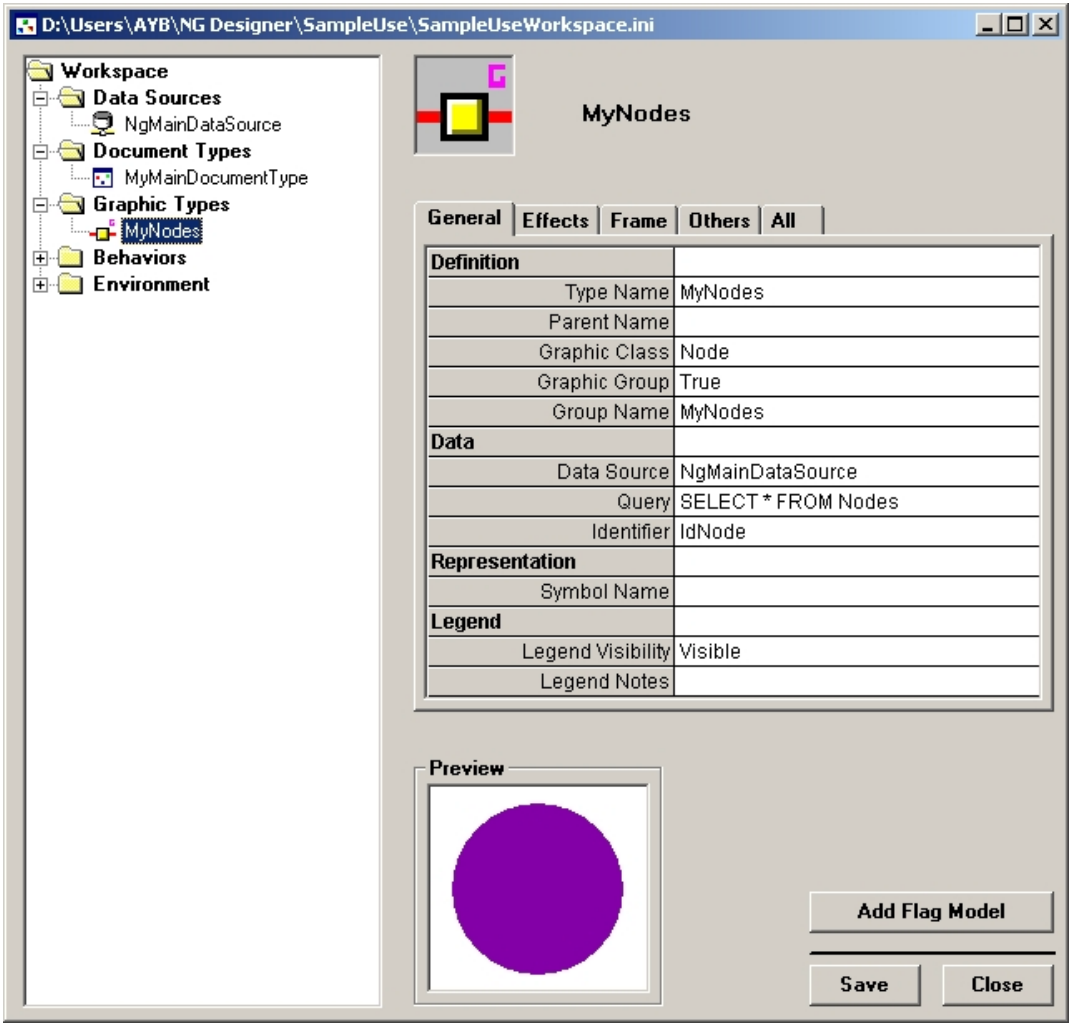
Note: All the objects related to a graphic object type must be identifiable as a unique graphic object.



(8) Validate the selected fields by clicking the  button, then click OK:

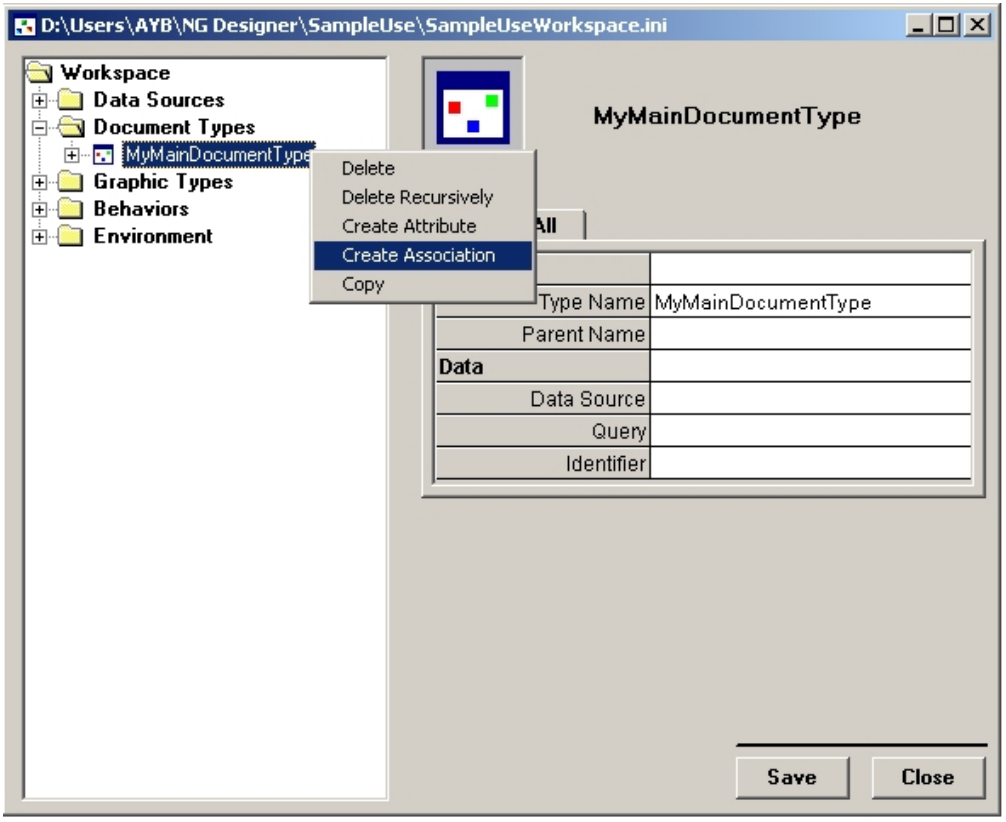


(9) The just defined identifier is automatically displayed in the "Identifier" field parameter:

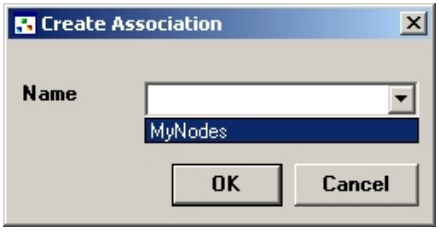


➢ Step 6: Defining Your First Association

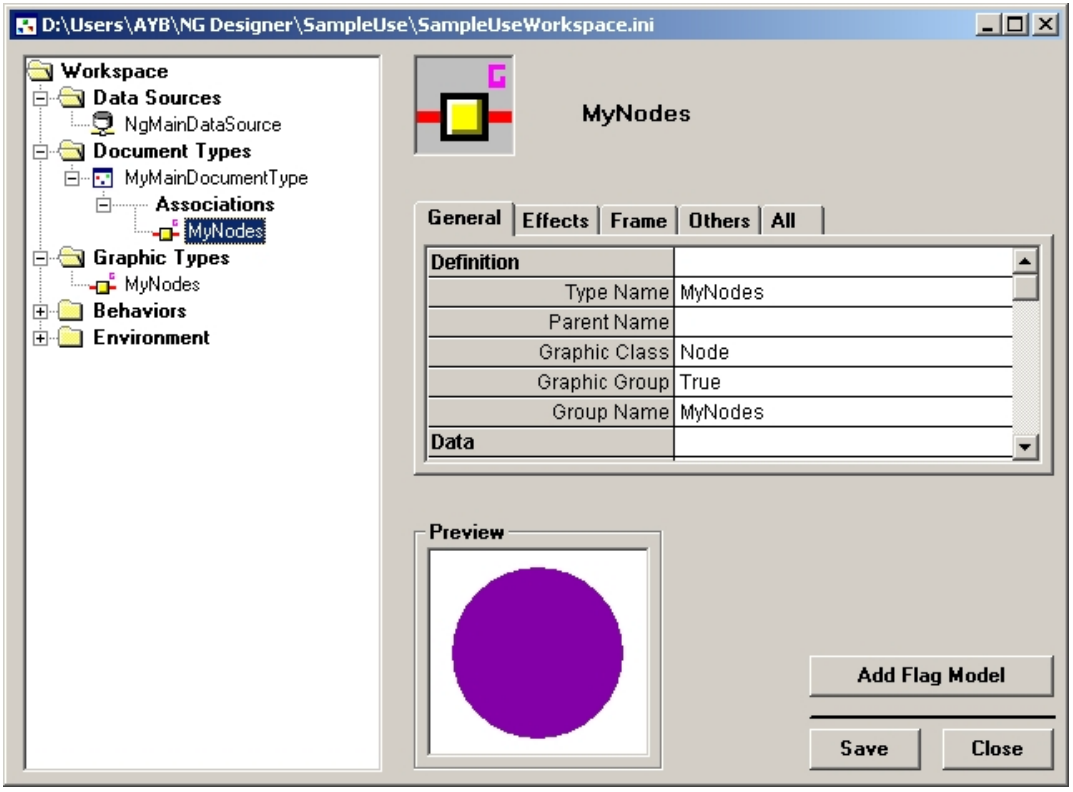
Right-click the document type tree entry (in our example it is "MyMainDocumentType") and click "Create Association" from the popup menu as follows:



The ArcGIS Schematics Designer "Create Association" dialog box automatically opens. Select the "MyNodes" already defined graphic type name and click OK:



The "Associations" and the first associated graphic type "MyNodes" tree entries are automatically created below the currently selected document type:



➢ Testing and Displaying Your First Network

At the end of the sixth step, you should have defined all the primary elements necessary to graphically display your first schematic document and its content. In fact, you have defined:

- **A workspace** and its primary parameters
- **One document type:** "MyMainDocumentType". As you have declared no query for this document type, it is automatically related to one single document

and

- **One graphic node type:** "MyNodes". For this graphic type, you have defined a query that returns all the nodes stored in the database.

When **declaring the association between the document type and the graphic node type**, you have defined the main elements for your workspace's first component: a document containing all the nodes stored in the database and... you can display it!

1) Click the "Save" button, 

, at the bottom right corner of the ArcGIS Schematics Designer Editor window, to save all of your already defined parameters.

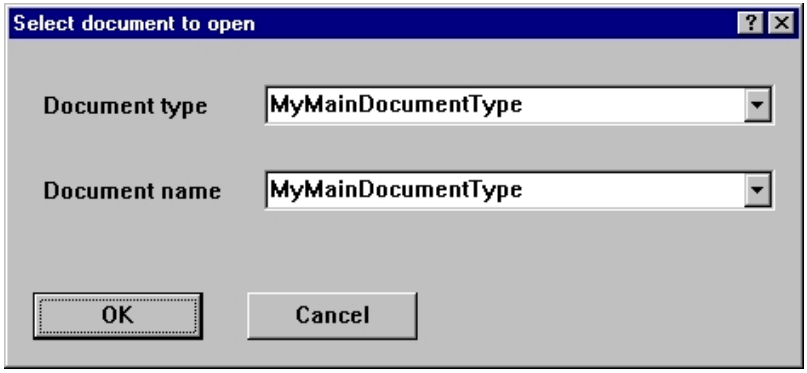
2) Use the "Close" button, 

, to close the ArcGIS Schematics Designer Editor window.

3) Now click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, 

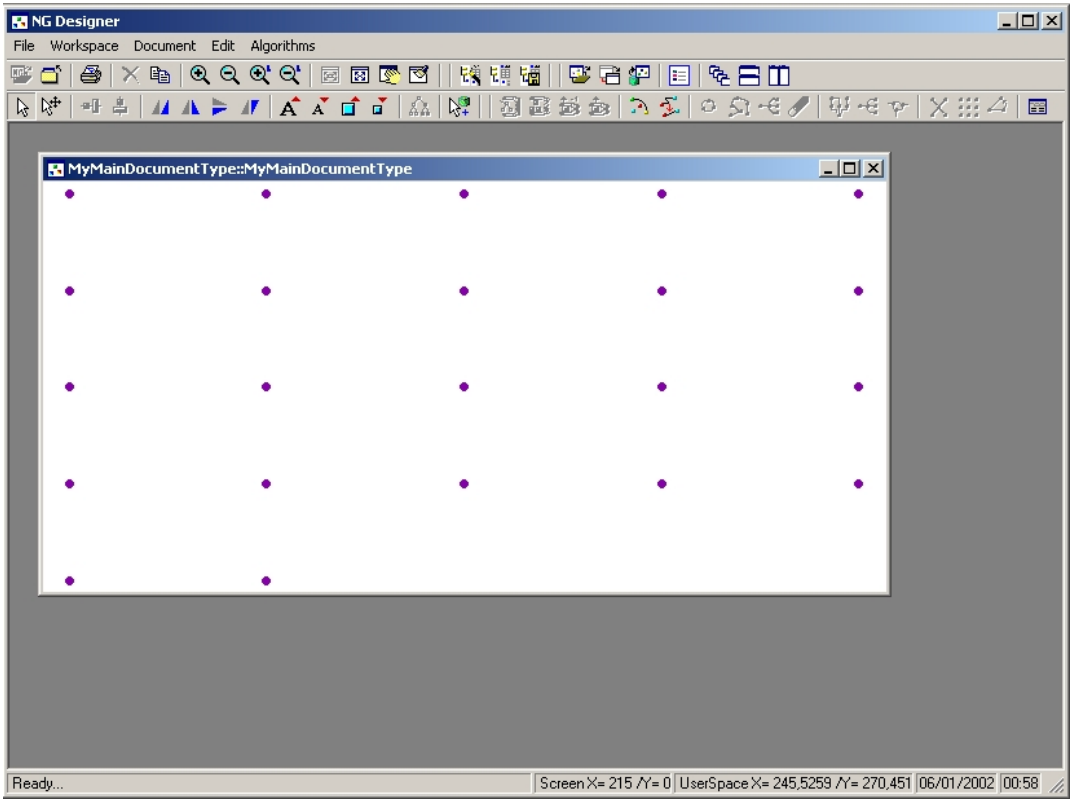
or select "Open Document Form" from the "Document" menu.

4) The "Select document to open" predefined dialog box opens:



The only document type called "MyMainDocumentType" is available from the "Document type" dropdown list, and the single "MyMainDocumentType" document is available from the "Document name" dropdown list.

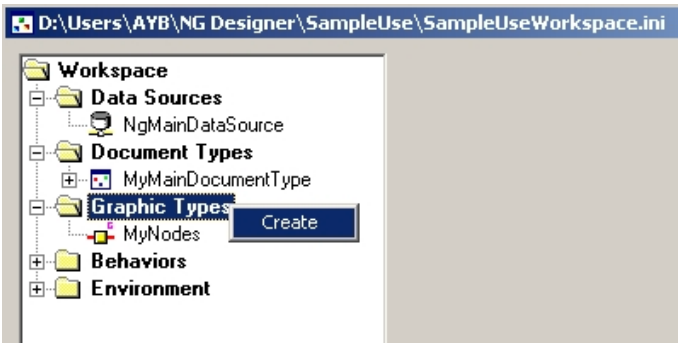
Select this document and click OK. Your first schematic document opens as follows:



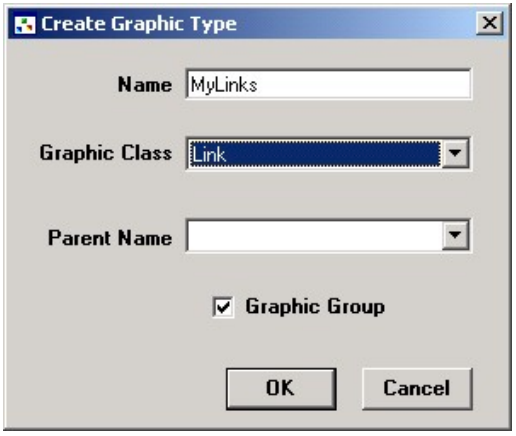
Note that as no geometric attributes are defined for any nodes (i.e., x and y coordinates are not specified for each node), ArcGIS Schematics Designer automatically places the nodes on a default grid.

➢ Step 7: Creating Your First Link Graphic Type

Right-click the "Graphic Types" tree entry and click "Create":

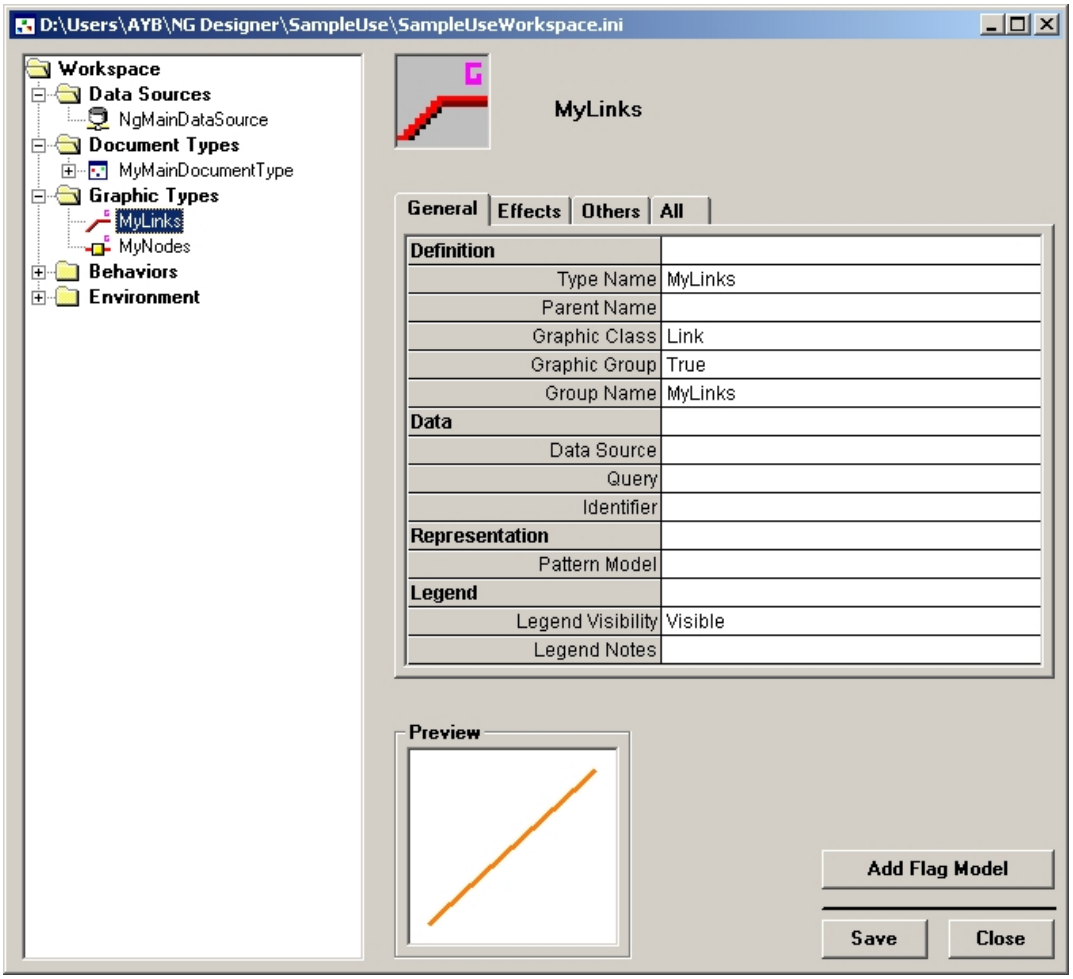


The ArcGIS Schematics Designer "Create Graphic Type" dialog box opens. Enter a name that will be used to reference your first link graphic type. Select "Link" from the "Graphic Class" dropdown list and click OK:



The new link graphic type tree entry is automatically created below the "Graphic Types" entry.

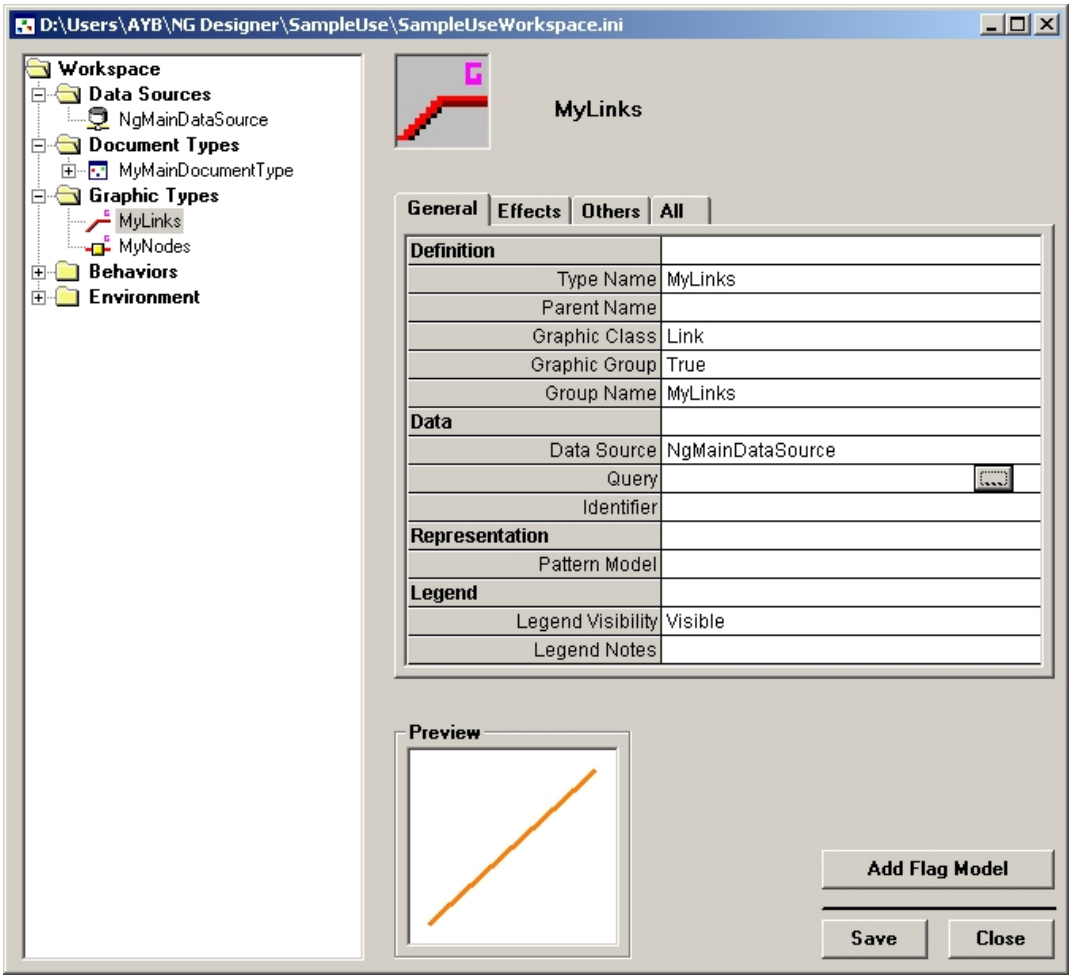
The preview window shows the link appearance for the links of this type. Here, as no specific values are specified for the line color and line width fields, it is the workspace's default parameter values set for lines that are used:



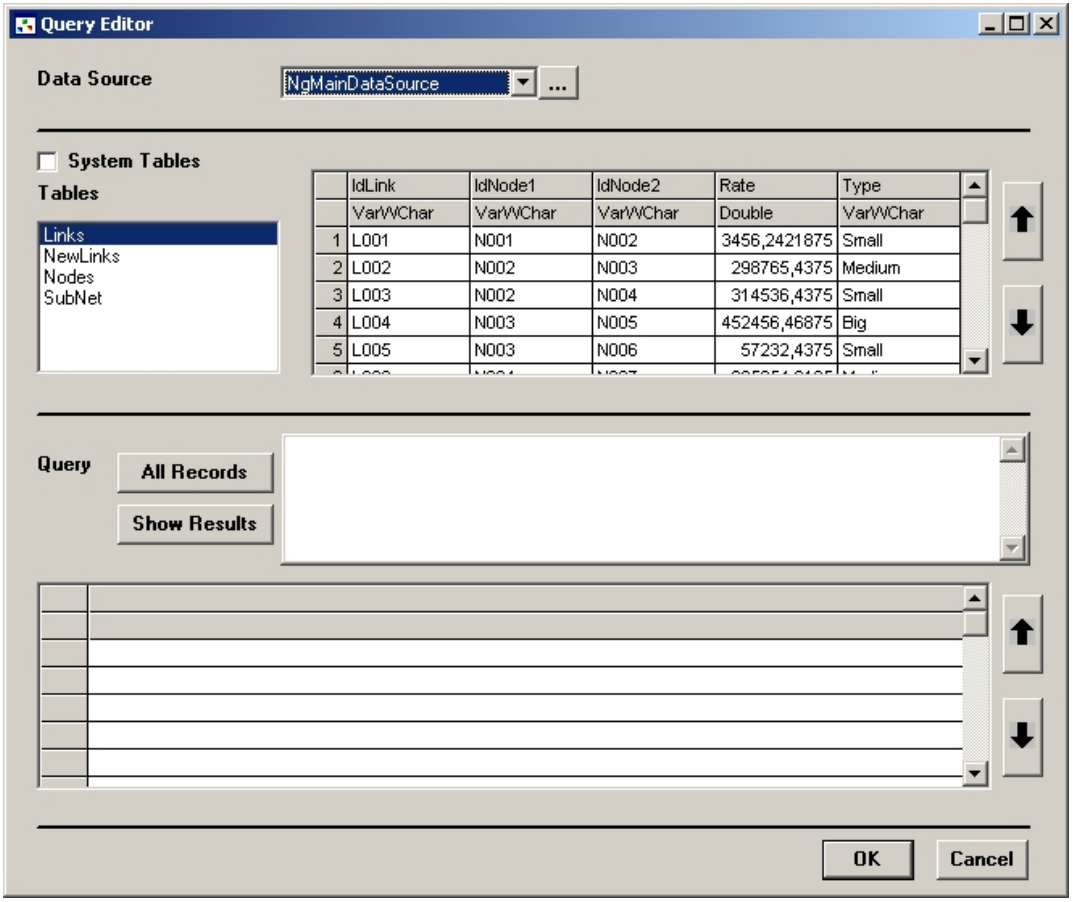
- Defining "Data" Parameters

(1) Select a data source name from the "Data Source" dropdown list. Here, we selected the existing single data source name: "NgMainDataSource".

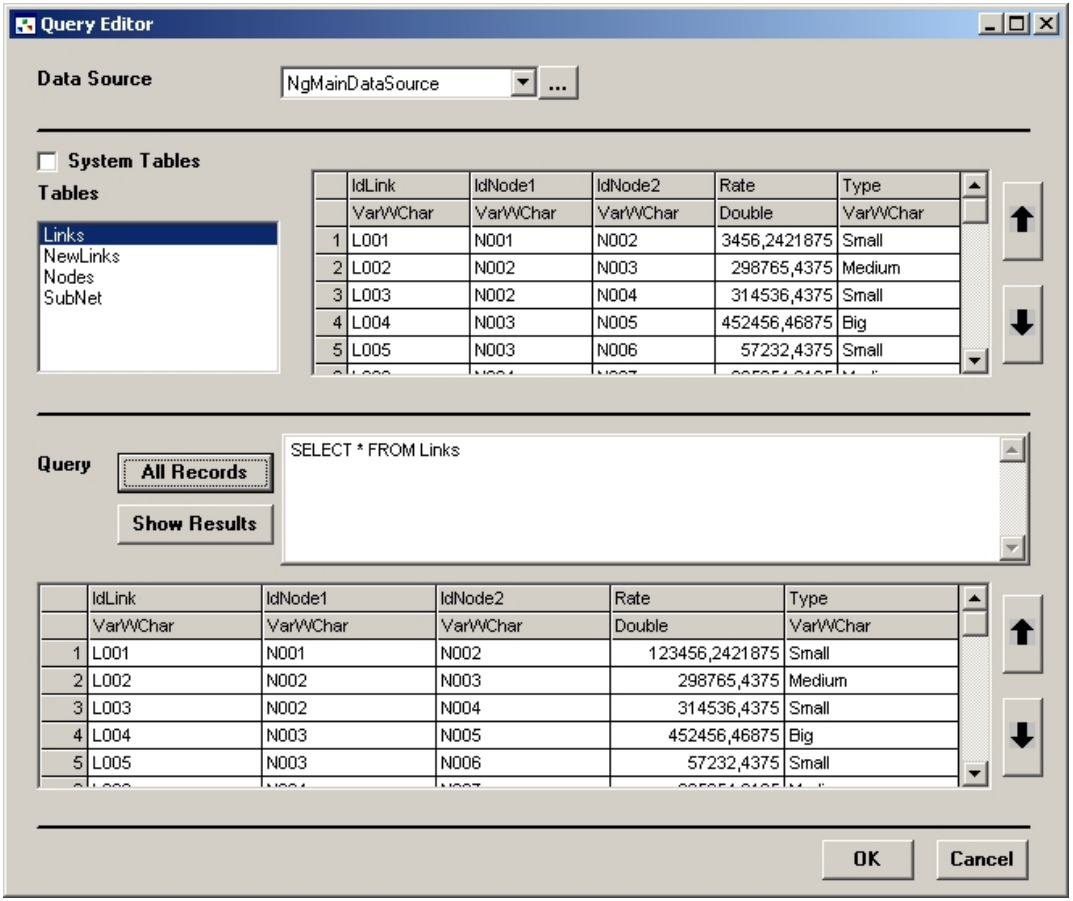
Click the "Query" parameter field and click the ... button:



(2) The ArcGIS Schematics Designer "Query Editor" automatically opens. Here, in our example, as the links query will be related to the "Links" table, we select the table called "Links" from the "Tables" list:

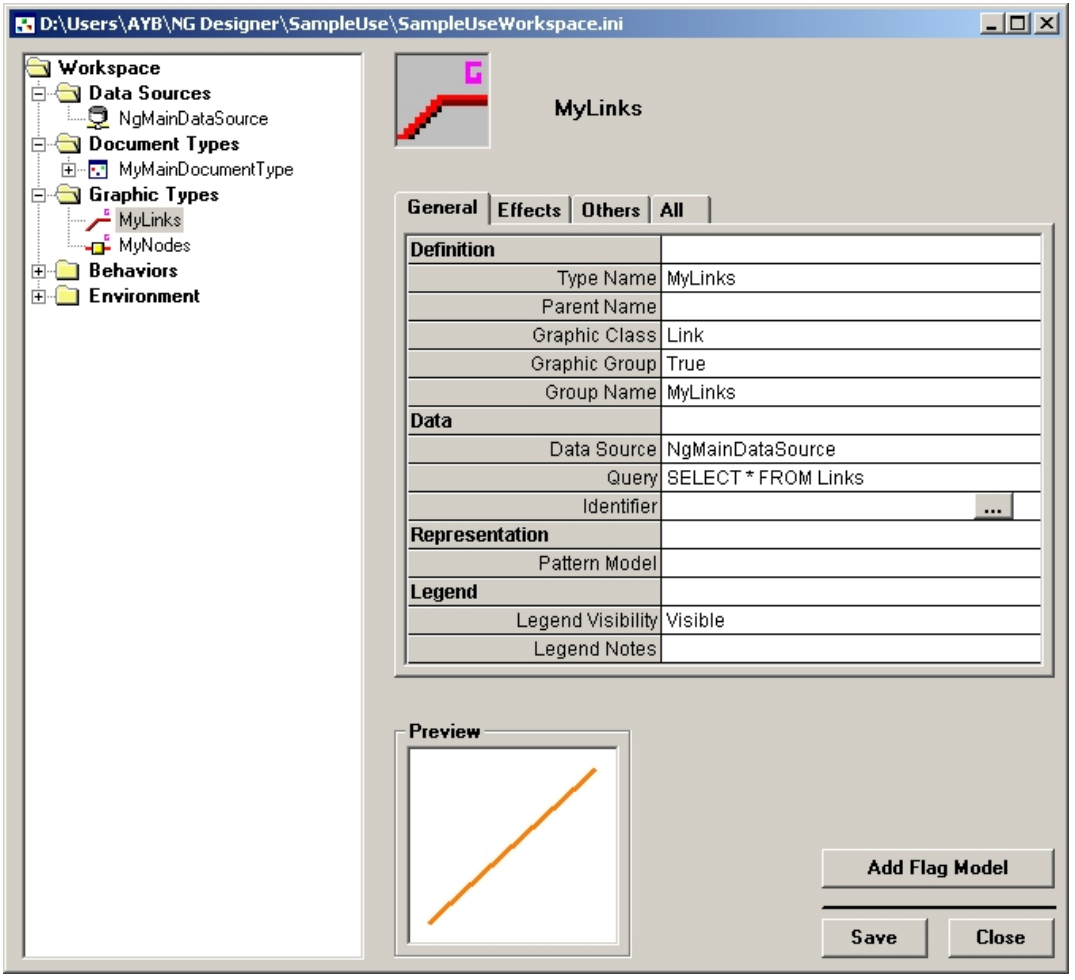


(3) Next, we automatically define our query clicking the "All Records" button: the current graphic type concerns all the links in the database:



(4) Click OK to validate these parameters. The just defined query is automatically displayed in the "Query" parameter field.

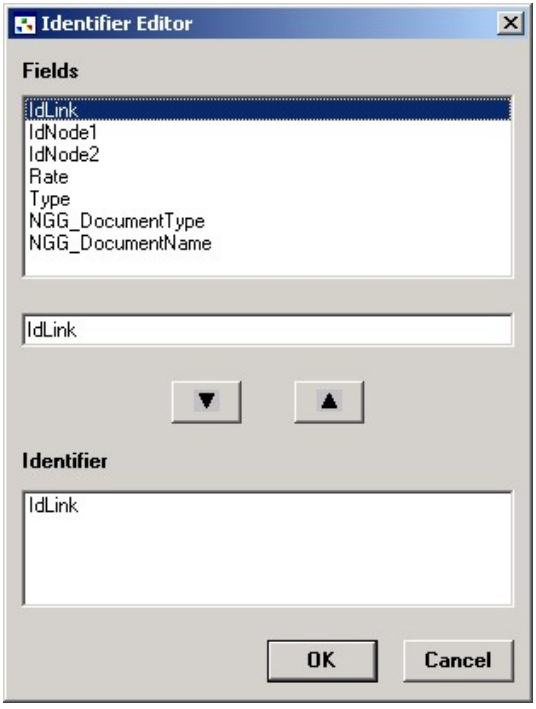
Now click the "Identifier" parameter field and click the ... button:



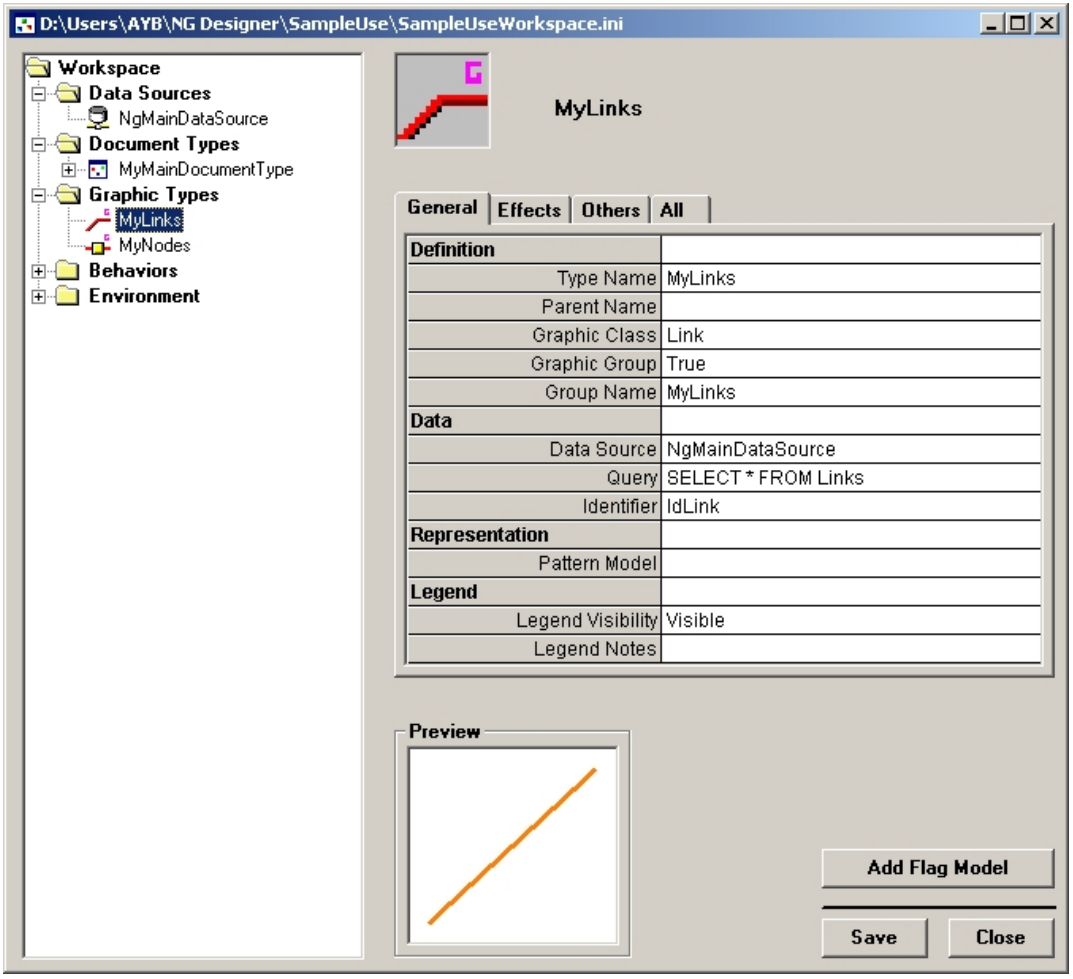
(5) The ArcGIS Schematics Designer "Identifier Editor" component automatically opens. Select the fields that will be used to identify the graphic objects of this type. As the "IdLink" field is the primary key in the "Links" table, we select this field to identify each link of this type.

Note: All the objects related to a graphic object type must be identifiable as a unique graphic object.

Validate the selected fields by clicking the  button and click OK:

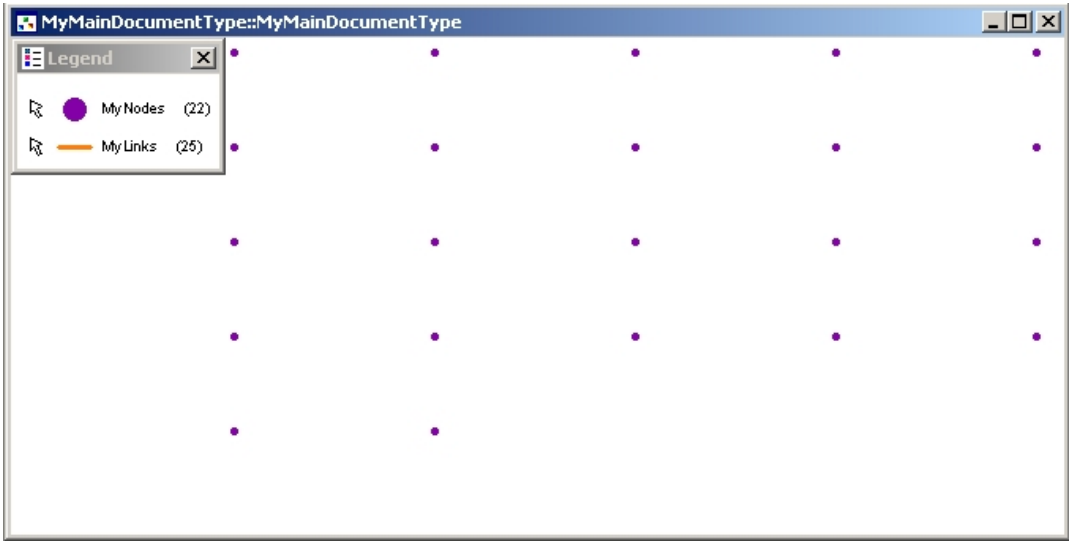


(6) The just defined identifier is automatically displayed in the "Identifier" field:



➢ Step 8: Creating Mandatory Attributes for the Link Graphic Type

Suppose that you want to test the display of your network now: even if you associate your new link type with your document type (this step is essential to display your new links), your network will appear as follows:

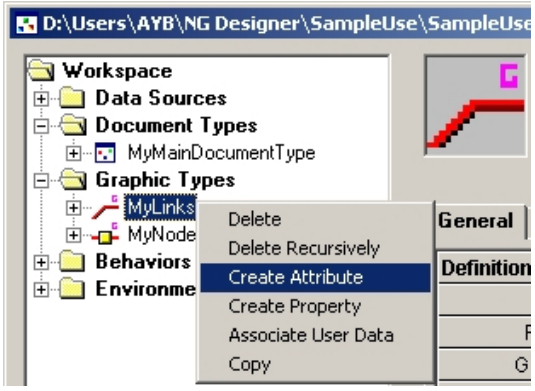


Even if the links appear in the legend subwindow, they are not displayed.

In fact, the links display is conditioned by their topological properties: origin and extremity nodes must be specified to display a link.

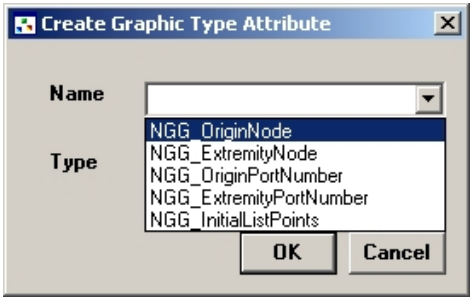
We need to create the two link's compulsory attributes: NGG_OriginNode and NGG_ExtremityNode.

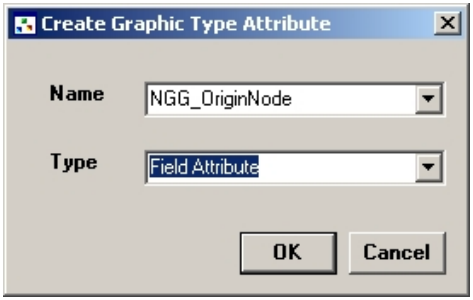
(1) Right-click the "MyLinks" tree entry corresponding to your link type and select the "Create Attribute" menu:



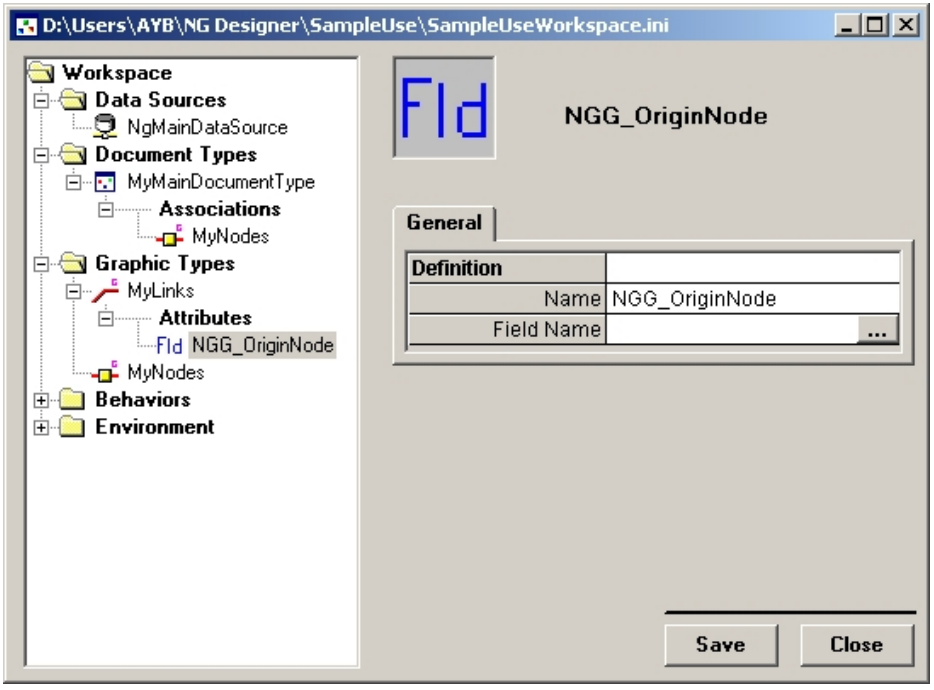
The ArcGIS Schematics Designer "Create Graphic Type Attribute" dialog box automatically opens: select the "NGG_OriginNode" predefined attribute name from the "Name" dropdown list and, as the origin node is a unique field returned by the link type query, select "Field Attribute" from the "Type" dropdown list and

validate:



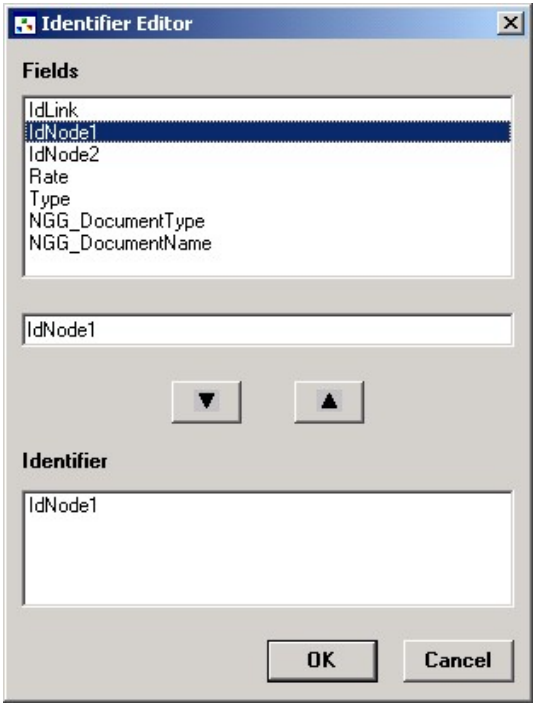


An "Attributes" new tree entry is automatically created below the "MyLinks" graphic type tree entry, and the "NGG_OriginNode" new attribute itself is referenced below this new entry:

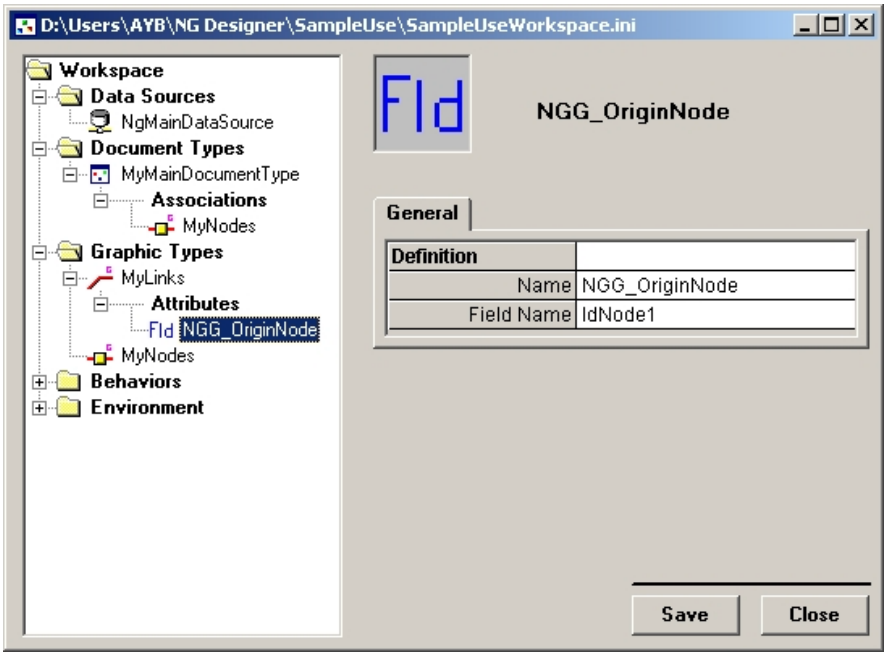


(2) Select the "Field Name" parameter field and click the ... button to open the ArcGIS Schematics Designer "Identifier Editor".

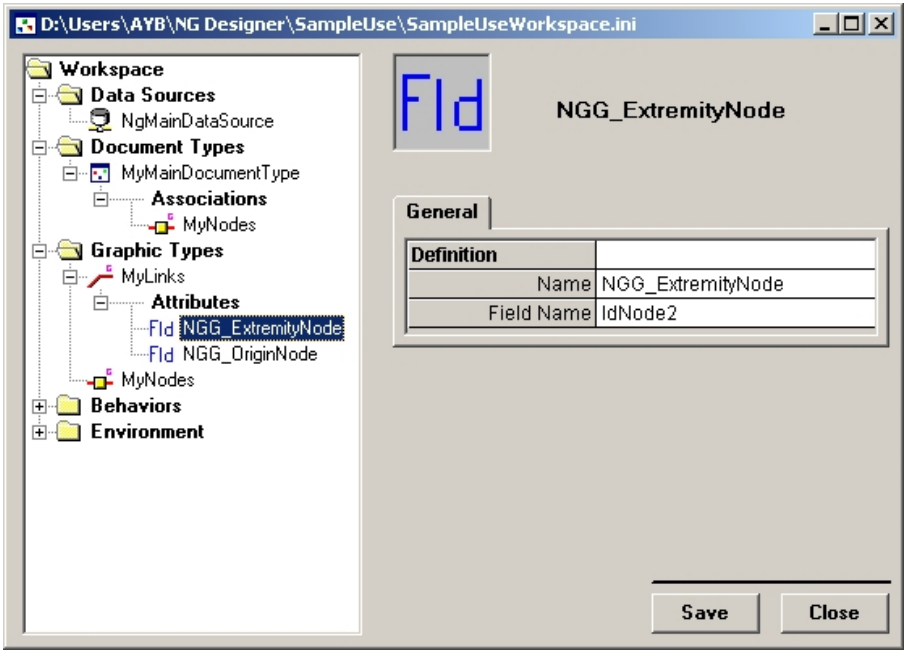
Select the fields that will be used to identify each link's origin node. In this example, the "IdNode1" field returned by the link type query is the field used to identify the link's origin. We select it from the "Fields" area, click the ▼ button to take our choice into account, and click OK:



The "IdNode1" value is automatically displayed in the "Field Name" field:



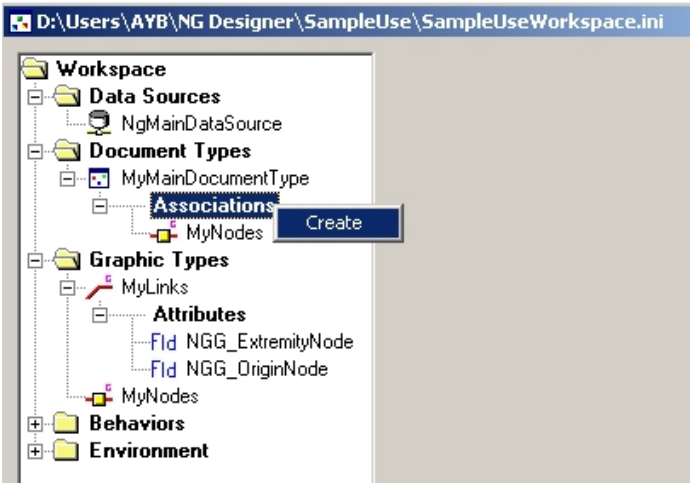
(3) Repeat the first and second steps to create the second "NGG_ExtremityNode" mandatory attribute as follows:



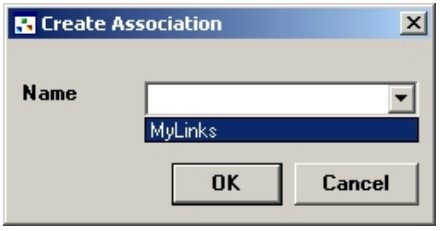
➢ Step 9: Associating the New Link Type and Displaying Your Network

(1) As already done when you defined the association between your first node type and your single document type, right-click the "MyMainDocumentType" tree entry and click "Create Association" from the popup menu.

Note: You can also choose the "Create" menu displayed when you right-click the "Associations" tree entry as follows:

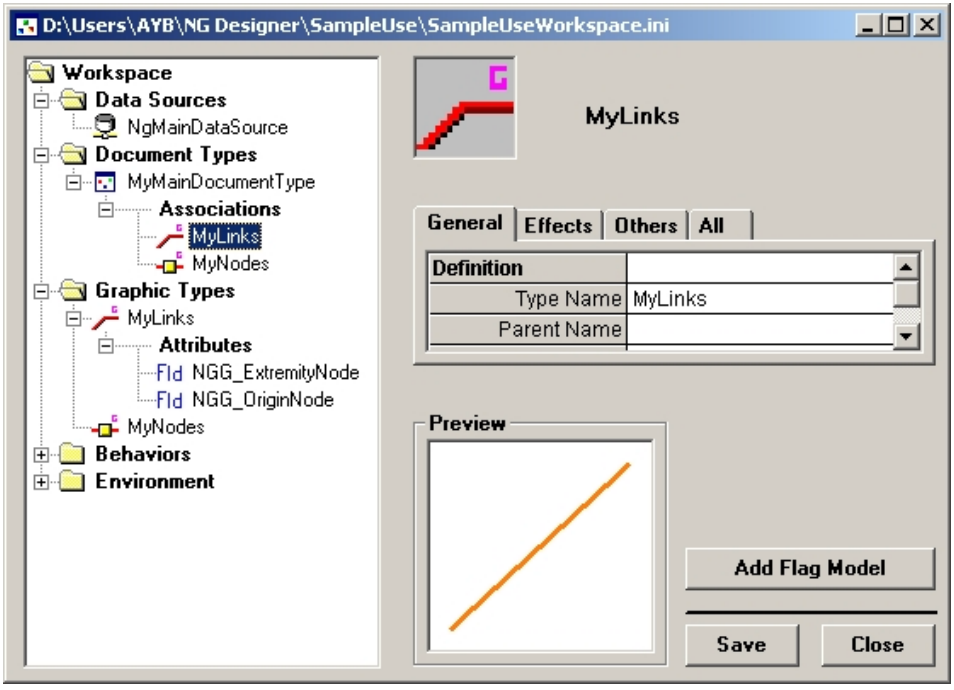


In both cases, the ArcGIS Schematics Designer "Create Association" dialog box opens as follows:



Select the "MyLinks" value from the "Name" dropdown list and click OK.

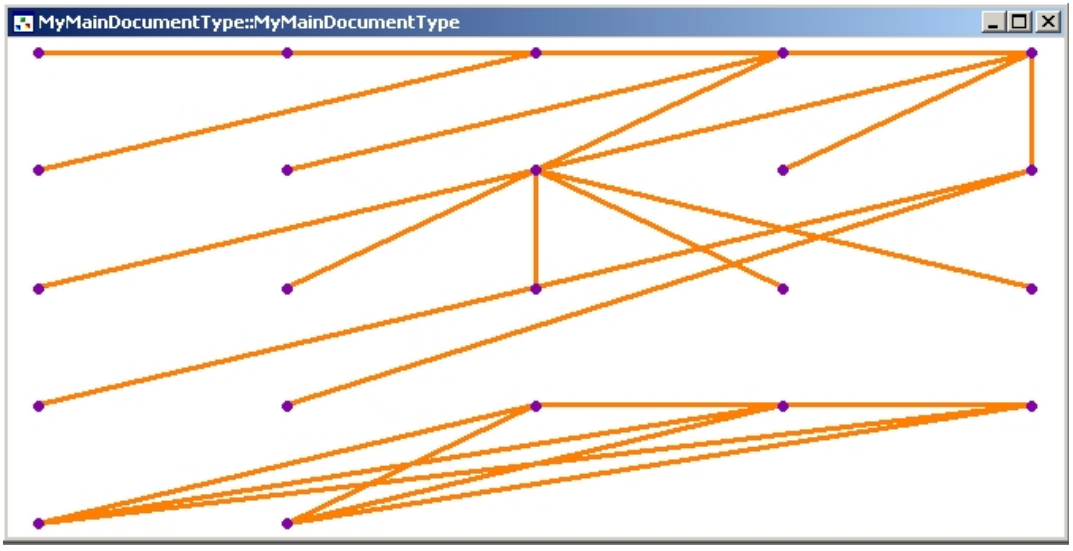
The just created association is automatically referenced below the "Associations" tree entry:



(2) Now that you have defined a document containing all the nodes and the links stored in the database you can display the complete network.

Click Save to save all your workspace parameters and click Close to close the ArcGIS Schematics Designer Editor window.

Click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, or click the "Open Document Form" item from the "Document" menu. Select the single "MyMainDocumentType" document type name from the "Document Type" dropdown list and click OK. Your new schematic document opens as follows:



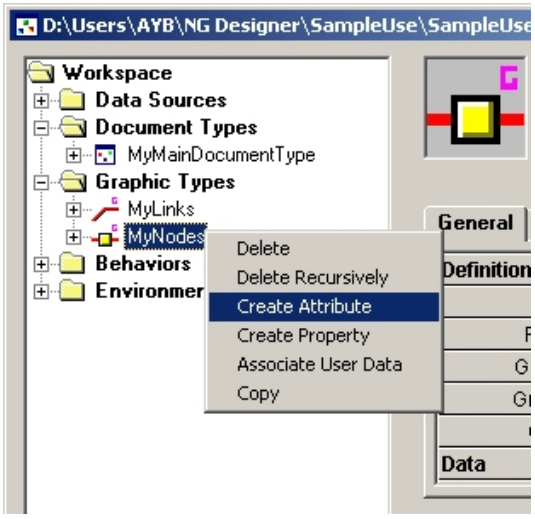
➢ Step 10: Creating Textual Properties to Display Node and Link Identifiers

In this step, we are going to create two textual properties:
- The **"NodeName" property** will display the node name centered at the top of each node. The information will be formatted as follows: "Node ID: *IdNode*" where *IdNode* corresponds to the "IdNode" field returned by the node type query.

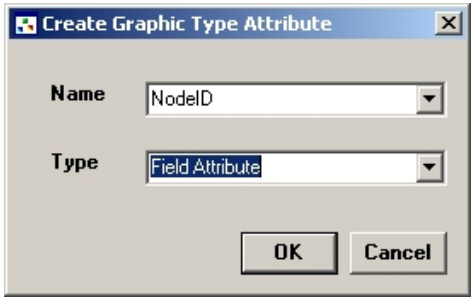
- The **"LinkName" property** will display the link name in blue, centered below each link, as follows: "From node *IdNode1* to *IdNode2*" where *IdNode1* and *IdNode2* correspond to the "IdNode1" and "IdNode2" fields returned by the link type query (i.e., the origin and extremity node identifiers, respectively).

>> Creating the "NodeName" Property
(1) As the "NodeName" property will use the "IdNode" field returned by the query as a formatted parameter of the property label that will be displayed, we must begin with creating an attribute corresponding to this field.

Right-click the "MyNodes" tree entry and select "Create Attribute" from the popup menu:

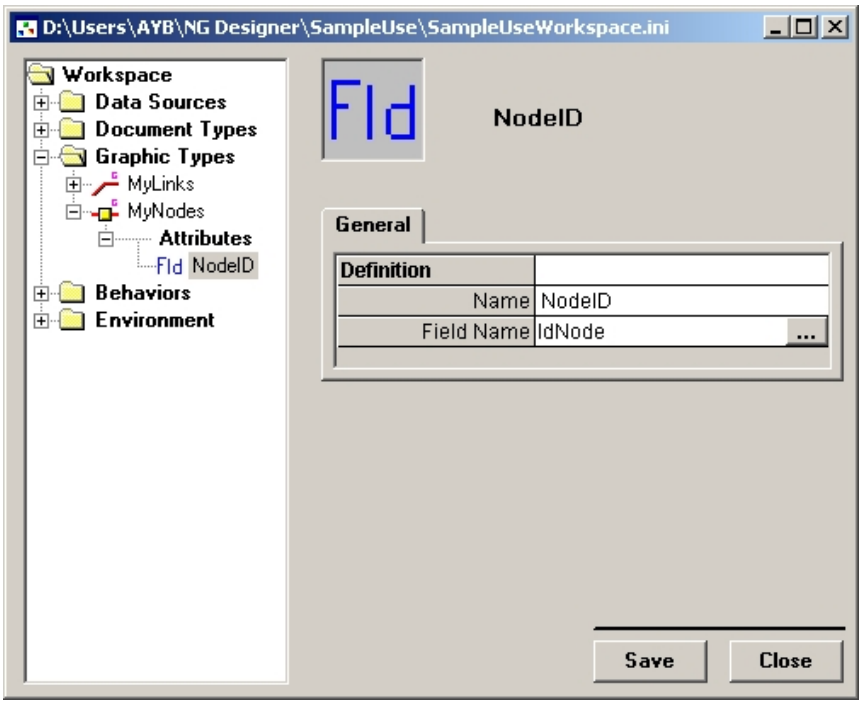


In the ArcGIS Schematics Designer "Create Graphic Type Attribute" dialog box, enter the name of the new attribute in the "Name" field ("NodeID", for example), select "Field Attribute" value in the "Type" dropdown list and validate:



The "NodeID" new attribute is automatically referenced below the "Attributes" tree entry related to the "MyNodes" graphic type.

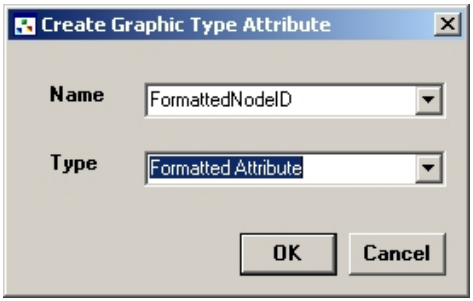
Select the "Field Name" field displayed in the right part of the ArcGIS Schematics Designer Editor window and click the ... button to open the ArcGIS Schematics Designer "Identifier Editor". Select the "IdNode" field from the dialog box's "Fields" area, click the ▼ button to take the chosen field into account, and click OK. The ArcGIS Schematics Designer Editor window appears as follows:



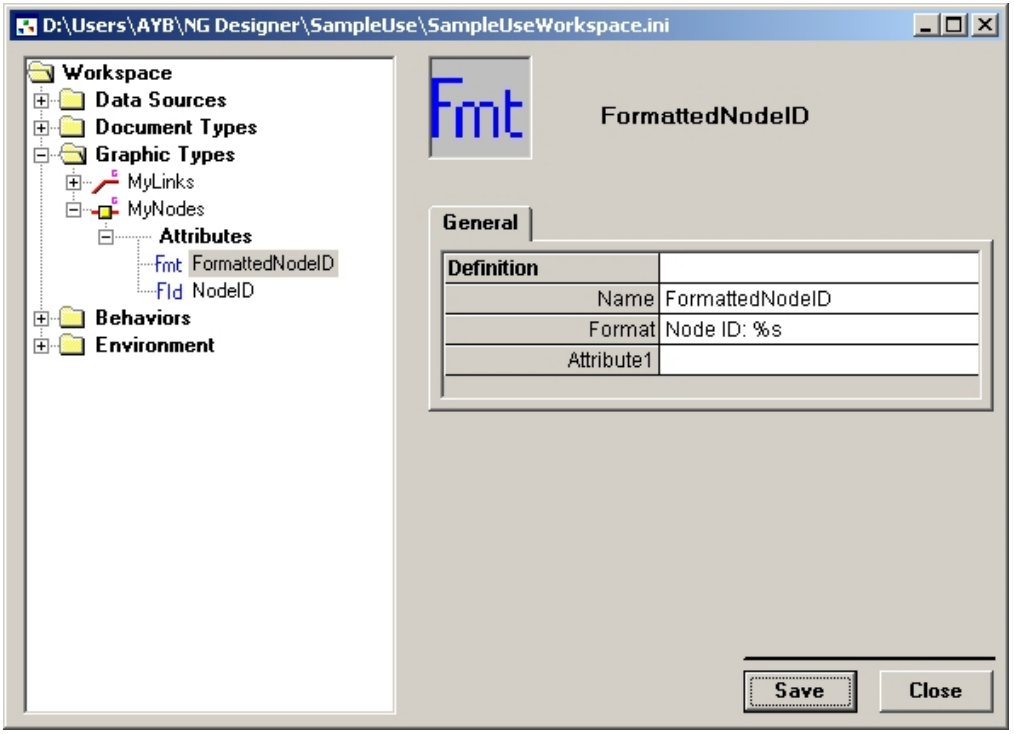
(2) The "NodeName" property that we are going to create will not directly use the "NodeID" attribute. The property label must be formatted as follows: "Node ID: *IdNode*". We have just created the "NodeID" attribute that will correspond to the *IdNode* label parameter. Now we must create a new attribute to format the label as well.

As in the previous step, right-click the "MyNodes" tree entry and select "Create Attribute" from the popup menu (you can also select the "Create" menu by right-clicking the "Attributes" tree entry displayed just below the "MyNodes" tree entry).

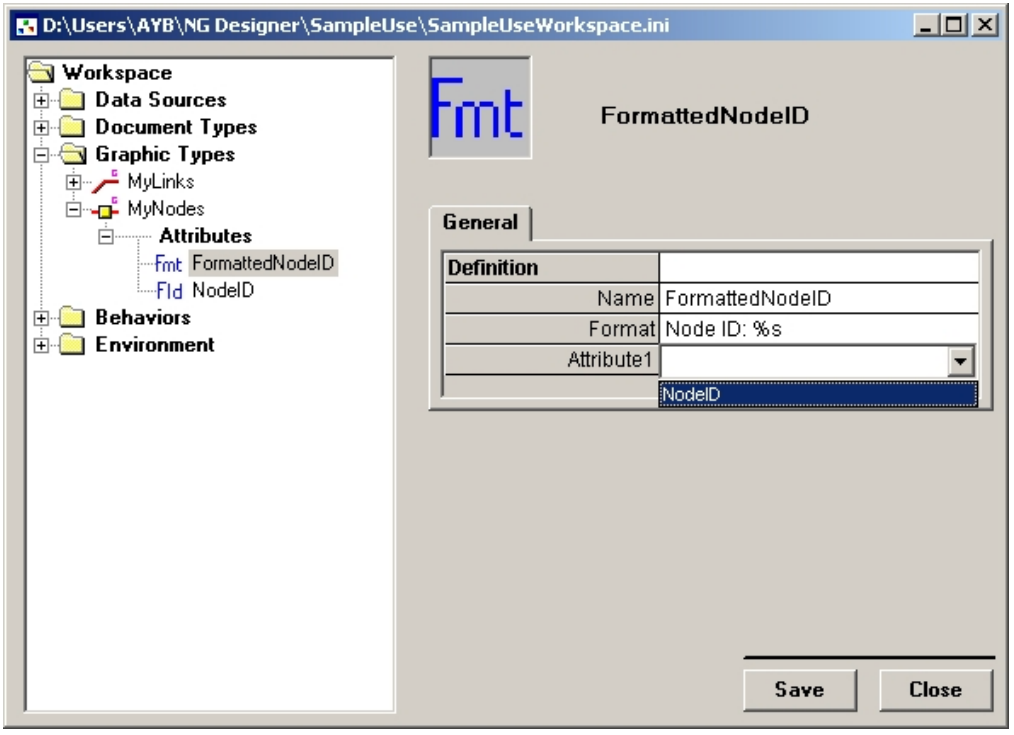
In the "Create Graphic Type Attribute" dialog box, enter the name of the second new attribute in the "Name" field ("FormattedNodeID", for example), select "Formatted Attribute" value from the "Type" dropdown list, and click OK:



Now, in the right part of the ArcGIS Schematics Designer Editor window corresponding to the "FormattedNodeID" new attribute's parameters, specify the format that will be used to build up the new attribute. When you validate the format parameter, ArcGIS Schematics Designer automatically detects that one attribute is needed to build the new attribute. So a new parameter field—"Attribute1"—is displayed:

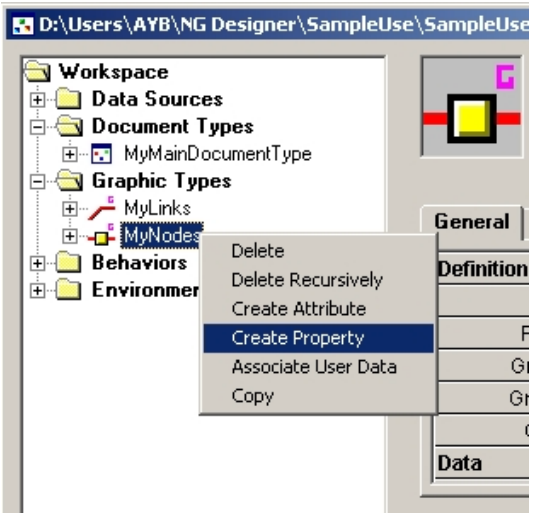


From the "Attribute1" dropdown list select the "NodeID" attribute name and click OK:

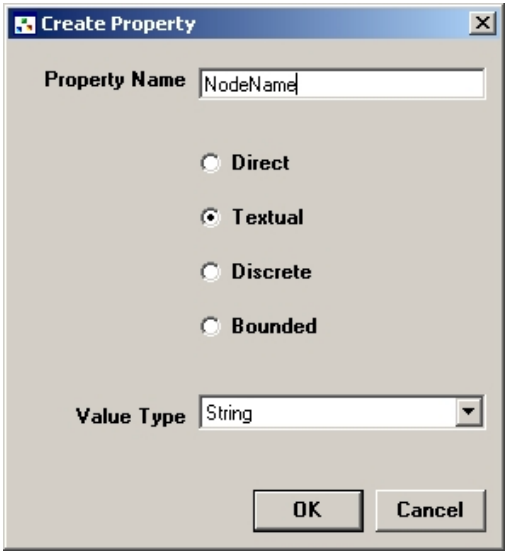


(3) At the end of this step, we have built up the label that we want to display at the top of each node. Now we must create the textual property that will manage this information display.

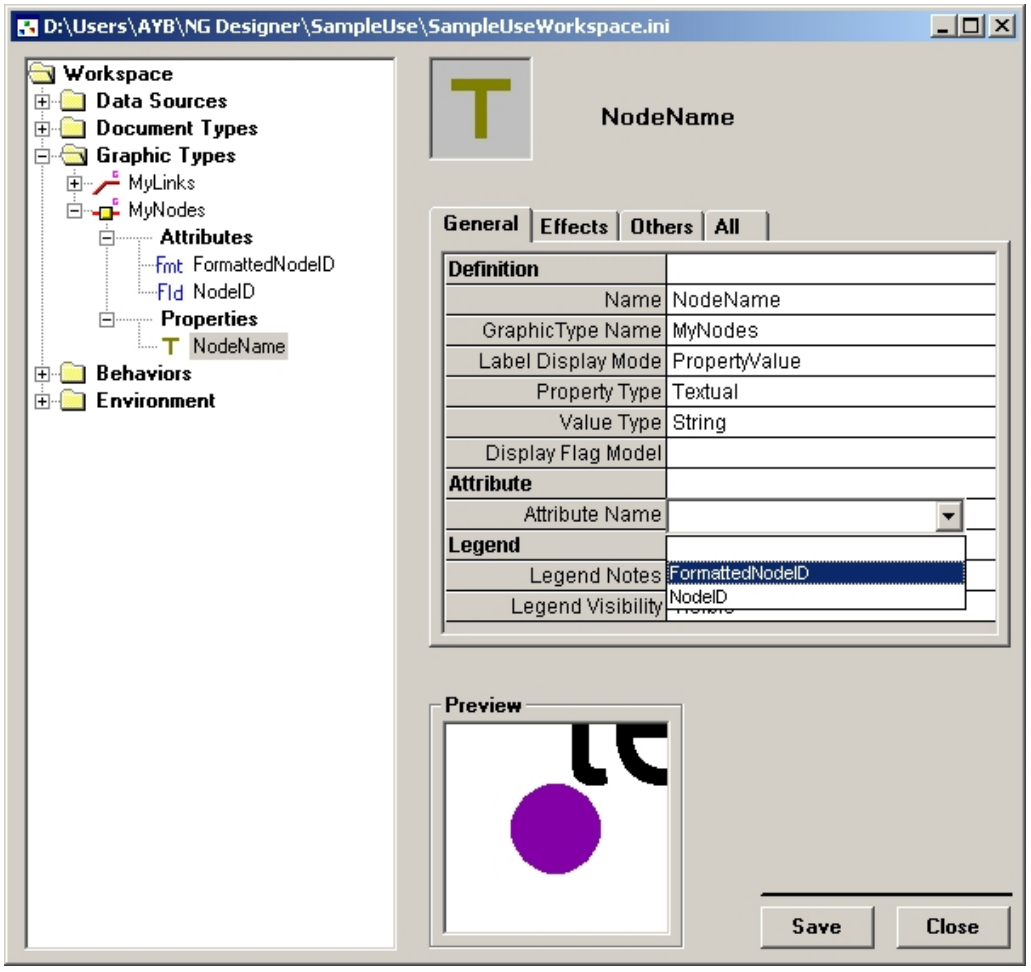
Right-click the "MyNodes" tree entry and select "Create Property" from the popup menu:



In the "Create Property" dialog box that opens, set the name of the new property in the "Property Name" field. Because the default parameters set in this form ("Textual" property type and "String" value type) are those we need, click OK.

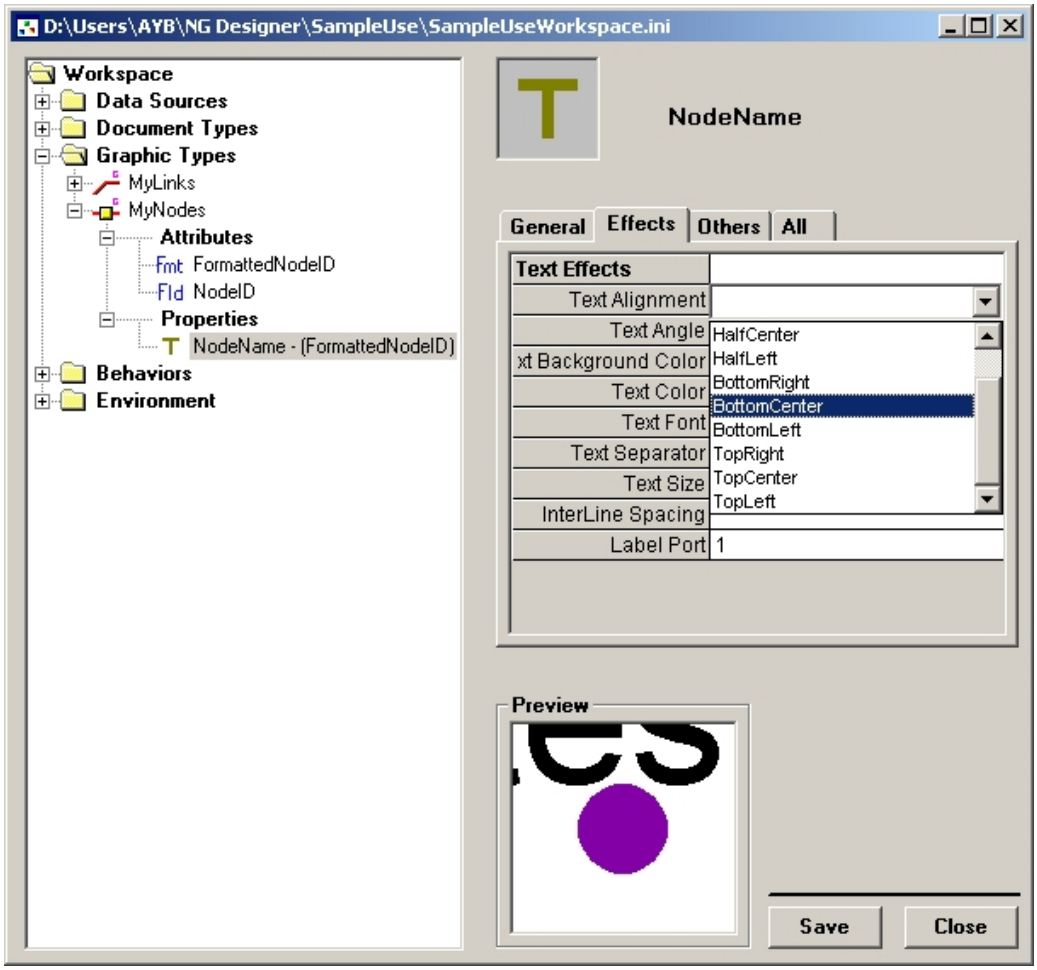


Now, in the right part of the ArcGIS Schematics Designer Editor window corresponding to the "NodeName" new textual property's parameters, specify the attribute name that will be used to display the property label:

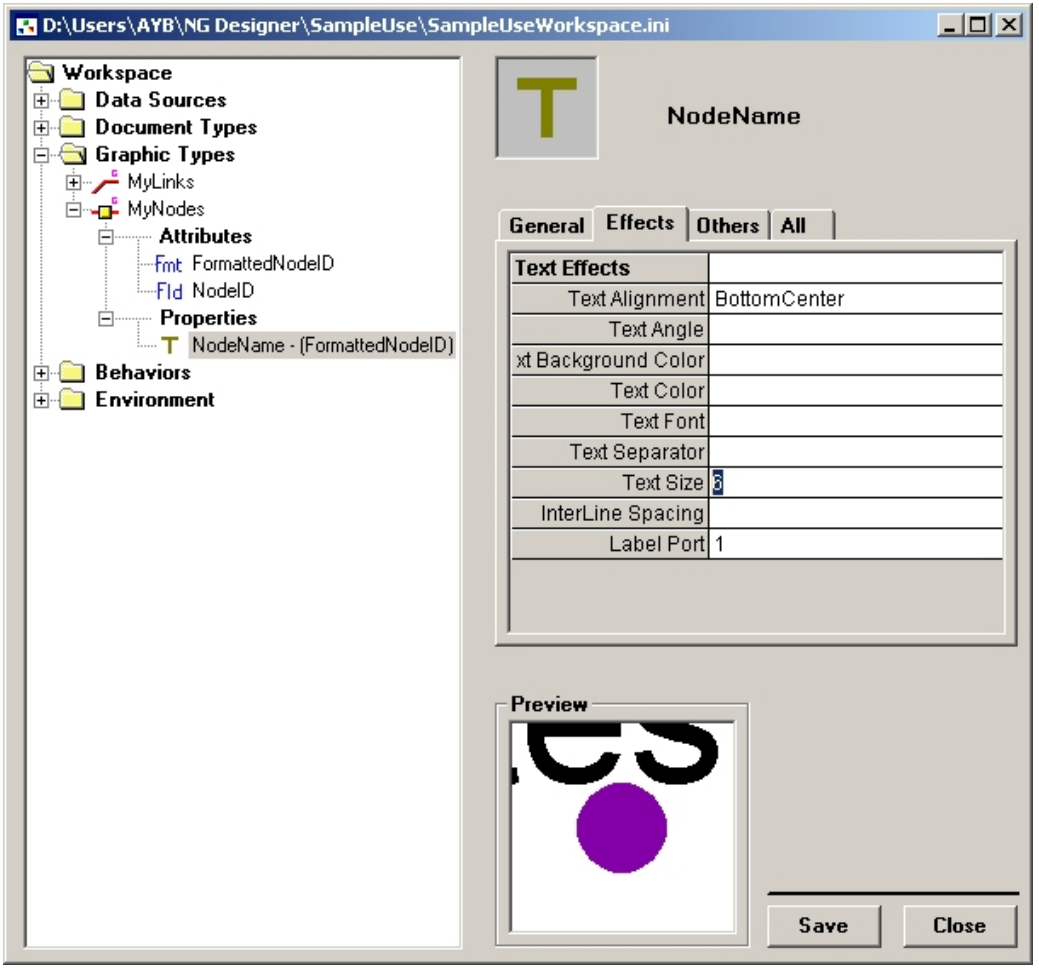

D:\Users\AYB\NG Designer\SampleUse\SampleUseWorkspace.ini
Workspace
Data Sources
Document Types
Graphic Types
MyLinks
MyNodes
Attributes
Fmt FormattedNodeID
Fld NodeID
Properties
T NodeName
Behaviors
Environment
NodeName
General
Effects
Others
All
Definition
Name NodeName
GraphicType Name MyNodes
Label Display Mode PropertyValue
Property Type Textual
Value Type String
Display Flag Model
Attribute
Attribute Name
Legend
Legend Notes
Legend Visibility
FormattedNodeID
NodeID
Preview
Save
Close

Click the "Effects" tab and select the "BottomCenter" value from the "Text Alignment" dropdown list.

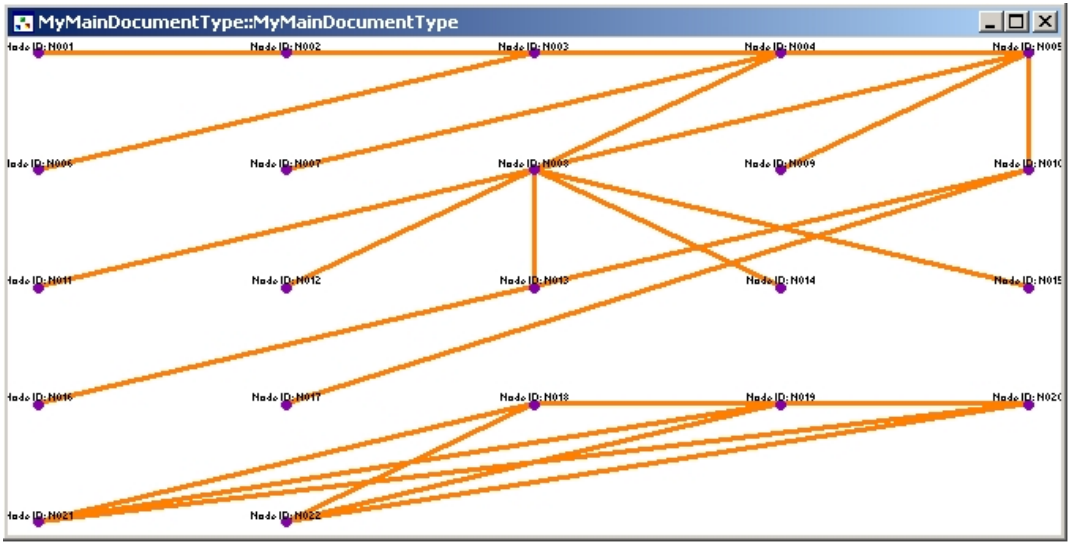
Note: "BottomCenter" text alignment means that the graphic object will appear centered at the bottom of the property label (i.e., the label will be centered at the top of each node).



Now set the "Text Size" parameter as follows and click OK:



Save your workspace parameters, close the ArcGIS Schematics Designer Editor window, and test your network display. The result will be as follows:

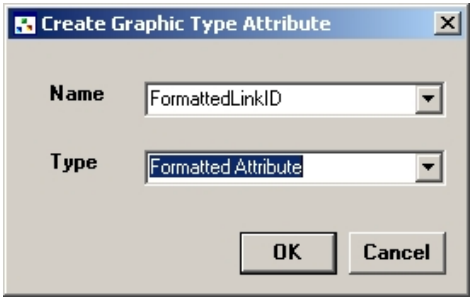


>> Creating the "LinkName" Property

(1) Here, the "LinkName" property will use the "IdNode1" and "IdNode2" fields returned by the query as formatted parameters of the property label displayed. We have already defined two attributes corresponding to these fields, "NGG_OriginNode" and "NGG_ExtremityNode" attributes. These two attributes are those we need to build the property label as we want; we just have to create the corresponding formatted attribute.

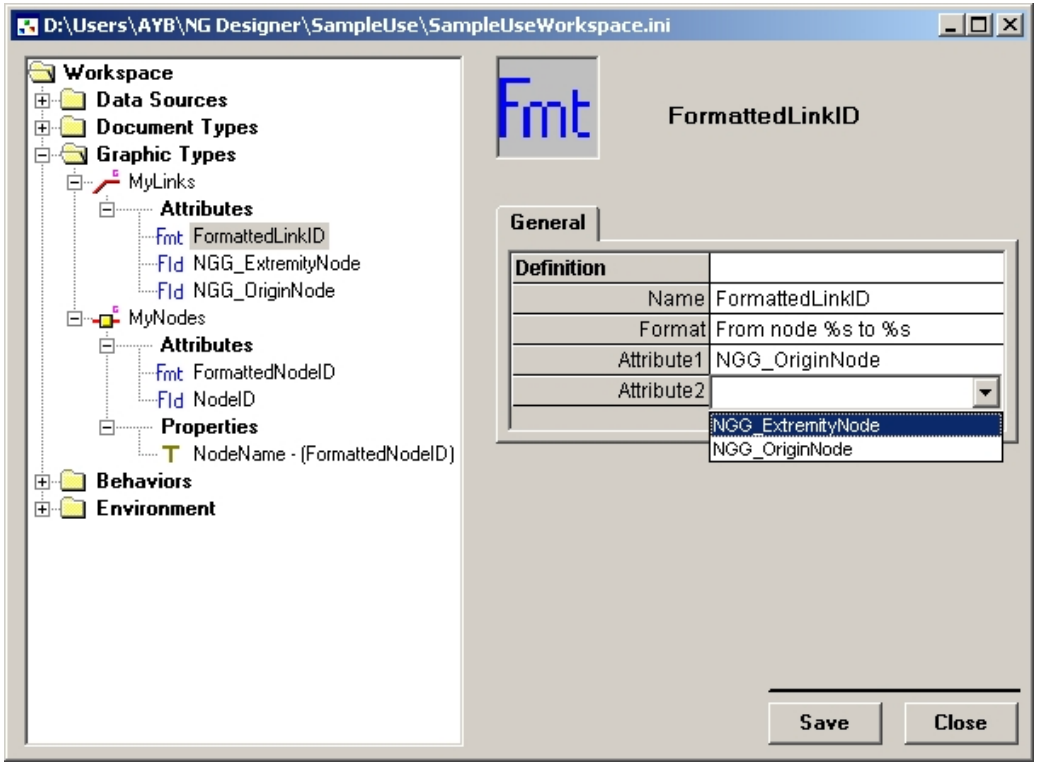
As in the node case, right-click the "MyLinks" tree entry and select "Create Attribute" from the popup menu (you can also select the "Create" menu by right-clicking the "Attributes" tree entry displayed just below the "MyLinks" tree entry).

In the "Create Graphic Type Attribute" dialog box, enter the name of the new attribute in the "Name" field ("FormattedLinkID", for example), select "Formatted Attribute" from the "Type" dropdown list, and click OK:



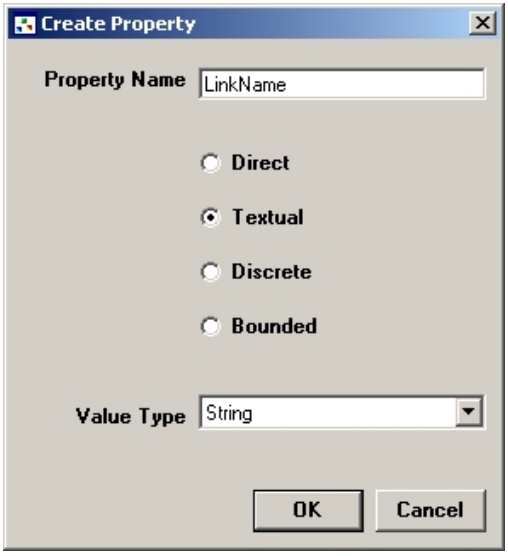
Now, in the right part of the ArcGIS Schematics Designer Editor window corresponding to the "FormattedLinkID" new attribute's parameters, specify the format that will be used to build up the new attribute and validate.

From the "Attribute1" and "Attribute2" dropdown lists, select the "NGG_OriginNode" and the "NGG_ExtremityNode" attribute names, respectively.

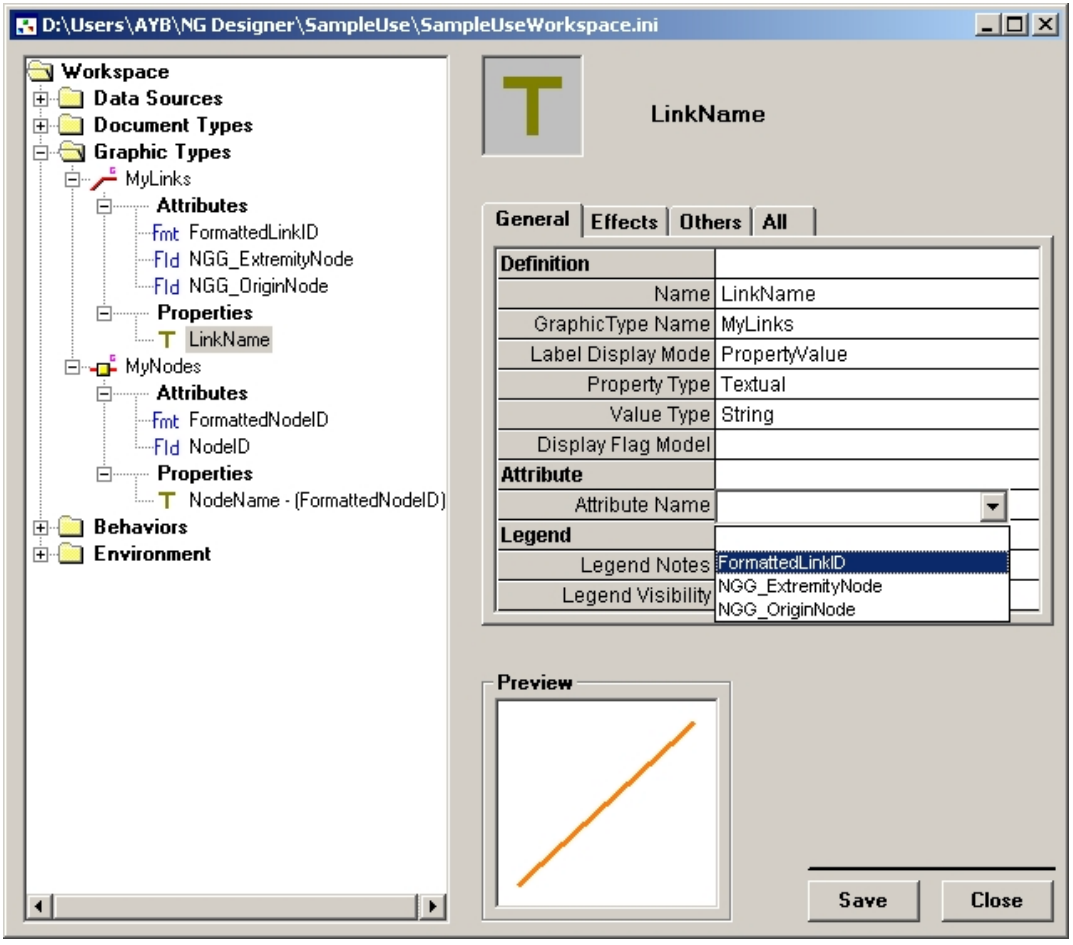


(2) At the end of this step, we have built up the label that we want to display below each link. Now we must create the textual property that will manage this information display.

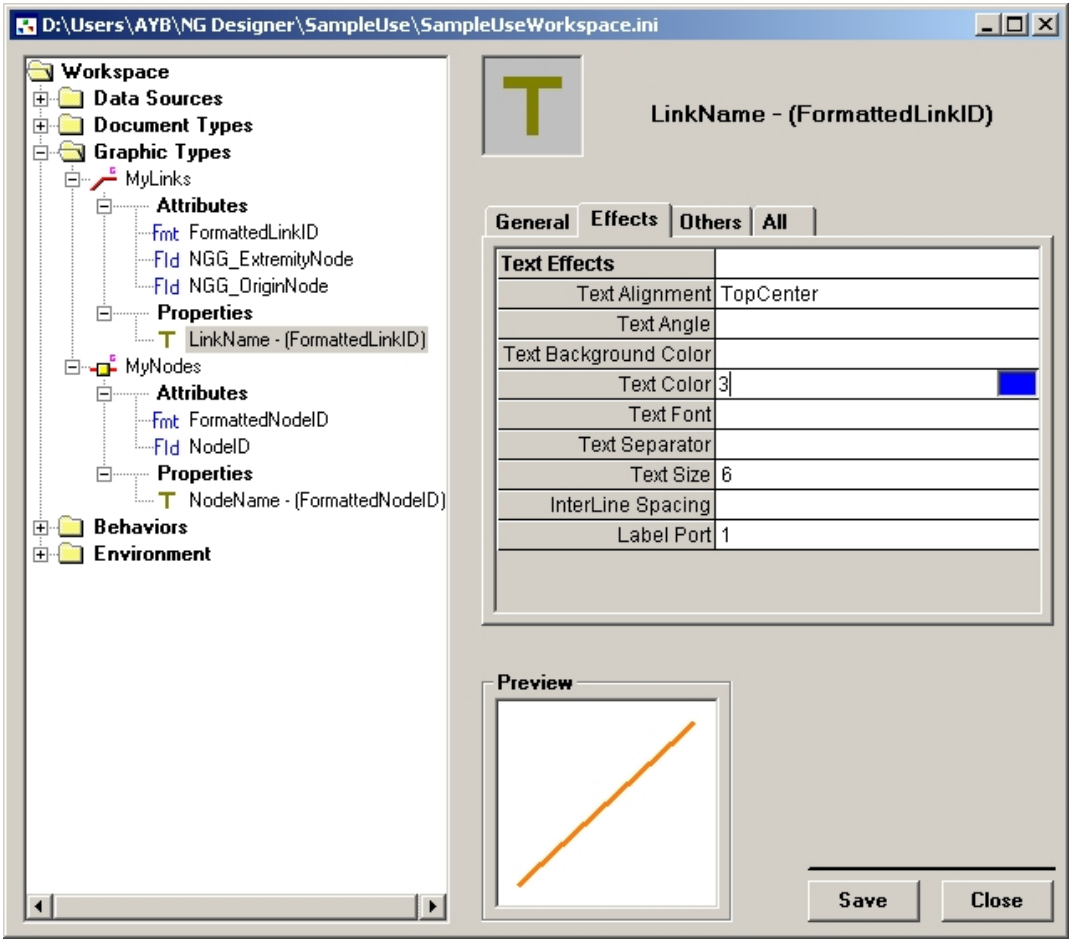
Right-click the "MyLinks" tree entry and select "Create Property" from the popup menu. In the "Create Property" dialog box that opens, set the name of the new property in the "Property Name" field and click OK:



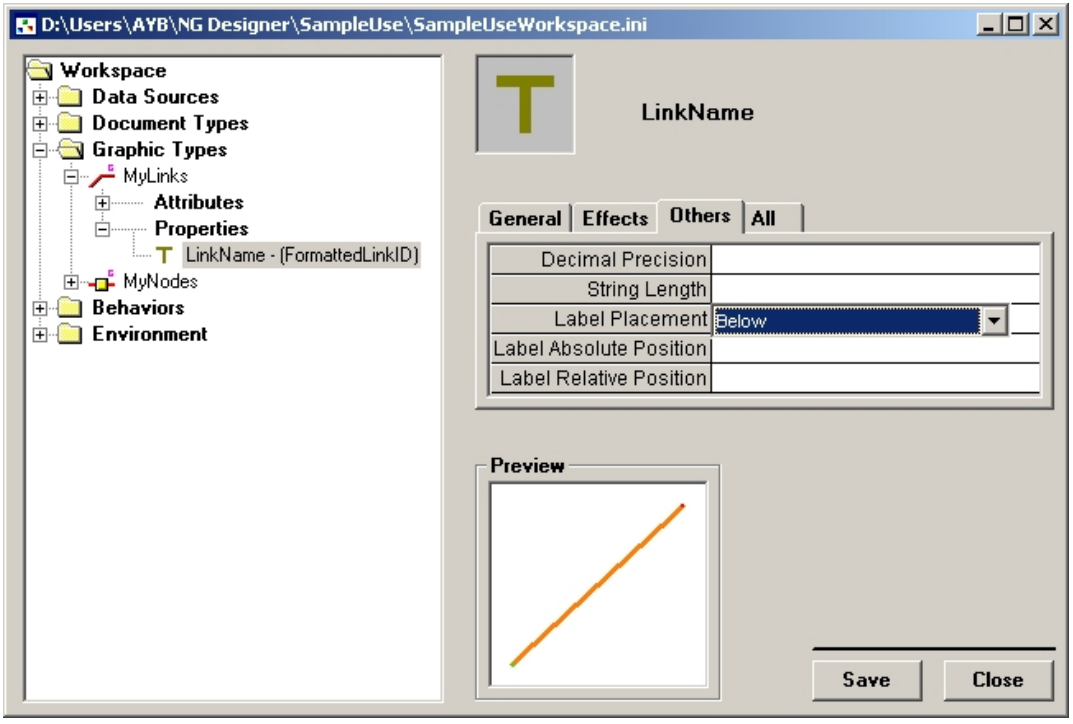
Now, in the right part of the ArcGIS Schematics Designer Editor window corresponding to the "LinkName" new textual property's parameters, specify the attribute name that will be used to display the property label.



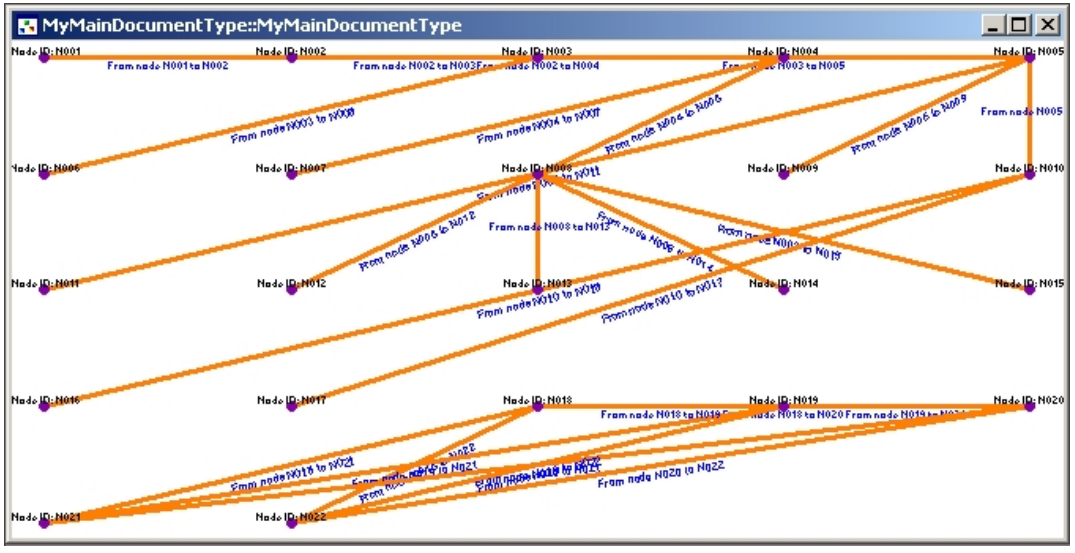
Click the "Effects" tab and select the "TopCenter" value from the "Text Alignment" dropdown list. Set the "Text Size" parameter value and select the blue color you want by using the ArcGIS Schematics Designer Color Editor. (Clicking the little rectangle displayed when you click anywhere in the "Text Color" parameter field automatically opens this component):



Now click the "Others" tab and select the "Below" value from the "Label Placement" dropdown list:



Save your workspace parameters, close the ArcGIS Schematics Designer Editor window, and test your network display. The result will be as follows:

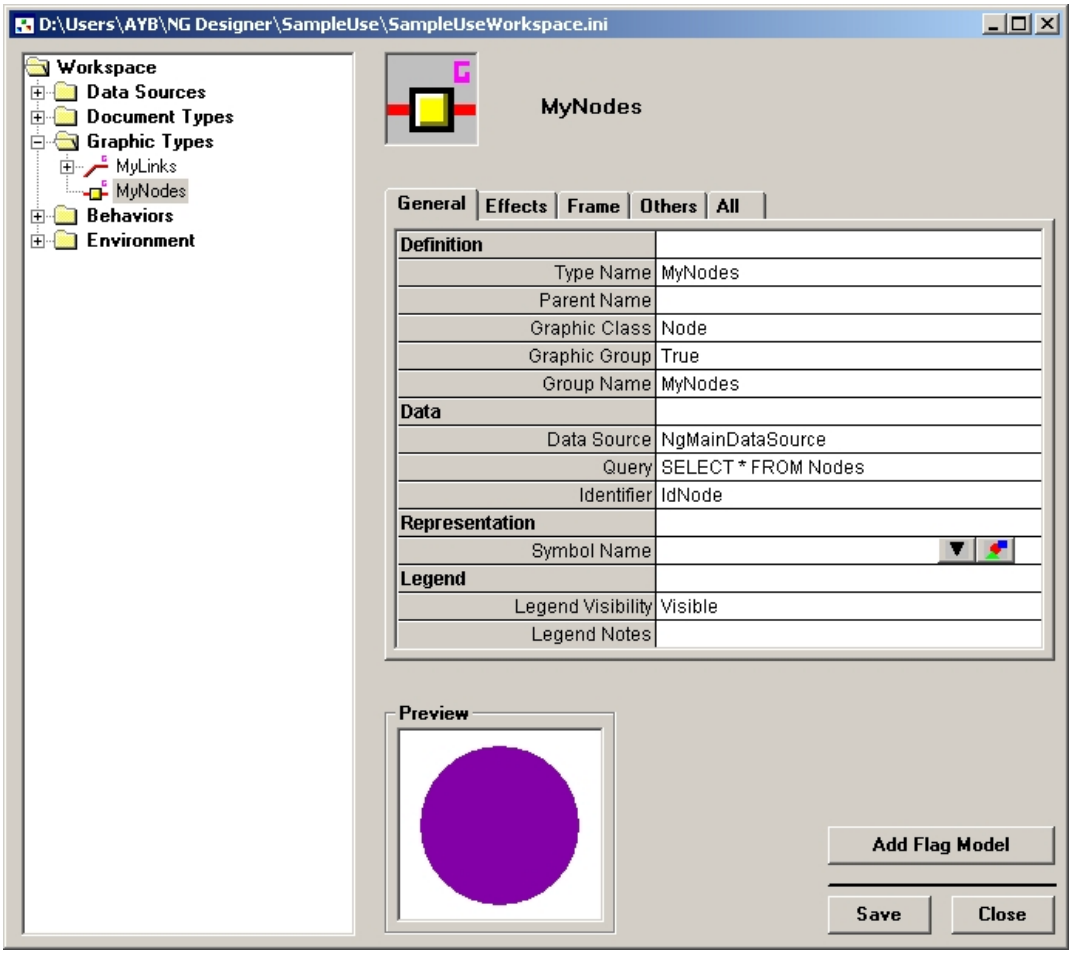


➢ Step 11: Using a Composed CGM Symbol to Display the Node Group

As the "MyNodes" symbol name is not specified, ArcGIS Schematics Designer uses the default node symbol set for the workspace to display each node of this type.

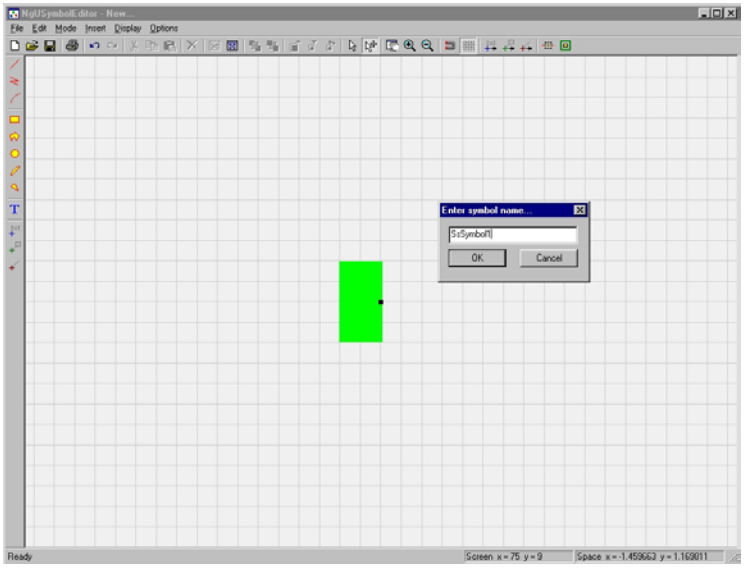
In this step, to represent the "MyNodes" node type, we decide to create a new symbol based on the already existing "MyDefNodeSymbol" CGM symbol and composed of two other subsymbols.
At the node type level, each subsymbol will be invisible, but we will modify the subsymbols' visibility attribute afterwards when we define graphic effects related to a property filters in Step 12.

Activate the "MyNodes" tree entry, select the "Symbol Name" parameter displayed in the "General" tab, and click the  button to launch the NgUSymbol Editor.



(1) Creating the subsymbol CGM files

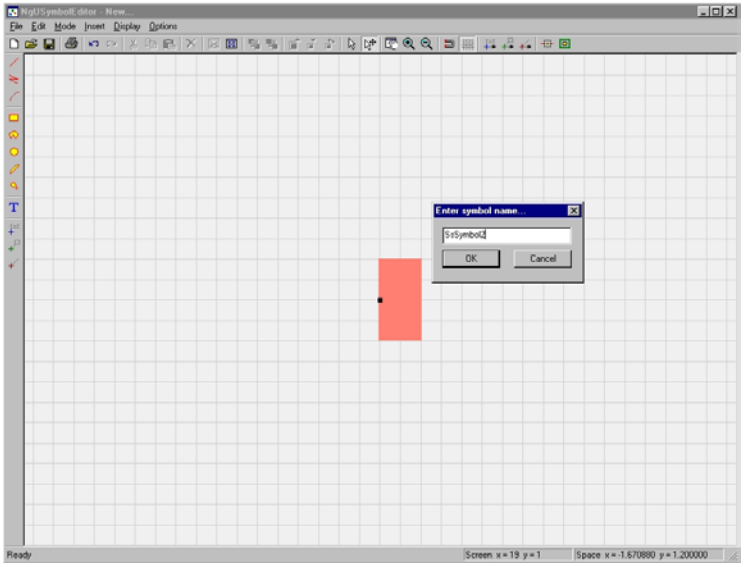
Use the  button to draw a green rectangle as in the following screenshot. Select the "Save As..." item from the "File" menu and enter the name that will reference your first subsymbol:



Note: Symbols are saved by default in the CGM folder in C:\arcgis\arcexe82\Schematics\Samples\VB\Session.

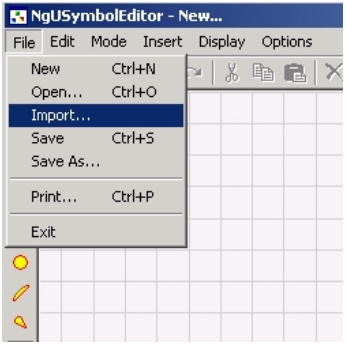
Next, select the “New” item from the “File” menu to create the new empty CGM file where a second subsymbol will be drawn.

Use the button to draw an orange rectangle as in the following screenshot. Select the "Save As..." item from the "File" menu and type the name that will reference your second subsymbol:

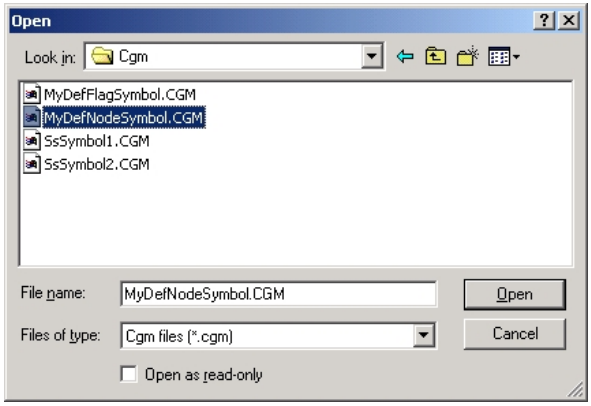


(2) Creating the node type CGM symbol

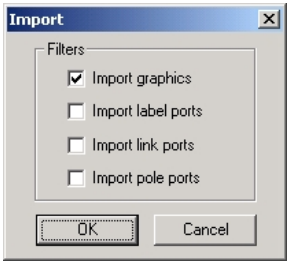
Now, we are going to create the node type CGM symbol. Select "New" from the "File" menu. Then, select "Import..." from the "File" menu as in the following screenshot:



In the "Open" dialog box, select the "MyDefNodeSymbol" CGM file from the "CGM" directory:

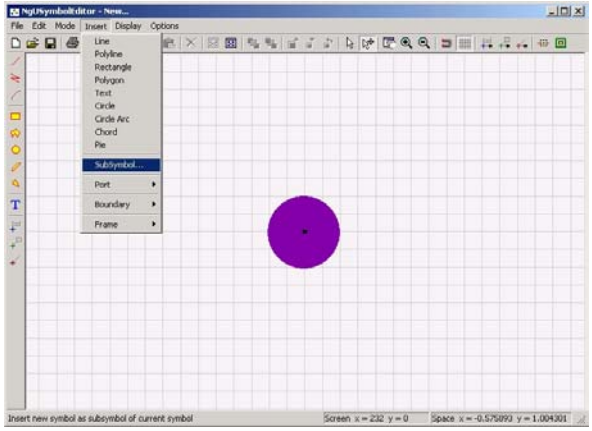


Click "Open". The "Import" dialog box automatically opens. Check the "Import graphics" box and click OK:

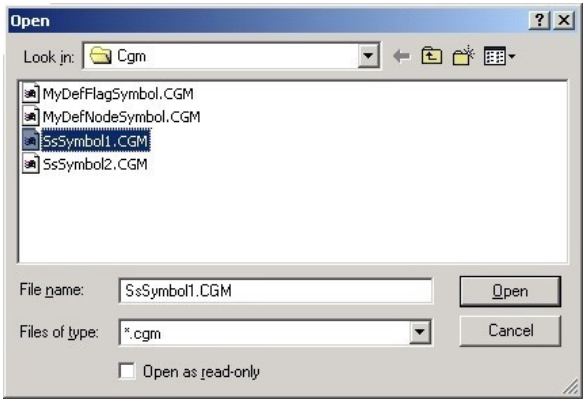


The "MyDefNodeSymbol" CGM circle is automatically imported and placed in the center of the NgUSymbol window.

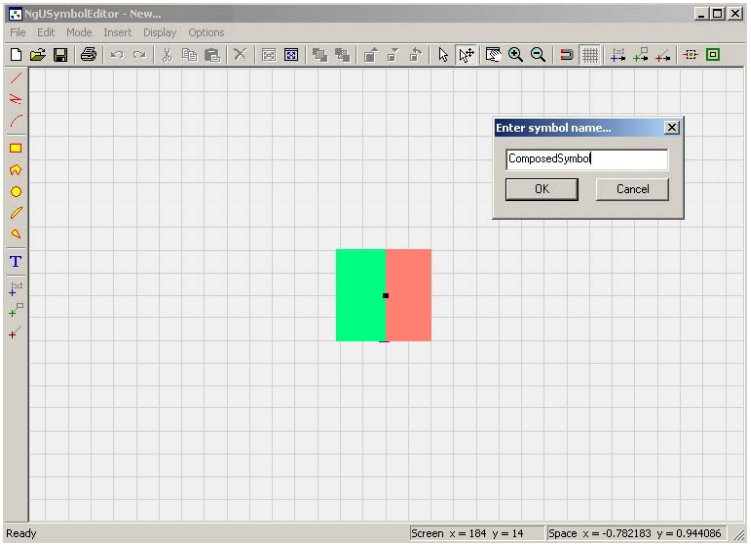
Now, select "SubSymbol..." from the "Insert" menu:



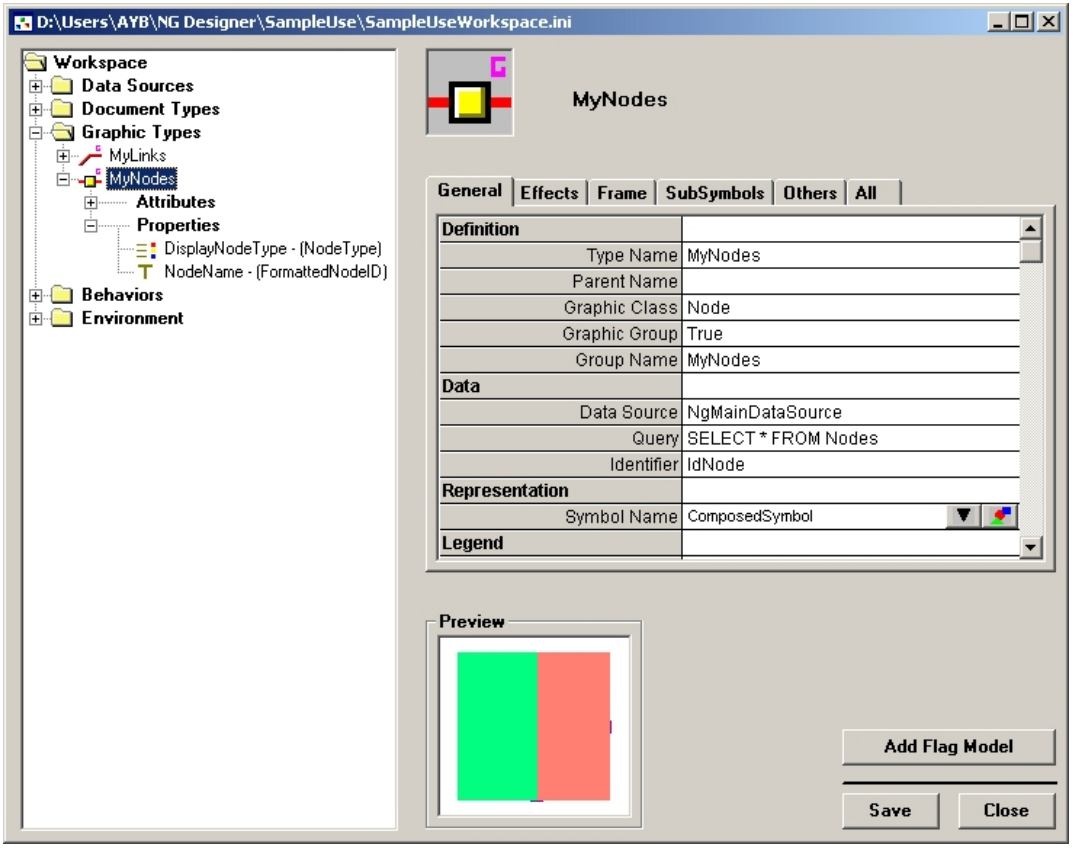
Select the CGM file corresponding to the first subsymbol (the green rectangle) and click OK:



Repeat the operation to insert the second subsymbol file (the orange rectangle) and save the CGM file result.

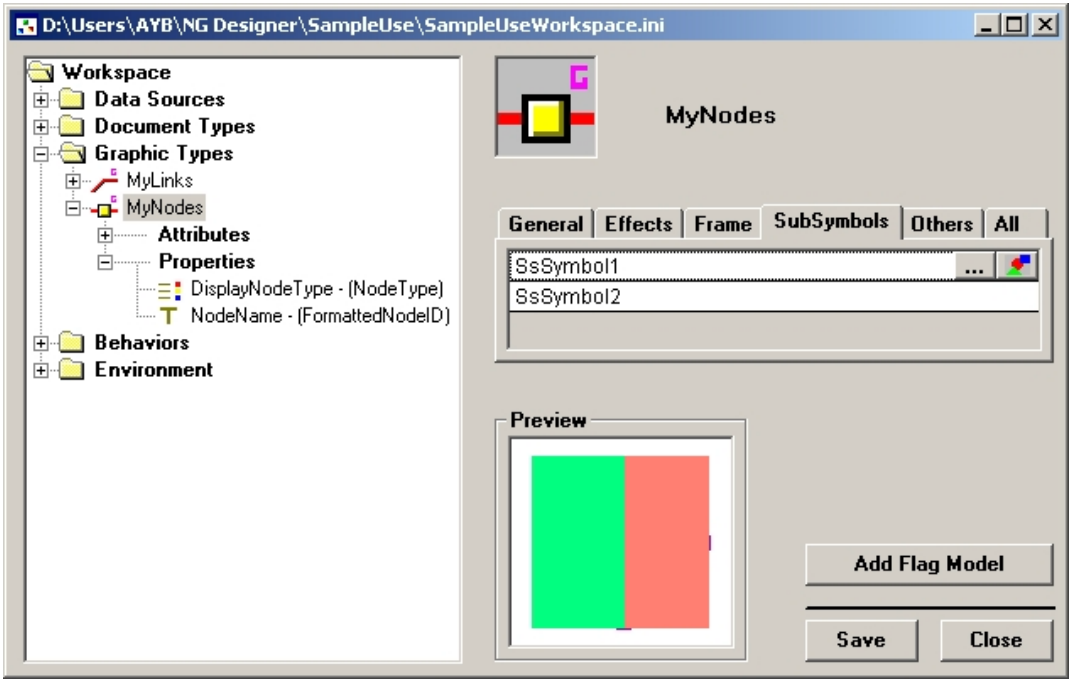


Exit the "NgUSymbolEditor" drawing tool. The just created CGM file is automatically used as the node type symbol:

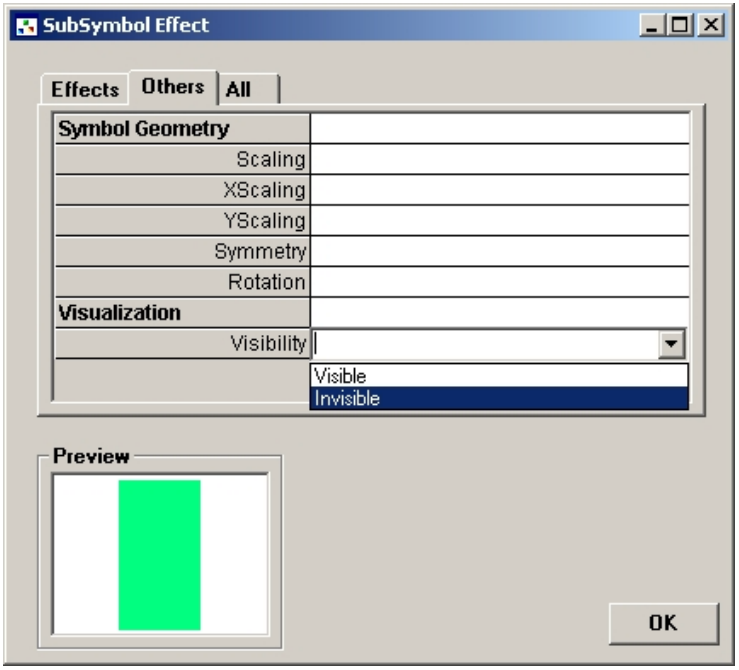


(3) Setting the subsymbols attributes to represent the node group

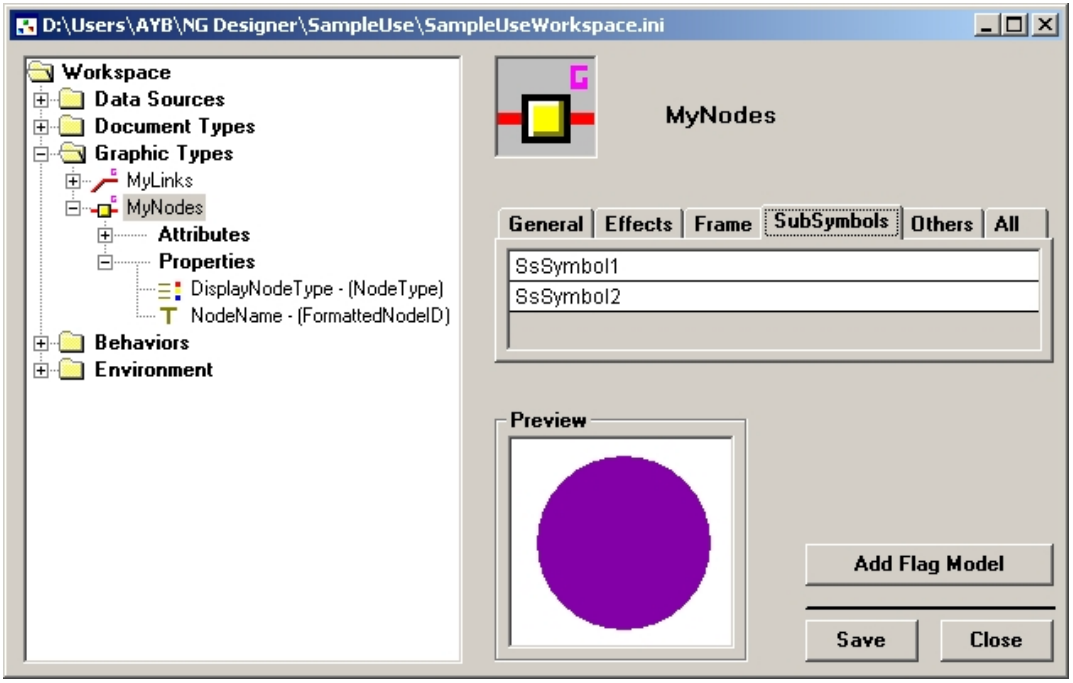
As this CGM symbol is composed of subsymbols, the "SubSymbols" tab lets you show and modify each subsymbol attribute. Select this tab and click the ... button, which is displayed when you click anywhere in the first subsymbol line to edit the subsymbol effects.



In the "SubSymbol Effect" form that automatically opens, click the "Others" tab, select "Invisible" from the "Visibility" dropdown list, and click OK. Repeat this operation for the second subsymbol.



When you are finished this step, the preview subwindow that shows the node appearance should appear as follows:



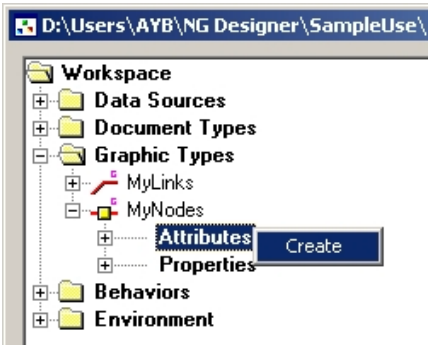
➢ Step 12: Animating the Network Nodes According to the Node's "Type" Database Field

The "Type" field returned by the node graphic type query stores the type of each node. Each node is either an "A", "B", "C","D", "E", or "F" type.

In this step, we will take this information into account graphically: we are going to create the "DisplayNodeType" discrete property composed by six discrete filters; each filter corresponds to each "Type" value.

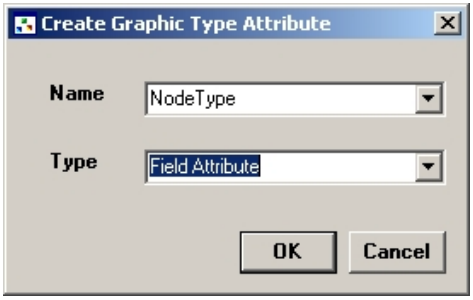
(1) Creating the "NodeType" Attribute Corresponding to the Node "Type" Field
As the "DisplayNodeType" property will use the "Type" field returned by the query, we must begin to create an attribute corresponding to this field.

Right-click the "Attributes" tree entry displayed below the "MyNodes" graphic type and select the "Create" menu:

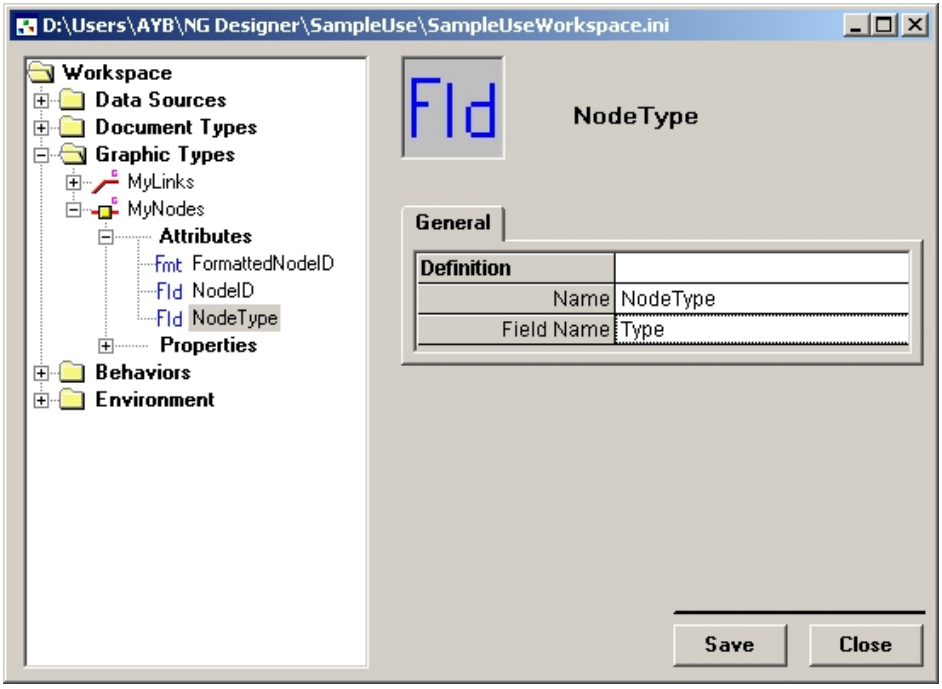


In the ArcGIS Schematics Designer "Create Graphic Type Attribute" form:

- Set the name that will be used to reference the new attribute in the "Name" field.
- Select "Field Attribute" from the "Type" dropdown list and click OK:

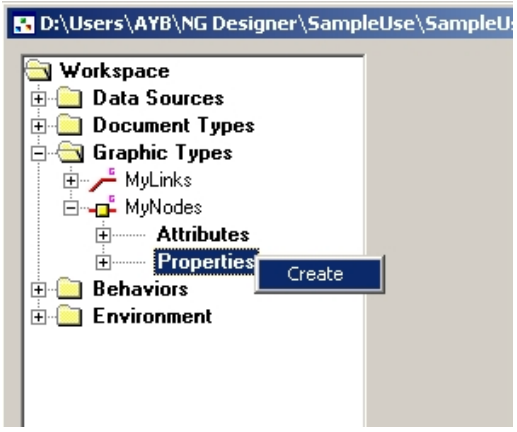


Fill the "Field Name" parameter by selecting the "Type" field.

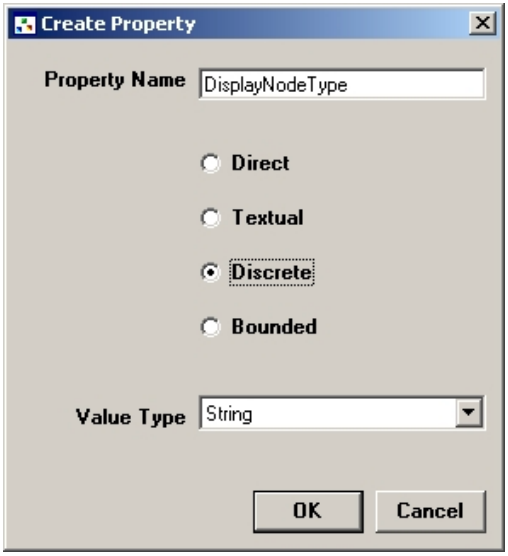


(2) Creating the "DisplayNodeType" Discrete Property
Now you will create the "DisplayNodeType" discrete property that will display each node according to the just created "NodeType" attribute value.

Right-click the "Properties" tree entry displayed below the "MyNodes" graphic type and select the "Create" menu:

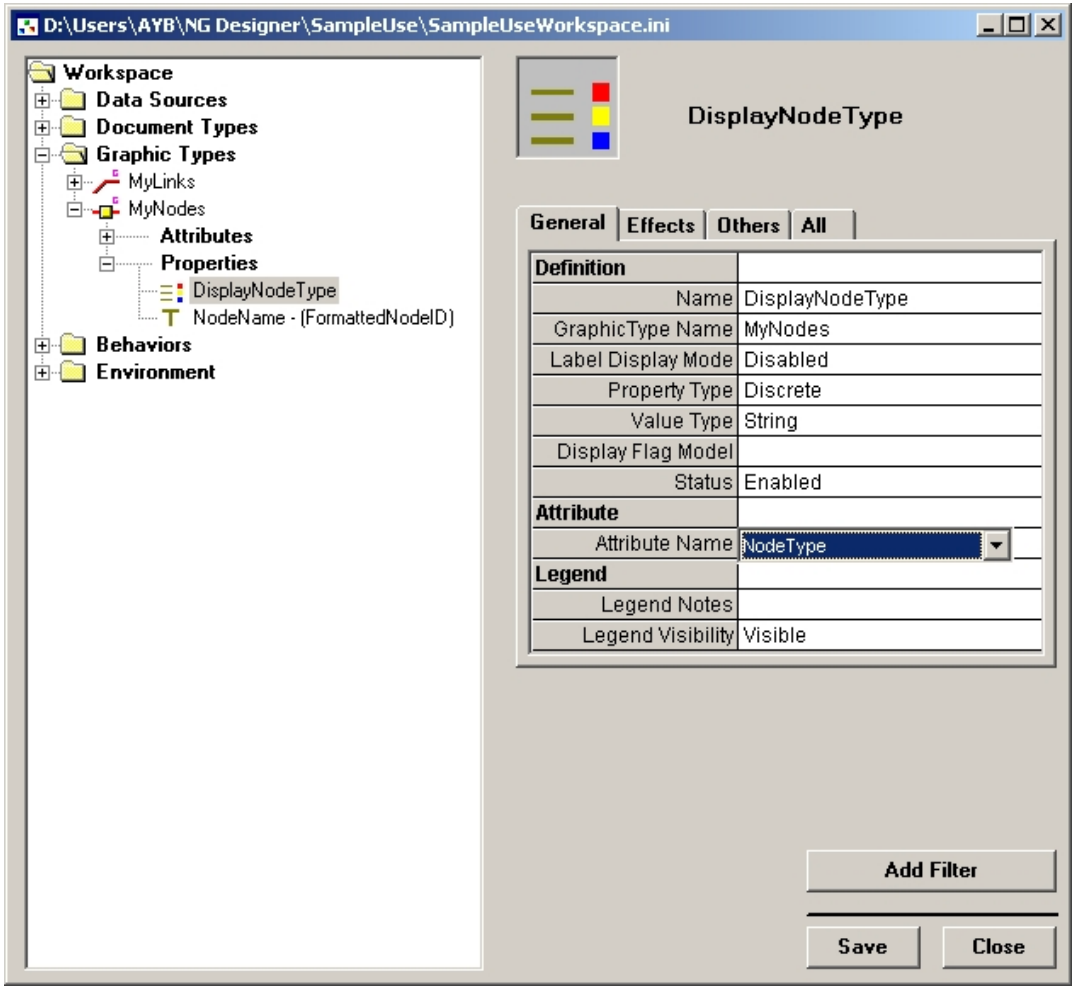


In the "Create Property" form, fill the "Property Name" field the same way as in the following screenshot, select "Discrete" as type property, and click OK:



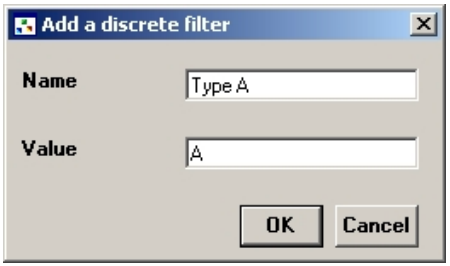
The new "DisplayNodeType" property is automatically referenced below the "Properties" tree entry.

Now associate this new property with the "NodeType" attribute by selecting "NodeType" from the "Attribute Name" dropdown list:

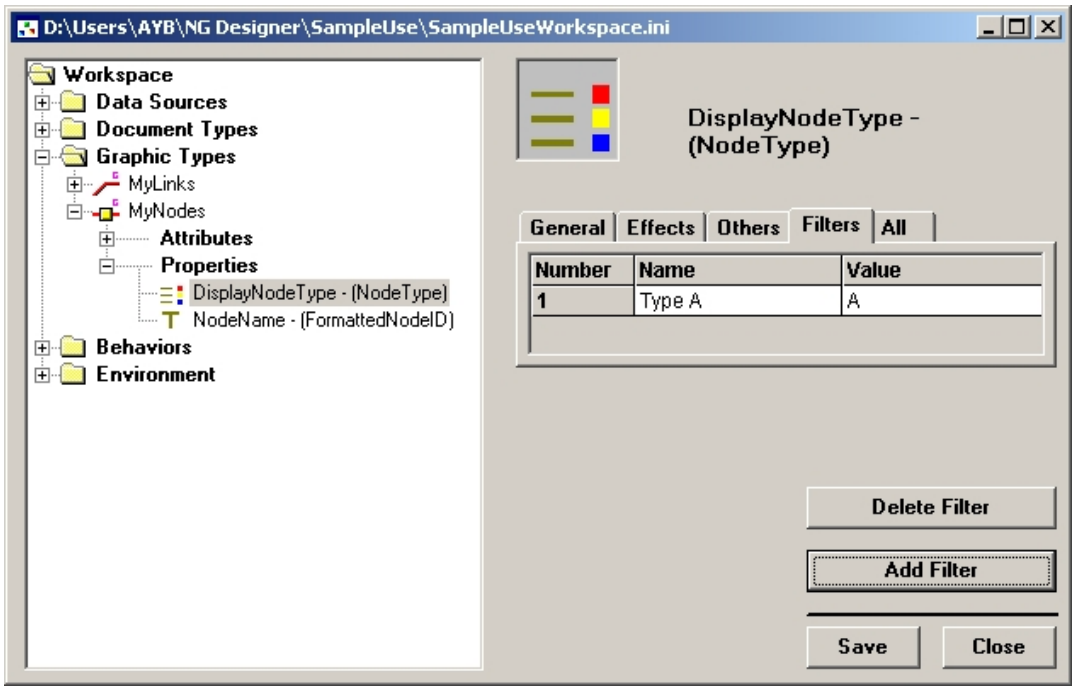


(3) Creating the "DisplayNodeType" Discrete Filters
A discrete property exists through its discrete filters. So, we are going now to create the "DisplayNodeType" discrete filters:

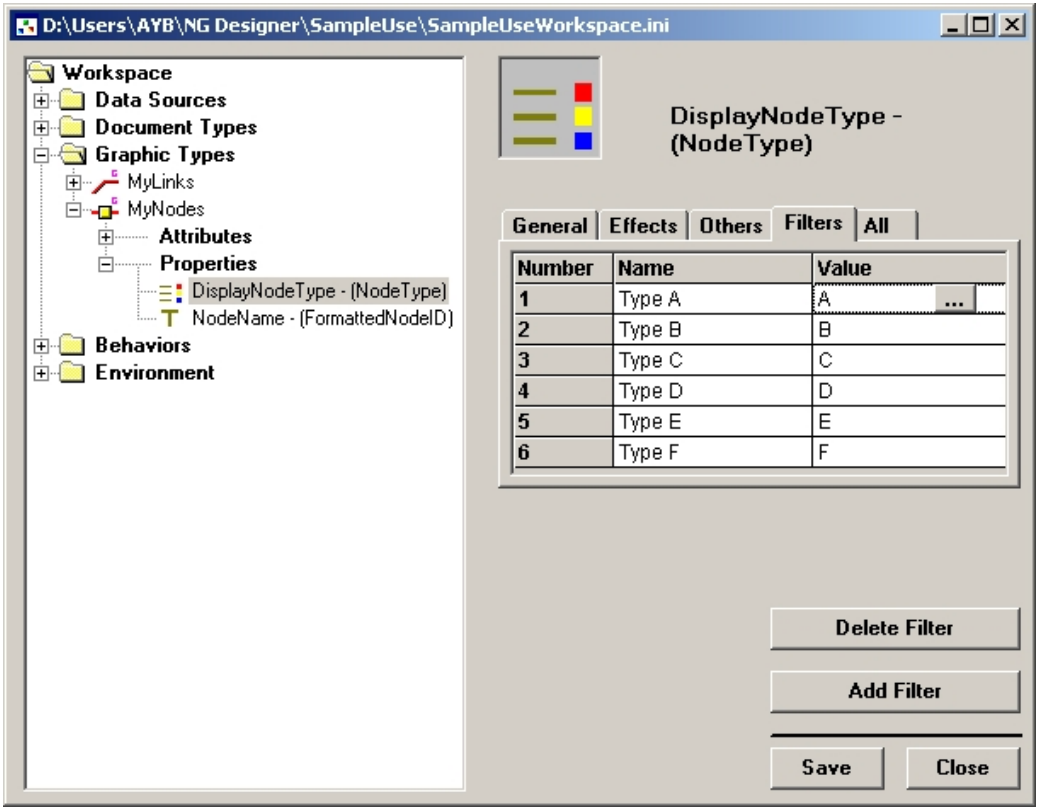
- Click the Add Filter button on the lower right-hand corner of the ArcGIS Schematics Designer Editor window.
- The ArcGIS Schematics Designer "Add a discrete filter" form automatically opens. Fill the "Name" field, set the first value that will be associated with this first filter (this value is one of the values taken by the "Type" field stored in the database), and click OK:



The "Filters" tab is automatically displayed. The filter you just created is referenced in this new tab:



Repeat this operation to create five new other filters corresponding to the "B", "C", "D", "E", and "F" values available from the "Type" field in the database:



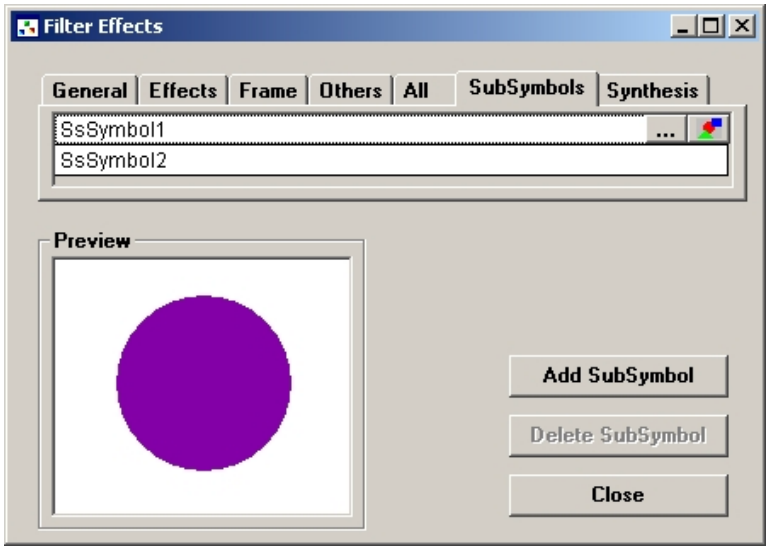
(4) Defining the Graphic Effects Corresponding to Each Discrete Filter

This discrete property will display the nodes according to the "Type" field as follows:

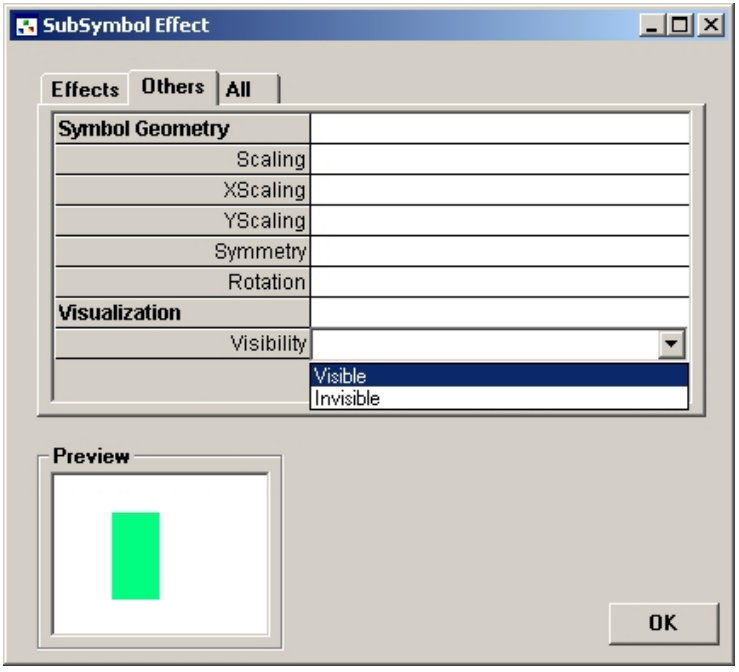
"Type" Value	Filter Graphic Effects
A	The first subsymbol is to be visible
B	The second subsymbol is to be visible
C	The second subsymbol is to be visible, with a rotation angle of 90 degrees, and its fill color is to be changed
D	The two subsymbols are to be visible
E	A new CGM symbol will be used
F	A character of the ESRI Cartography font will be used

>> Defining the "Filter A" Discrete Filter Graphic Effects (Activating the "SsSymbol1" Visibility)

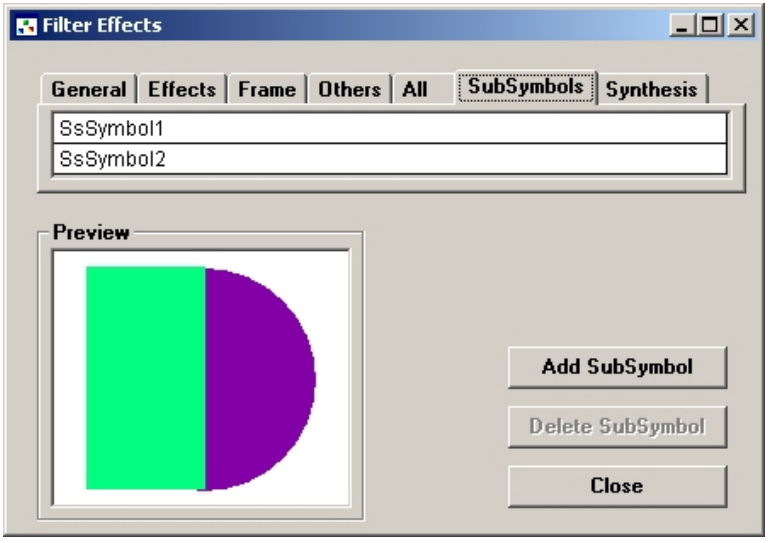
- From the "Filters" tab, select the "Type A" first discrete filter and click the ... button.
- The "Filter Effects" form automatically opens. As the node type's symbol is composed by subsymbols, a "SubSymbols" tab is displayed. Select this tab. Its content resumes all the subsymbols that composed the node type's symbol.
- Select the line corresponding to the first subsymbol and click the ... button.



- The "SubSymbol Effect" form related to the "SsSymbol1" subsymbol opens. Click the "Others" tab and select the "Visible" value from the "Visibility" dropdown list:



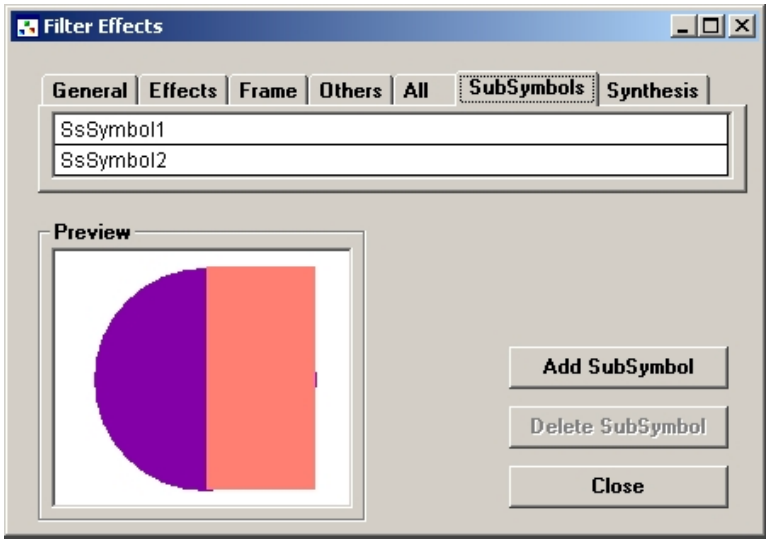
Click OK to close the "SubSymbol Effect" form. The preview subwindow in the "Filter Effects" form appears as follows:



>> Defining the "Filter B" Discrete Filter Graphic Effects (Activating the "SsSymbol2" Visibility)

For the "Filter B" discrete filter, you will repeat the same operations with the second subsymbol.

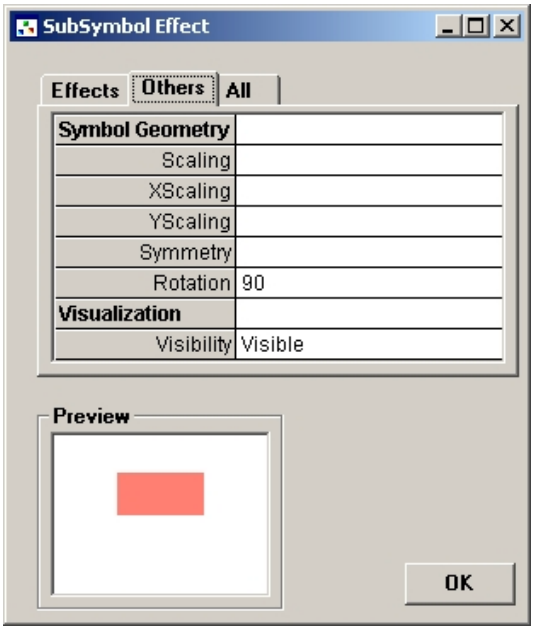
At the end of this step, the preview subwindow displayed in the "Filter Effects" form should appear as follows:



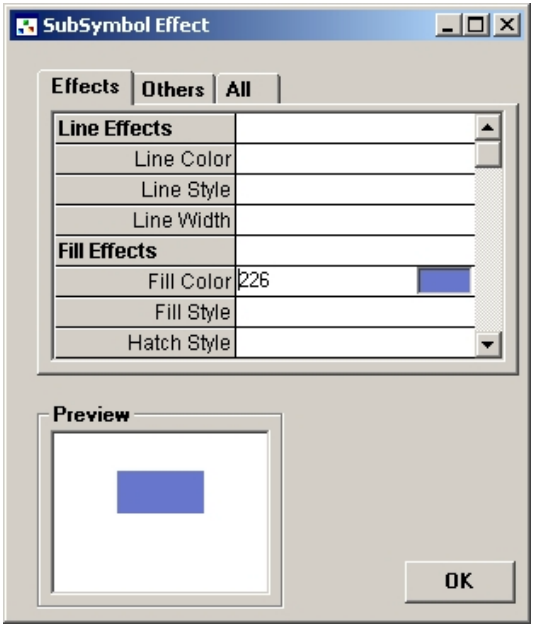
>> Defining the "Filter C" Discrete Filter Graphic Effects (Activating the "SsSymbol2" Visibility, Changing the Default Subsymbol Rotation Angle, and Modifying the Default Fill Color)

Open the "Filter Effects" form corresponding to the third discrete filter. Click the "SubSymbols" tab and open the "SubSymbol Effect" form related to the "SsSymbol2" subsymbol.

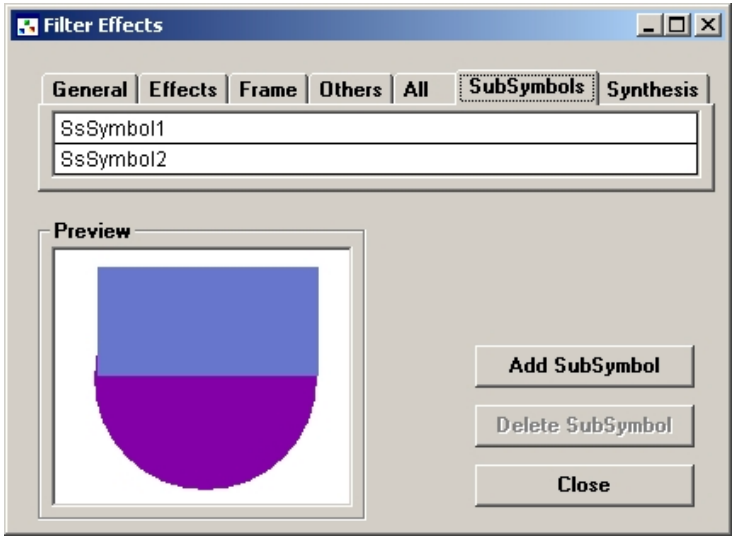
In the "Others" tab, select "Visible" from the "Visibility" dropdown list and set an angle value in the "Rotation" field:



Now click the "Effects" tab and change the "Fill Color" value:

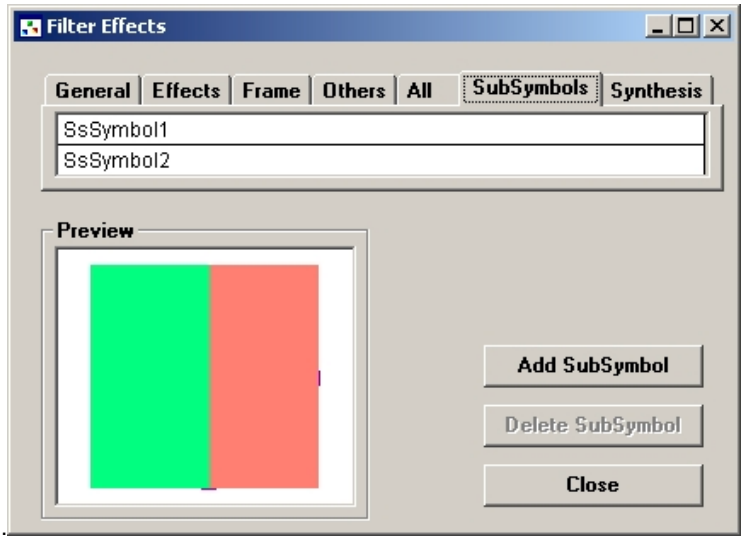


Click OK to close the "SubSymbol Effect" form. The preview subwindow in the "Filter Effects" form appears as follows:



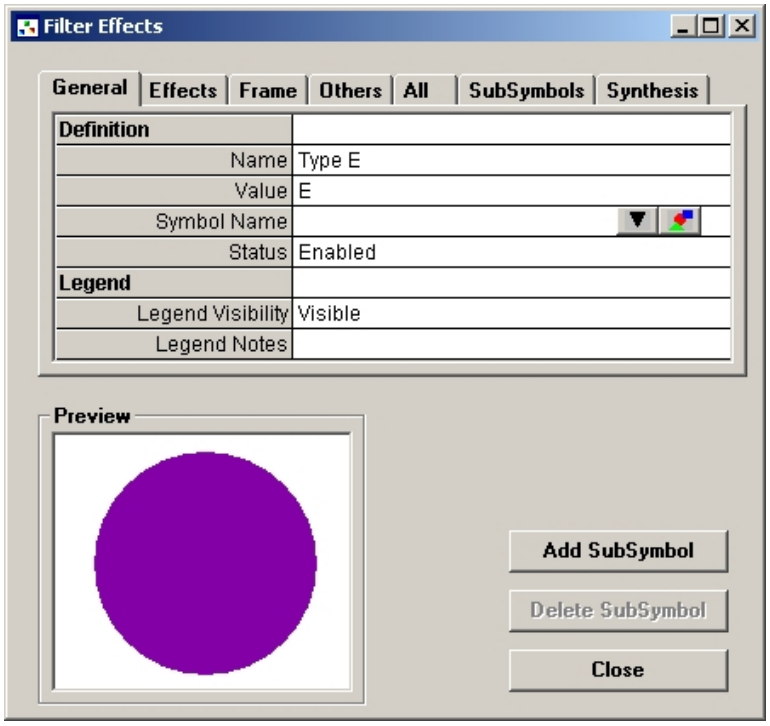
>> Defining the "Filter D" Discrete Filter Graphic Effects (Activating the Two "SsSymbol1" and "SsSymbol2" Visibility)

For this fourth discrete filter's graphic effects, modify the "Visibility" parameter related to each subsymbol, such as the two subsymbols displayed in the following preview subwindow:

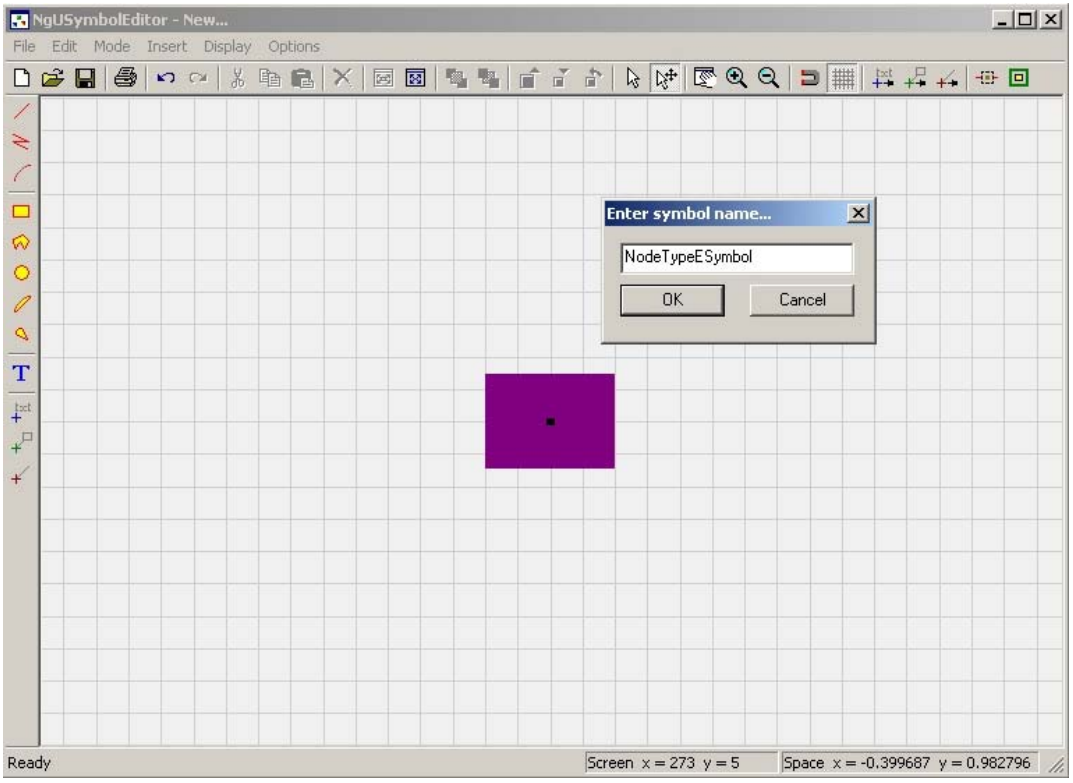


>> Defining the "Filter E" Discrete Filter Graphic Effects (Creating a New CGM Symbol and This New Symbol to Represent the Filter)

In the "General" tab corresponding to the fifth discrete filter, open the "NgUSymbolEditor" from the "Symbol Name" parameter field:



Draw a rectangle, save it as NodeTypeESymbol, and exit from the "NgUSymbolEditor":

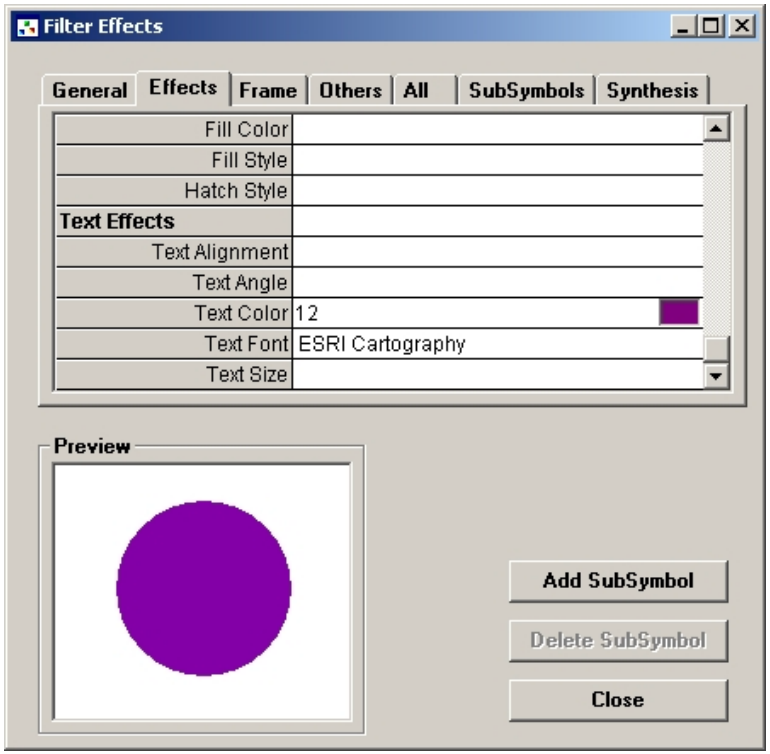


>> Defining the "Filter F" Discrete Filter Graphic Effects (Using a Specific Character Font)

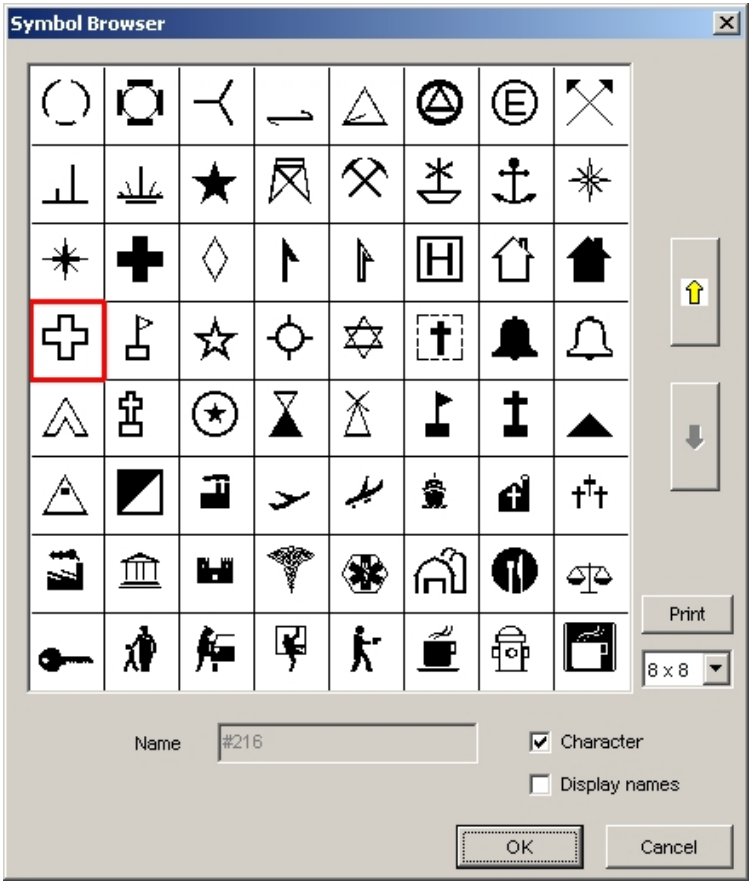
The symbol used to represent a node or a drawing graphic object is often a CGM symbol. But a specific character font can also be used to display that graphic object.

For the last discrete filter representation, you can represent the node with any character of the "ESRI Cartography" font.

Open the "Filter Effects" form related to this last discrete filter and click the "Effects" tab. Set the "ESRI Cartography" font in the "Text Font" field and choose the "Text Color" that will be used to display the character:

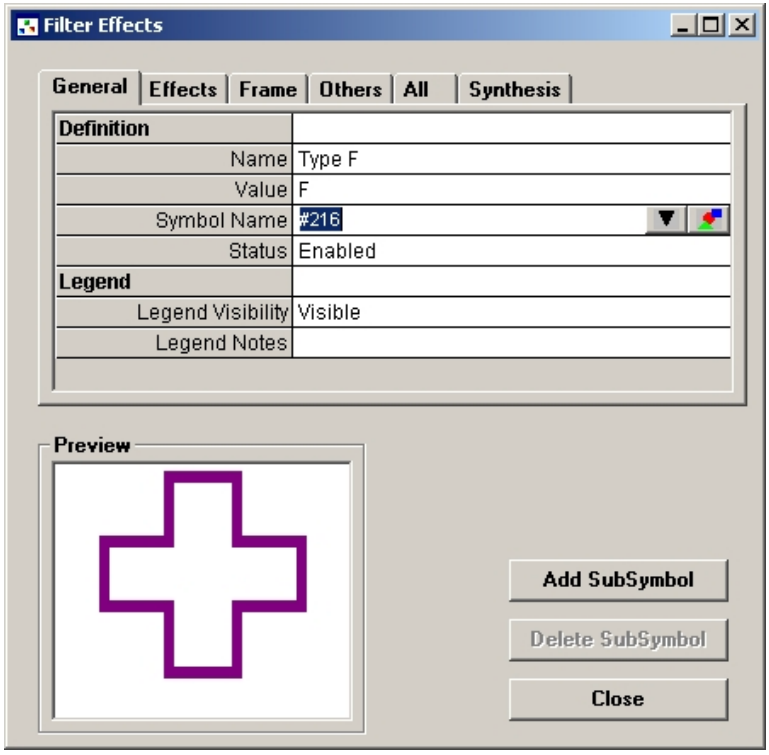


Now click the '"General" tab and, from the "Symbol Name" parameter field, click the  button to open the ArcGIS Schematics "Symbol Browser".



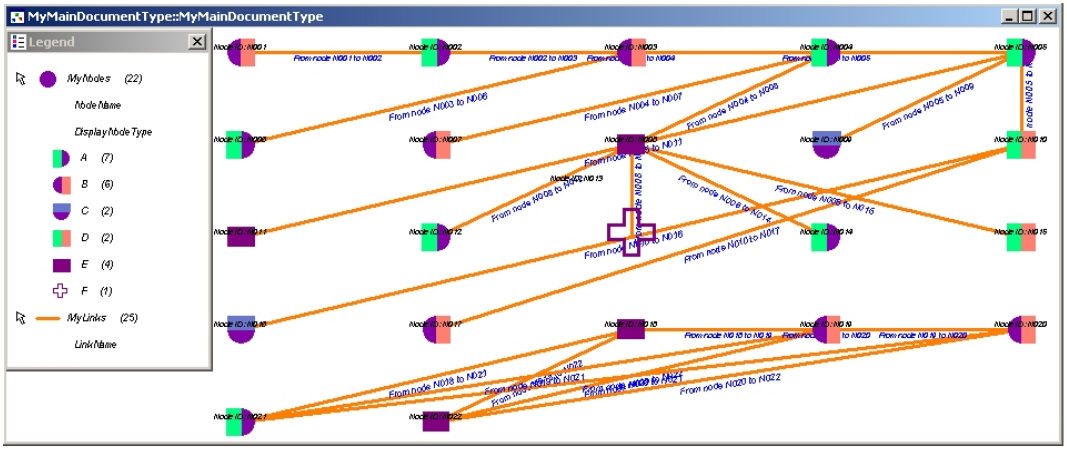
Select the desired ESRI Cartography TrueType™ character and click OK to validate.

The chosen character ASCII code appears in the "Symbol Name" parameter field; it is preceded by the "#" character:



(5) Testing Your Network Display

Click Save to save all your workspace parameters and click Close to close the ArcGIS Schematics Designer Editor window. Now click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, or click the "Open Document Form" item from the "Document" menu. Select the single "MyMainDocumentType" document type name from the "Document Type" dropdown list and click OK. Your document opens as follows:



➢ Step 13: Animating the Network Links According to the Link's "Type" Database Field

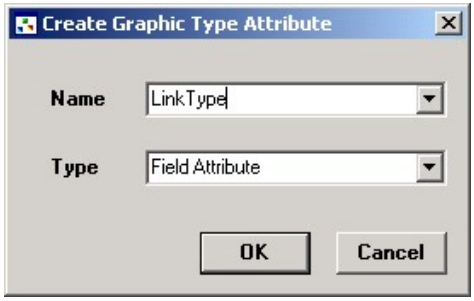
The "Type" field returned by the link graphic type query stores the type of each link. Each link is either a "Small", "Medium", or "Big" type.

In this step, you will decide to take this information into account graphically: we are going to create the "DisplayLinkType" discrete property composed by three discrete filters, with each filter corresponding to one type value. This property will display the links according to the "Type" field as follows:

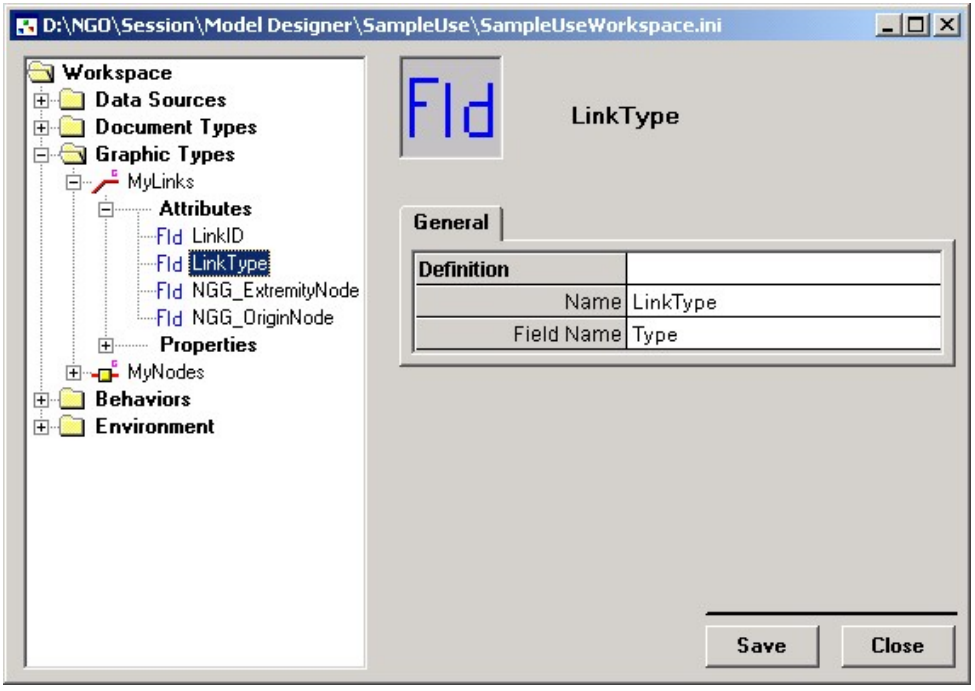
"Type" Value	Filter Graphic Effects
Small	Width Line: 1.0
Medium	Width Line: 2.0
Big	Width Line: 4.0

(1) Creating the "LinkType" Attribute Corresponding to the Link "Type" Field
As the "DisplayLinkType" property will use the "Type" field values returned by the query, we must begin by creating an attribute corresponding to this field.

As for nodes, right-click the "Attributes" tree entry displayed below the "MyLinks" graphic type and select the "Create" menu from the displayed popup menu; the ArcGIS Schematics Designer "Create Graphic Type Attribute" form automatically opens. Set the name that will be used to reference the new attribute in the "Name" field, select the "Field Attribute" value from the "Type" dropdown list, and click OK:

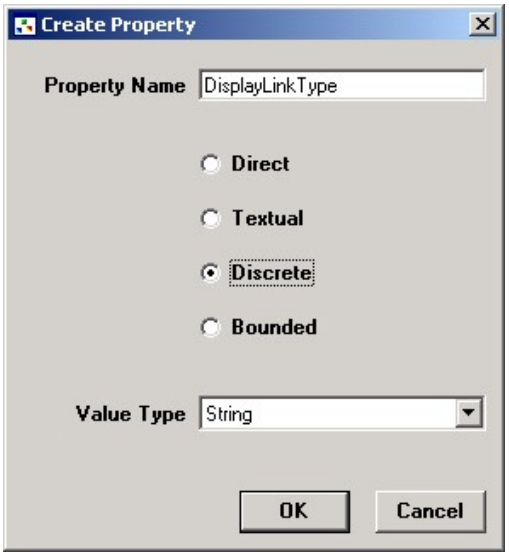


Fill the "Field Name" parameter by selecting "Type":

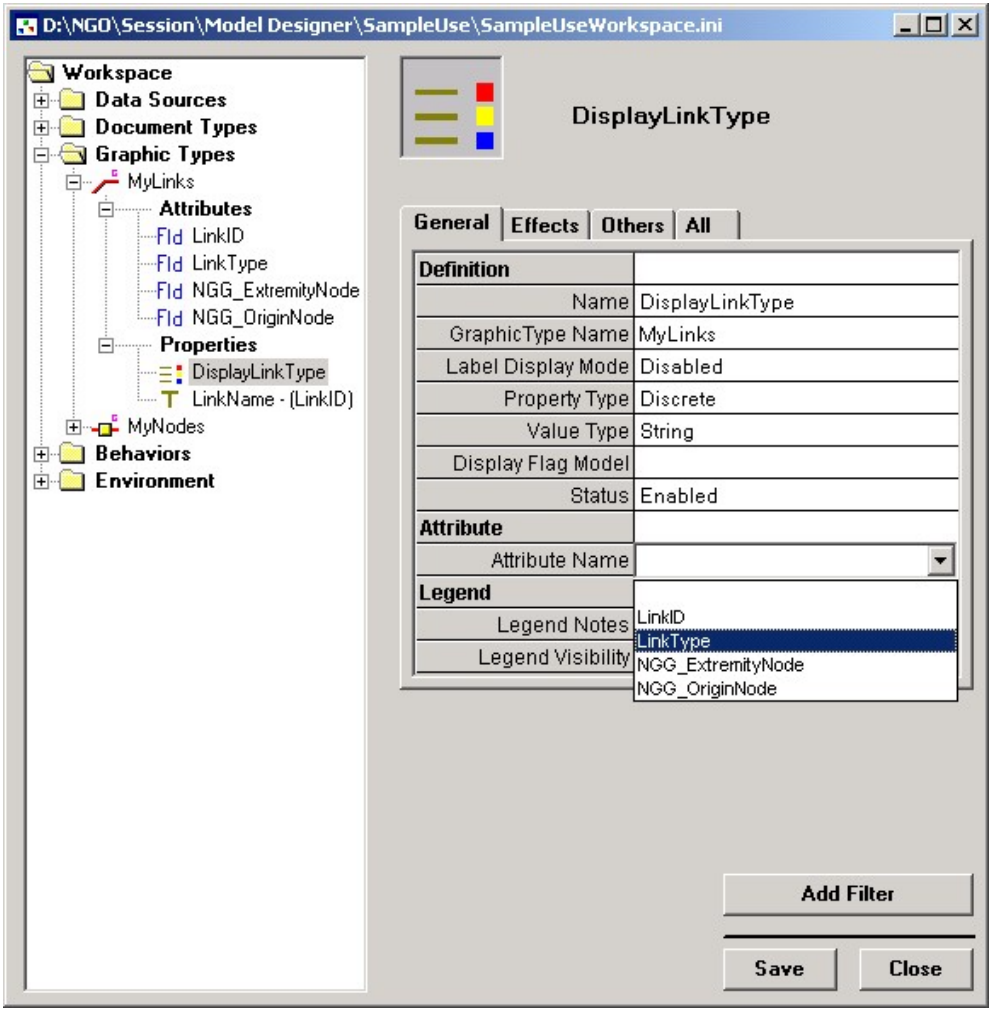


(2) Creating the "DisplayLinkType" Discrete Property
Now you will create the "DisplayLinkType" discrete property. It will display each link according to the "LinkType" attribute value.

Right-click the "Properties" tree entry displayed below the "MyLinks" graphic type and select the "Create" menu from the displayed popup menu. In the "Create Property" form that opens, fill the "Property Name" field as in the screenshot below, select "Discrete" as the type property, and click OK:

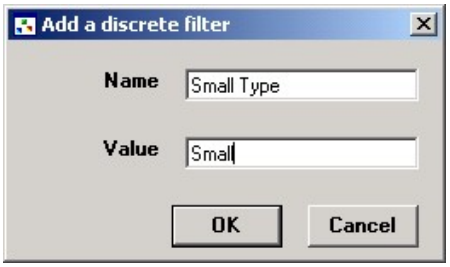


Now associate this new property with the "LinkType" attribute by selecting "LinkType" in the "Attribute Name" dropdown list:

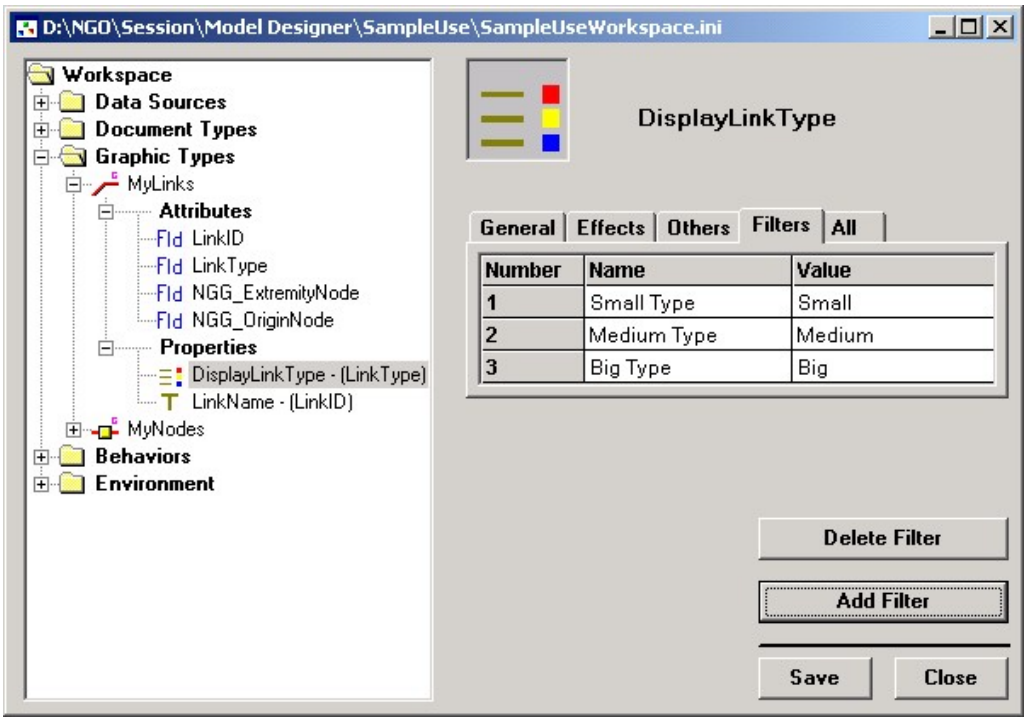


(3) Creating the "DisplayLinkType" Discrete Filters

Like when you defined the "DisplayNodeType" property for the "MyNodes" graphic type, click the Add Filter button on the lower-right corner of the ArcGIS Schematics Designer Editor window to create the property's first discrete filter. Fill the "Name" field in the ArcGIS Schematics Designer "Add a discrete filter" form, set the value that will be associated with this first filter (this value is one of the values taken by the "Type" field stored in database), and click OK:



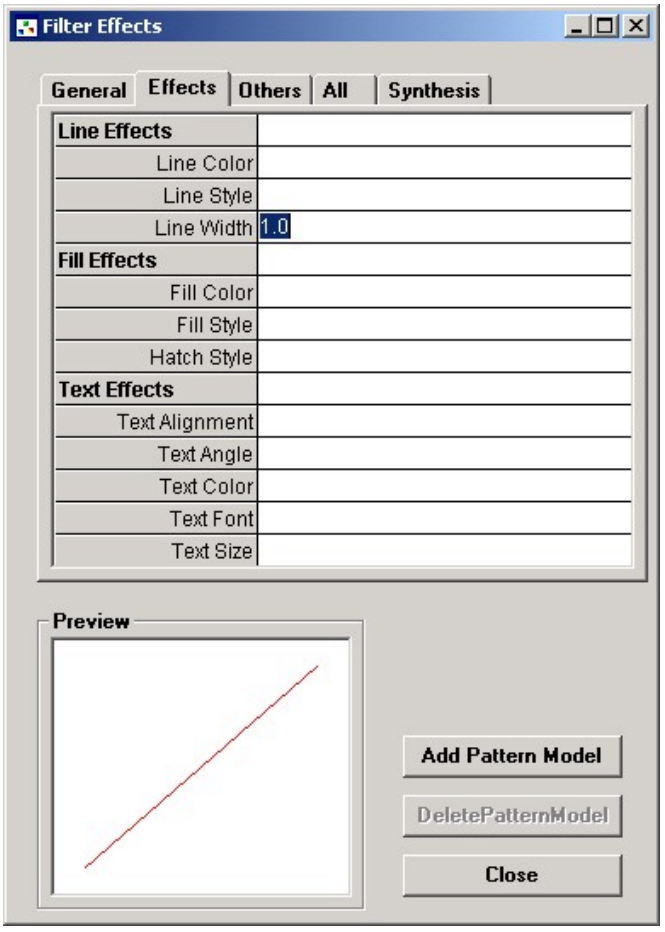
Repeat the preceding operation to create two other filters corresponding to the "Medium" and "Big" values available from the "Type" field database:



(4) Defining the Graphic Effects Corresponding to Each Discrete Filter

>> Defining the "Small Type" Discrete Filter Graphic Effects (Defining the "Line Width" Parameter)

From the "Filters" tab, select the "Small Type" first discrete filter and click the ... button to open the "Filter Effects" form. Select the "Effects" tab and set the "Line Width" parameter as follows:



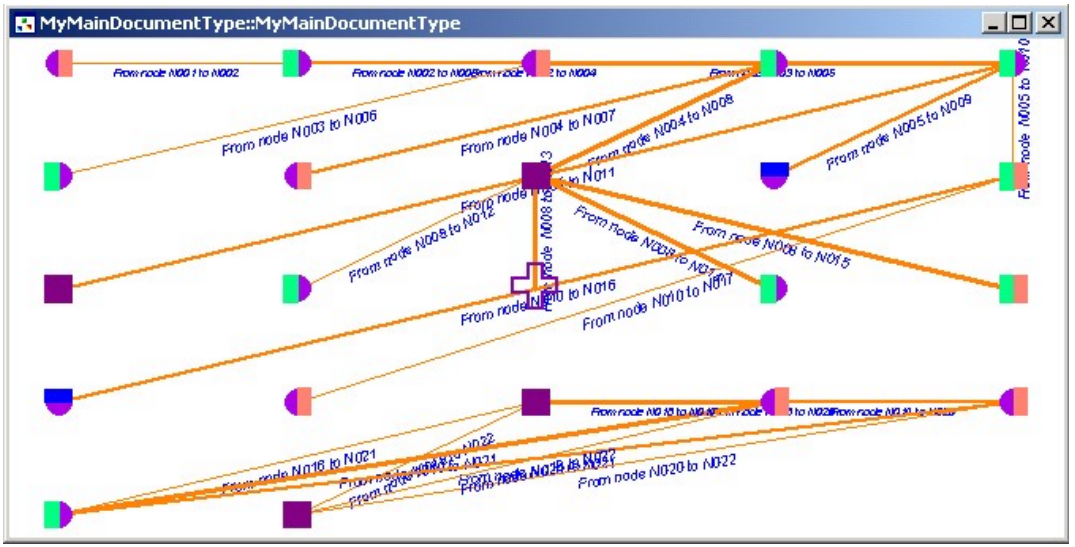
>> Defining the "Medium Type" and the "Big Type" Discrete Filters Graphic Effects (Defining the "Line Width" Parameter)

Click the ... button from the "Medium Type" second discrete filter to open the "Filter Effects" form related to this second discrete filter graphic effects. Set the "Line Width" parameter displayed in the "Effects" tab with the "2.0" value.

Repeat this operation for the third discrete filter ("Big Type"). Fill the "Line Width" parameter with the "4.0" value.

(5) Testing Your Network Display

Use the "Save" button to save all your workspace parameters and click the "Close" button to close the ArcGIS Schematics Designer Editor window. Click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, or click the "Open Document Form" item from the "Document" menu. Select the single "MyMainDocumentType" document type name from the "Document Type" dropdown list and click OK. Your document opens as follows:



➢ Step 14: Animating the Network Nodes According to the Node's "SizeN" Database Field

The "SizeN" field returned by the node graphic type query stored the size of each node as an integer value.

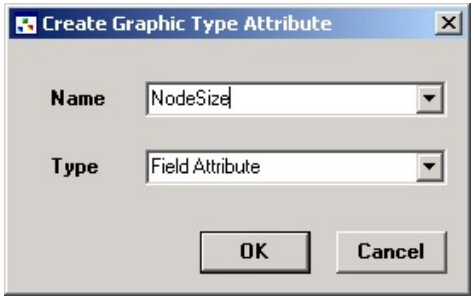
In this step, we decide to take this information into account graphically; we will create the "DisplayNodeSize" bounded property composed by four bounded filters, with each filter corresponding to one range of values. This property will display the nodes according to the "SizeN" field as follows:

"SizeN" Lower Value	"SizeN" Upper Value	Filter Graphic Effects
0	2	Scaling Factor: 1.0
3	5	Scaling Factor: 2.0
6	8	Scaling Factor: 3.0
9	10	Scaling Factor: 5.0

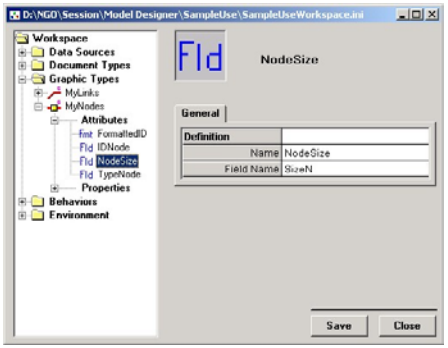
(1) Creating the "NodeSize" Attribute Corresponding to the Node "SizeN" Field
As the "DisplayNodeSize" property will use the "SizeN" field returned by the query, we must begin to create an attribute corresponding to this field.

Right-click the "Attributes" tree entry displayed under the "MyNodes" graphic type and select the "Create" menu from the popup menu.

In the ArcGIS Schematics Designer "Create Graphic Type Attribute" form, set the name that will be used to reference the new attribute in the "Name" field and select "Field Attribute" from the "Type" dropdown list:



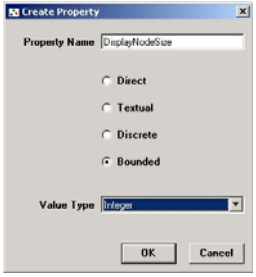
Next, fill the "Field Name" parameter by selecting "SizeN":



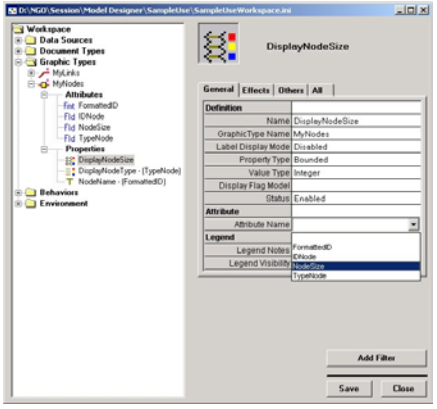
(2) Creating the "DisplayNodeSize" Bounded Property

Now we are going to create the "DisplayNodeSize" bounded property that will display each node according to the "NodeSize" attribute value.

Right-click the "Properties" tree entry displayed under the "MyNodes" graphic type and select the "Create" menu to open the "Create Property" form. Fill the "Property Name" field as in the following screenshot, select "Bounded" type property, select "Integer" from the "Value Type" dropdown list, and click OK:

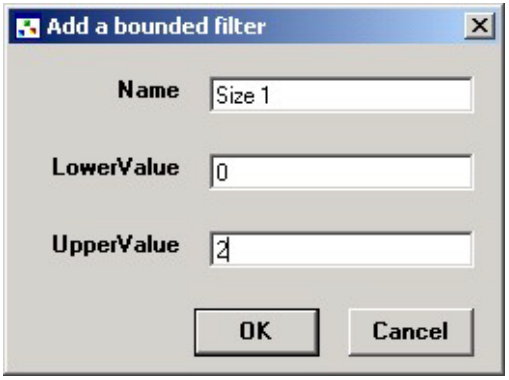


The new "DisplayNodeSize" property is automatically referenced below the "Properties" tree entry. Associate this new property with the "NodeSize" attribute by selecting "NodeSize" from the "Attribute Name" dropdown list.

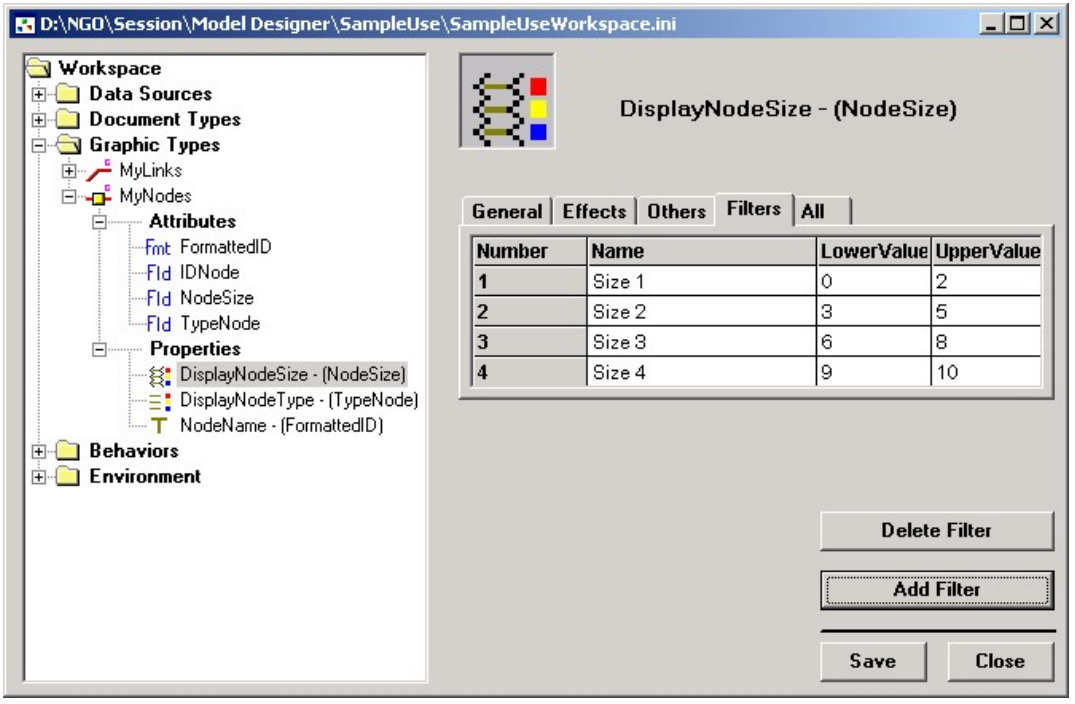


(3) Creating the "DisplayNodeSize" Bounded Filters

Now click the Add Filter button on the lower-right corner of the ArcGIS Schematics Designer Editor window. The ArcGIS Schematics Designer "Add a bounded filter" form automatically opens. Fill the "Name" field, set the lower and the upper values that will define this first bounded range, and click OK:



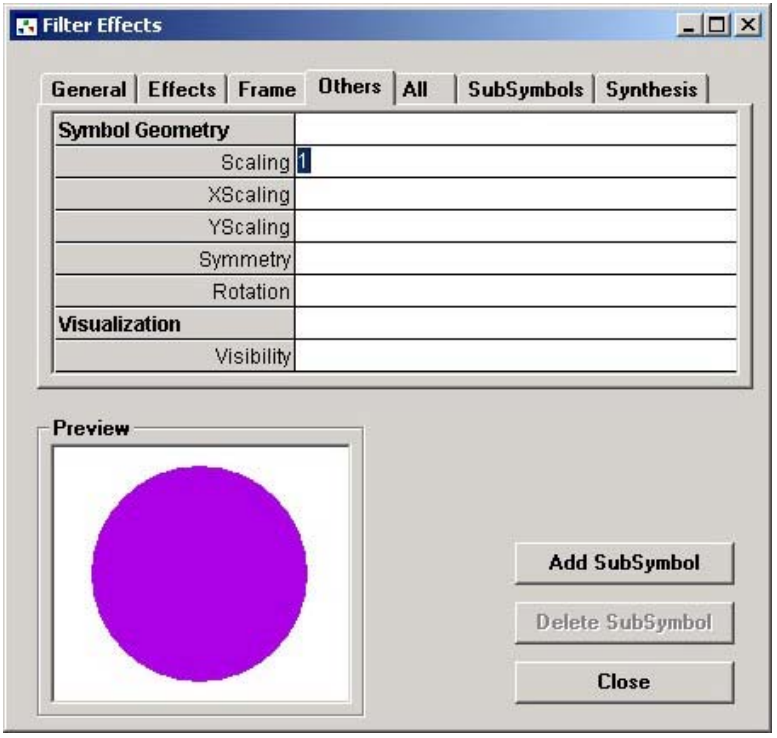
Repeat the preceding operation to create three new other filters corresponding to the "3 to 5", "6 to 8", and "9 to 10" values ranges. At the end of this step, the "Filters" tab should look like the following graphic:



(4) Defining the Graphic Effects Corresponding to Each Bounded Filter

>> Defining the "Size 1" Bounded Filter Graphic Effects (Defining the "Scaling" Parameter)

From the "Filters" tab, select the "Size 1" first bounded filter and click the ... button to open the "Filter Effects" form. Select the "Others" tab and fill the "Scaling" parameter with the "1" value, as shown in the following graphic:



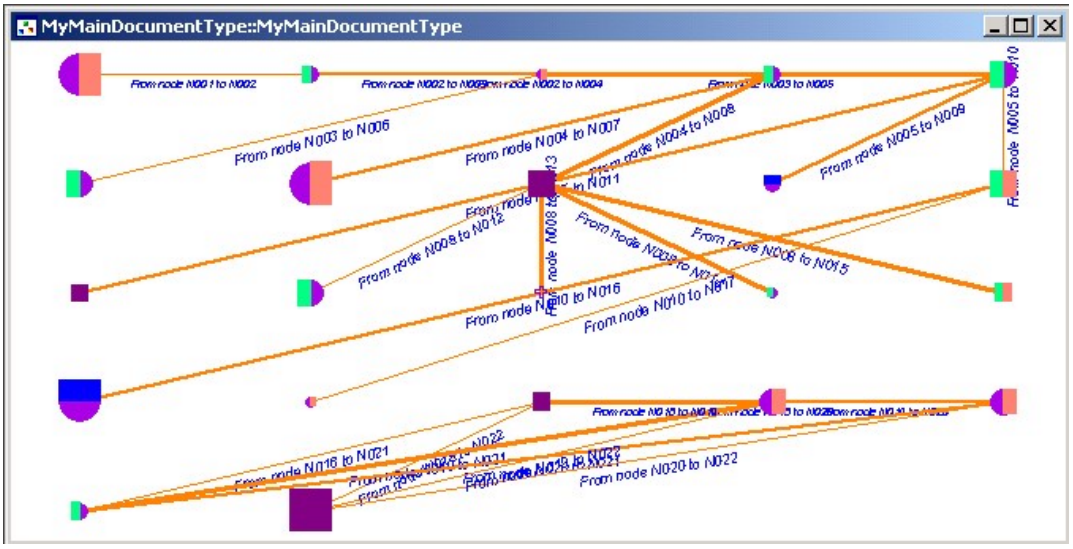
Click OK to close the "Filter Effects" form.

>> Defining the "Size 2", "Size 3", and "Size 4" Bounded Filters Graphic Effects (Defining the "Scaling" Parameter)

For the three other bounded filters, repeat the same operations and fill the "Scaling" parameter with the "2", "3", and "5" values, respectively.

(5) Testing Your Network Display

Now save all your workspace parameters and click the "Close" button to close the ArcGIS Schematics Designer Editor window. Click the "Open Document Form" icon, select the single "MyMainDocumentType" document type name from the "Document Type" dropdown list, and click OK. Your document opens as follows:

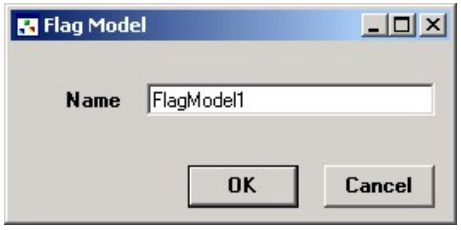


➢ Step 15: Creating a Flag Model and Using it to Modify the "NodeName" Property Display

(1) Creating Your First Flag Model

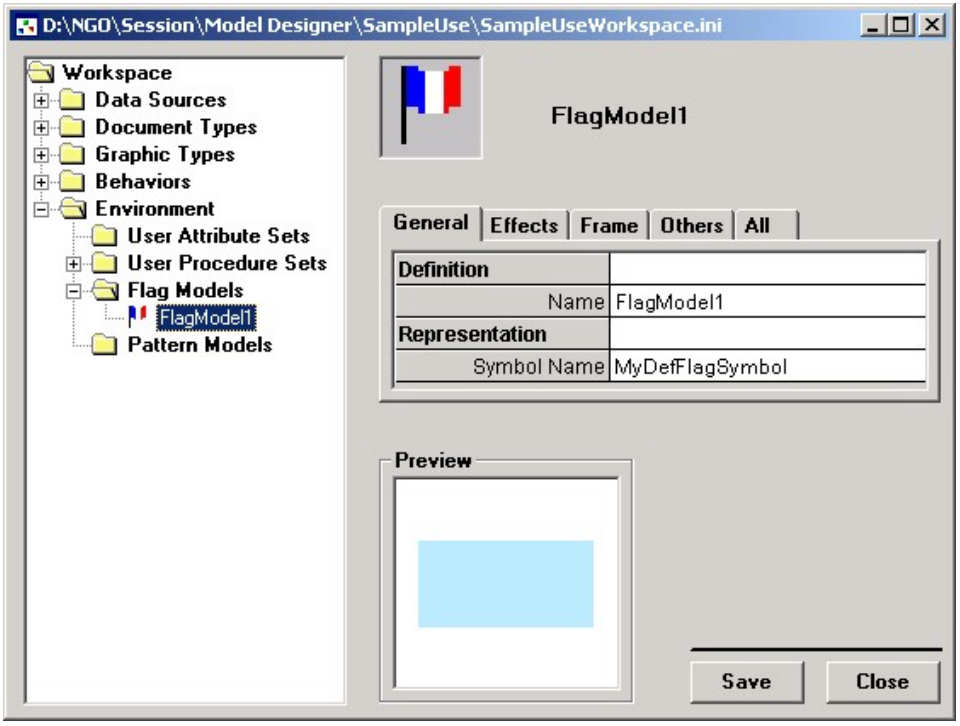
Right-click the "Flag Models" tree entry displayed below the "Environment" entry and select the "Create" menu:

The ArcGIS Schematics Designer "Flag Model" dialog box opens. Enter the name that will be used to reference your first flag model and click OK:



The new flag model tree entry is automatically created below the "Flag Models" entry.

The preview window shows the symbol that will be used by default to represent all flags of this type. The workspace's default flag symbol is in the screenshot below:



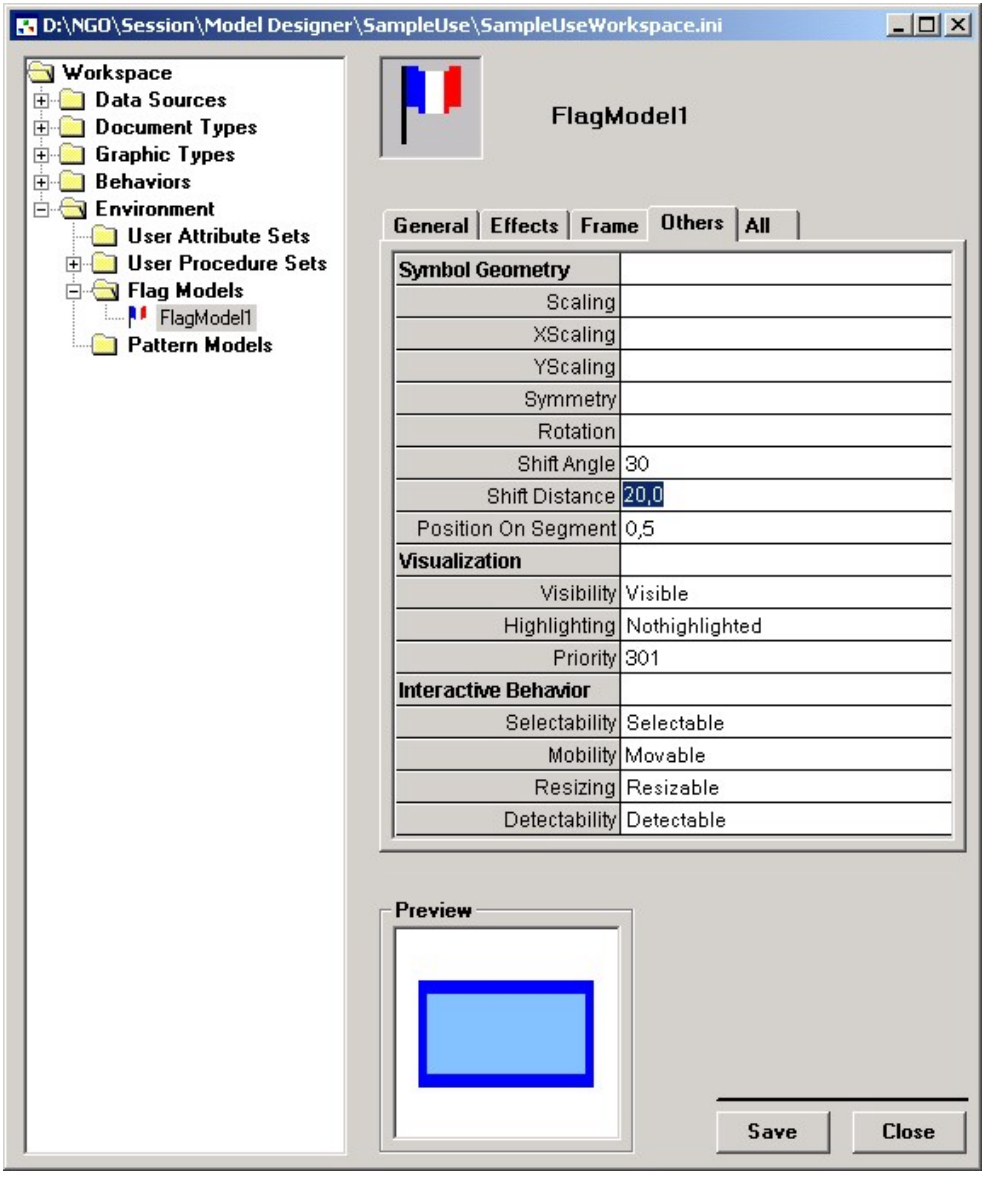
Use one of the two buttons ( or ) displayed when you select the "Symbol Name" field if you want to change the CGM symbol.

Click the different tabs to set the parameters you want.
For example, from the "Others" tab, you can set:

- The distance that will be used to display the flags of this type according to the position of the graphic objects with which it will be associated ("Shift Distance" parameter)

- The angle of the pole that will connect each flag to its associated graphic object ("Angle" parameter)

These are shown in the following graphic:

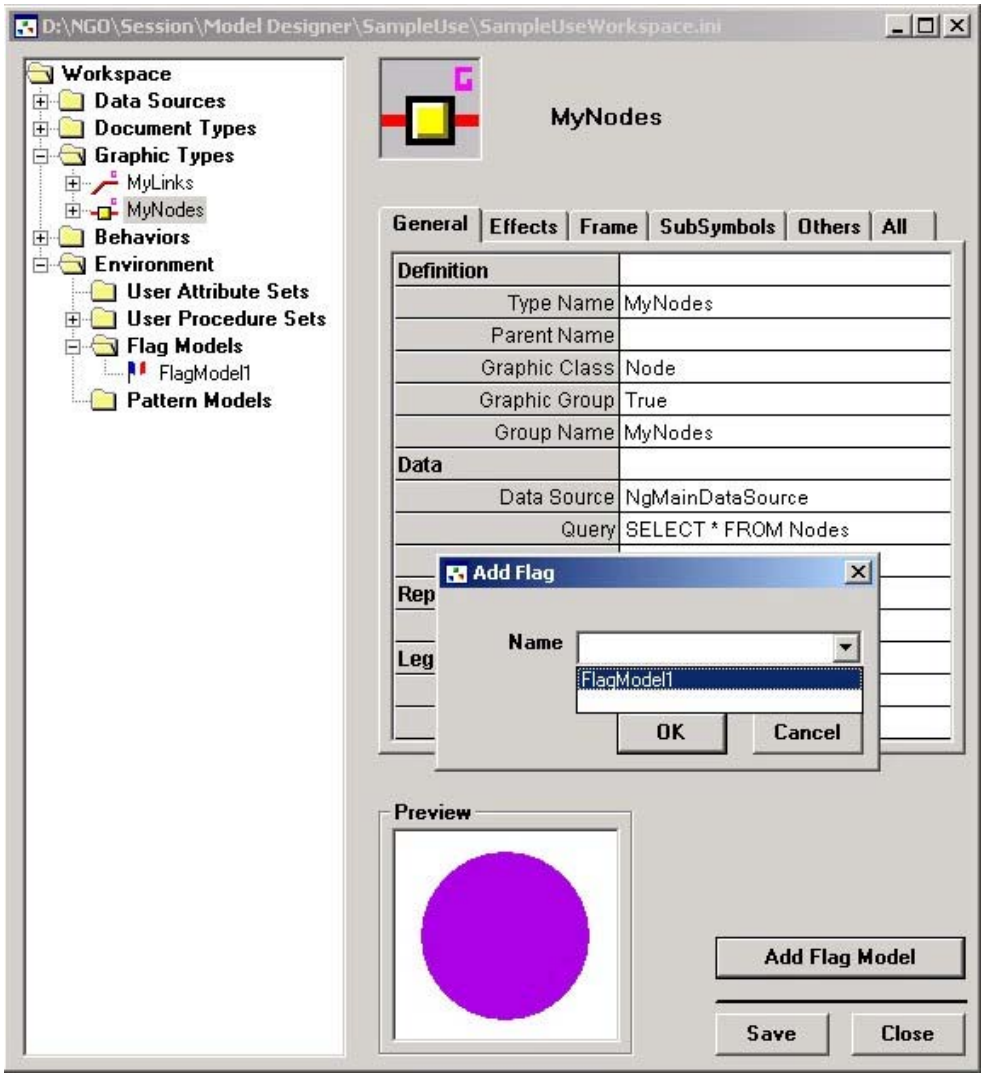


(2) Associating This Flag Model with the "MyNodes" Group

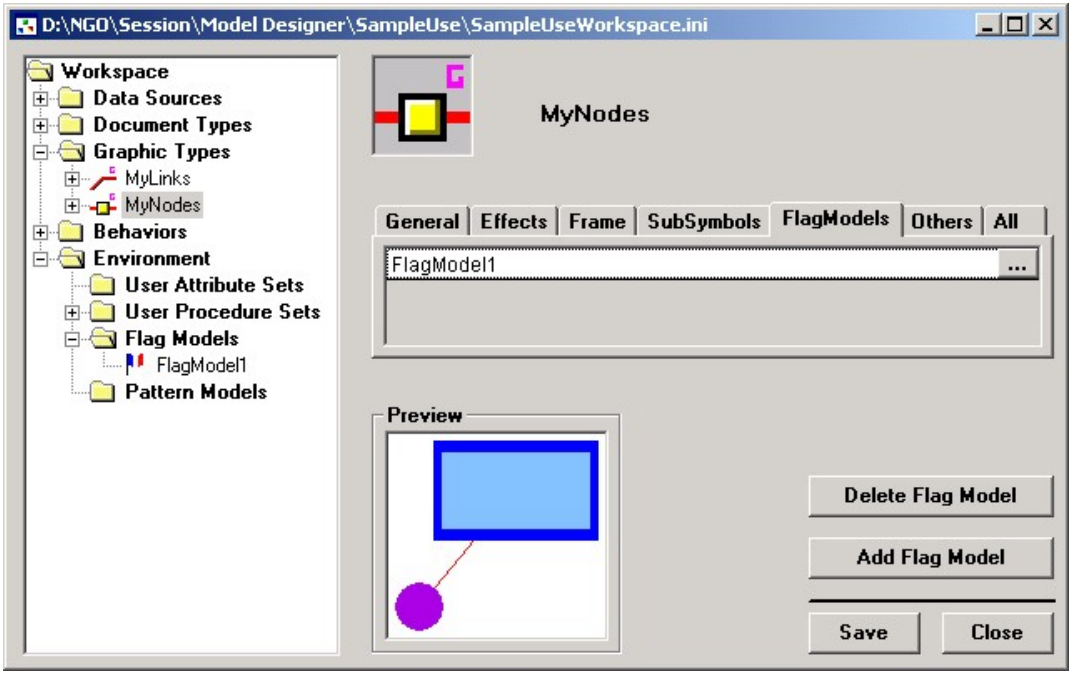
We want to modify the already defined "NodeName" property so that this new flag model is used to display the property label. Because no flag can be attached to the objects of a group if no association is set between the flag model and this objects group, we must begin to associate the new flag model with our "MyNodes" object group.

From the "MyNodes" graphic type Editor window, click the 

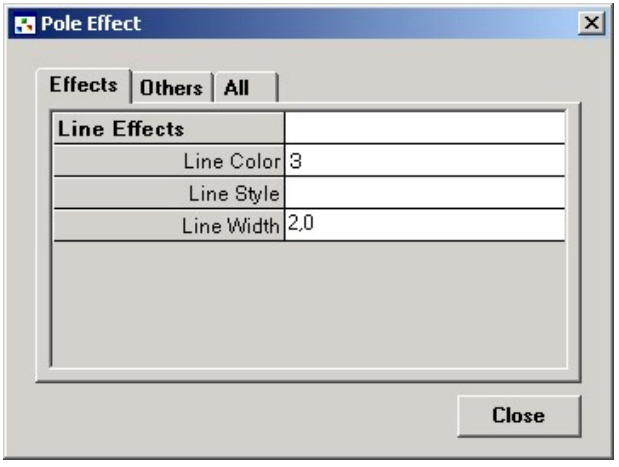
button displayed in the right-bottom corner to open the "Add Flag" form. Choose the single "FlagModel1" already defined and click OK to automatically associate the new flag model with the nodes group:



The "FlagModels" tab is created. The preview subwindow shows the new node appearance with its flag:

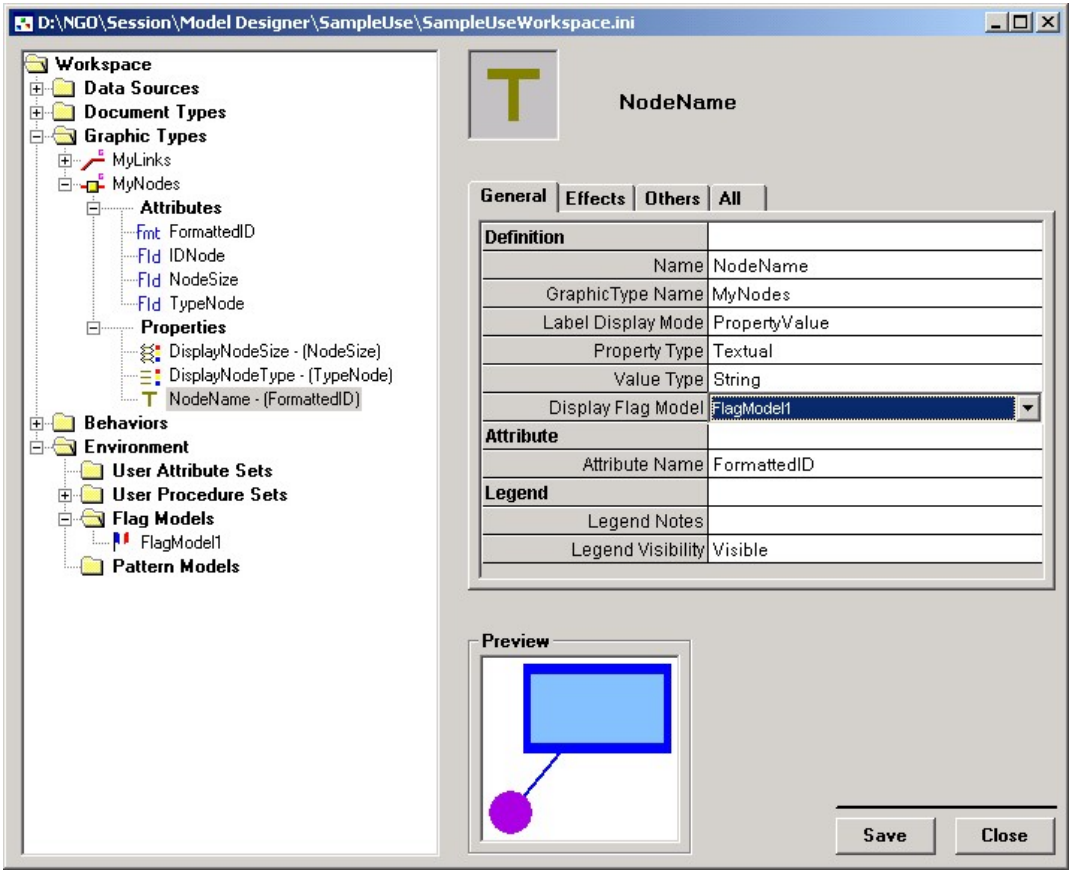


From this new "FlagModels" tab, select the "FlagModel1" flag model line and click the ... button to open the "Pole Effect" form. This form must be used to specify the graphic attributes of the pole that connects each flag to its associated object. For example, from the "Effects" tab, modify the "Line Color" and the "Line Width" as follows so that the pole line displays in blue and its width is enlarged:



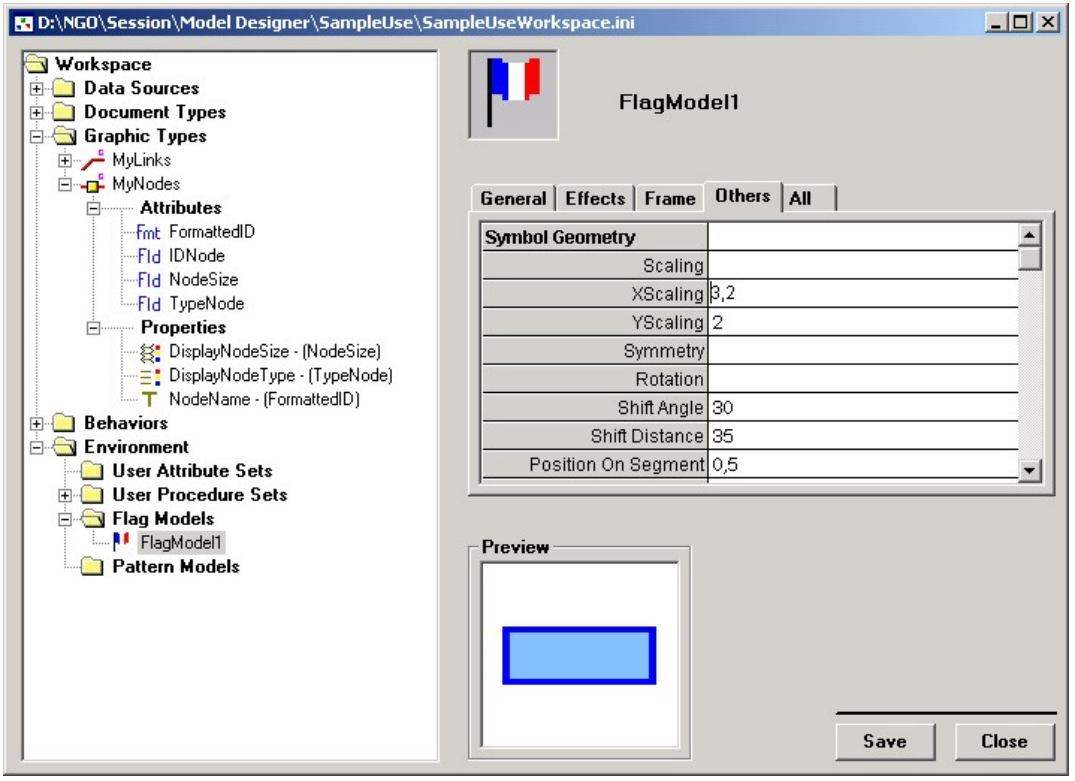
(3) Modifying the "NodeName" Property Parameters
As the new flag model is now associated with the node group, we will modify the "NodeName" property parameters so that the property label is displayed in the flag.

Click the "NodeName" property tree entry and in the "General" tab, select the "FlagModel1" flag model from the "Display Flag Model" dropdown list.

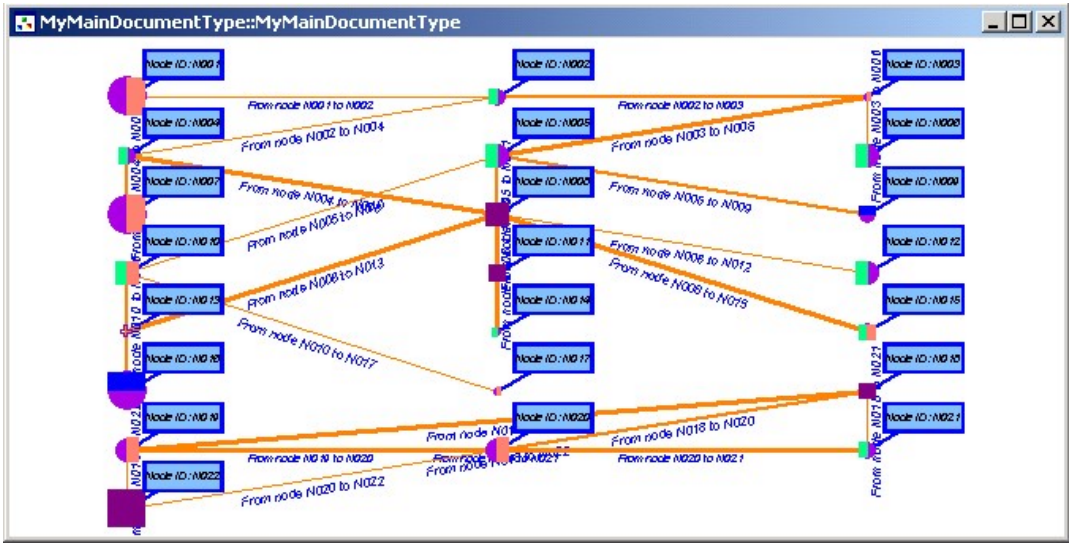


Save your workspace parameters and test your network display.

If the flag size is not suited to the label length, you can modify the "XScaling" and "YScaling" flag model parameters, as shown in the following screenshot:



At the end of this step, your network should appear as follows:



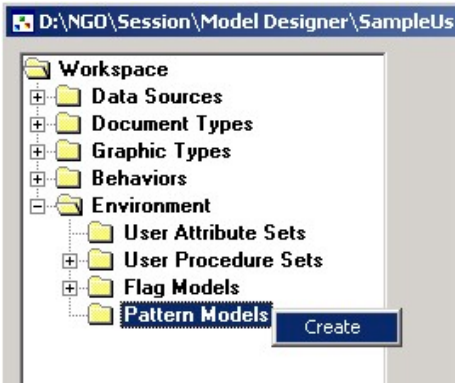
➢ Step 16: Creating Pattern Models That Will Be Used Afterwards to Represent a New Link Property

In this step, you will create two pattern models that you will then use to display the links according to a new property value.

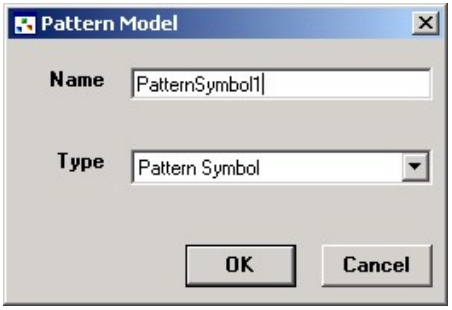
(1) Creating a Pattern Model Symbol

The first "PatternSymbol1" pattern model we will create is a pattern model symbol that will display an arrow placed on the middle of each link path route.

Right-click the "Pattern Models" tree entry displayed under the "Environment" entry and select the "Create" menu:

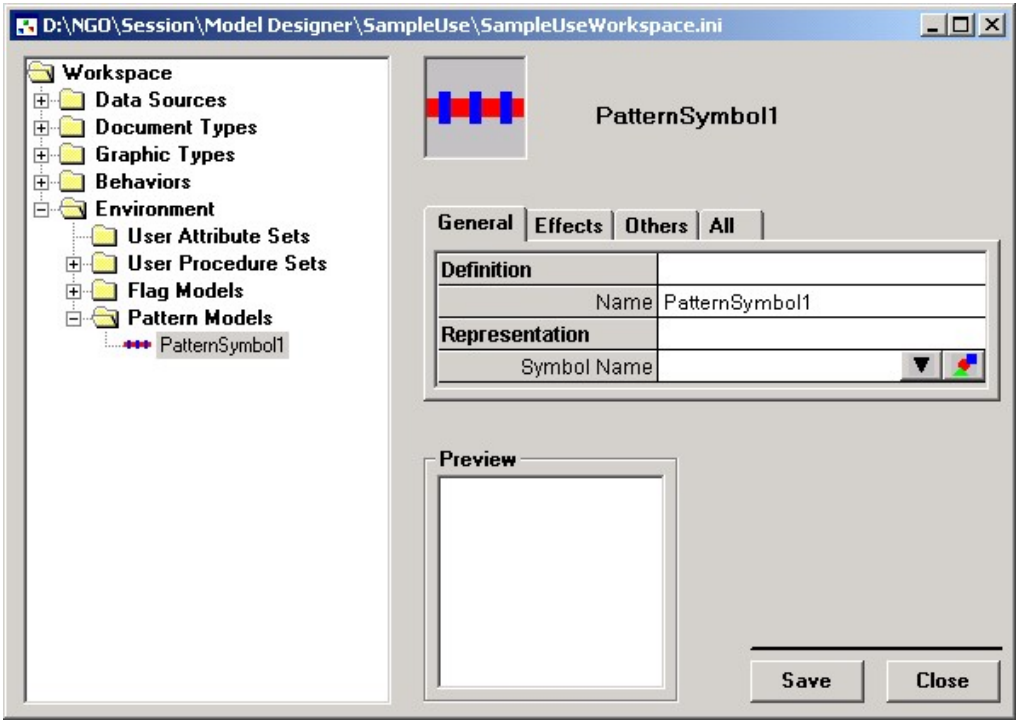


The ArcGIS Schematics Designer "Pattern Model" dialog box opens. Enter the name that will be used to reference your first pattern model, select the "Pattern Symbol" value from the "Type" dropdown list, and click OK.



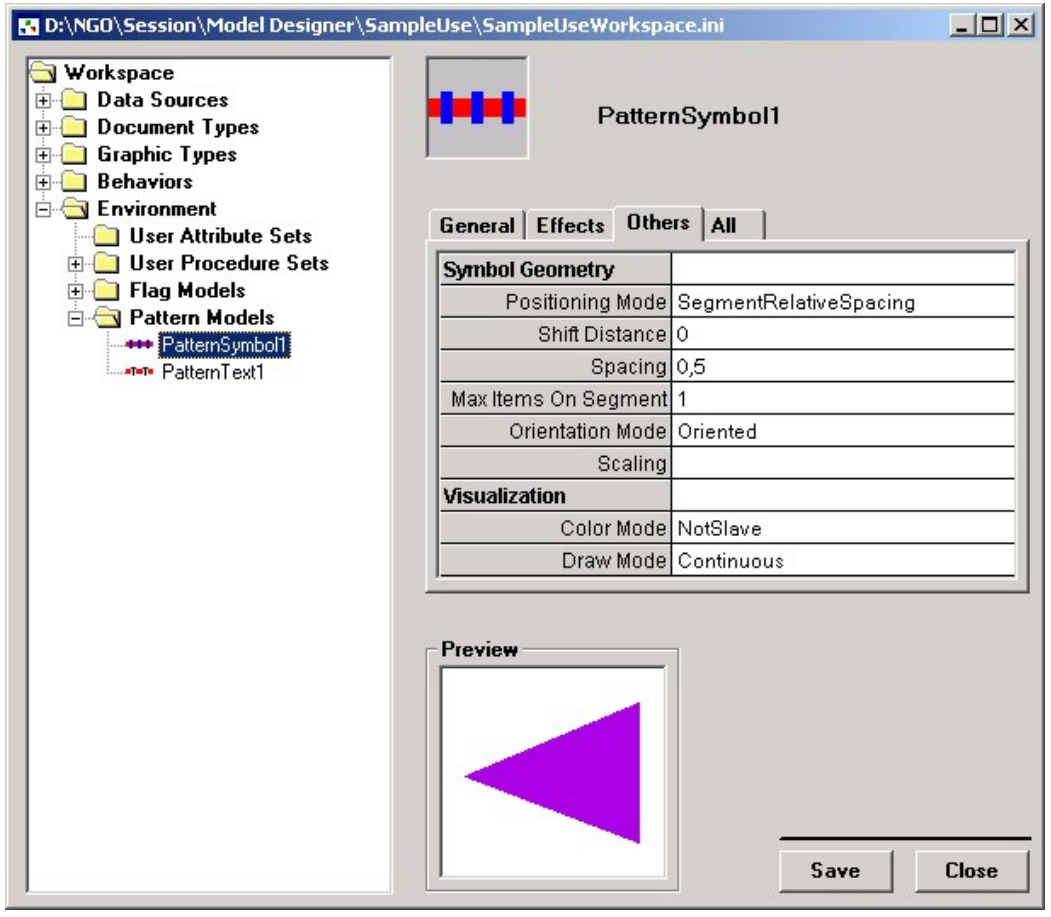
The new pattern model tree entry is automatically referenced below the "Pattern Models" tree entry.

From the "General" tab, specify the CGM symbol that will represent each pattern; use the  button displayed when you select the "Symbol Name" field to launch the NgUSymbolEditor and draw the new CGM file representing the desired symbol.



The parameters needed to define the rules that will be used to repeat the patterns along the segment are those available in the pattern model "Others" tab.

Select this tab. The default values set for the "Positioning Mode", the "Shift Distance", the "Spacing", and the "Max Items On Segment" parameters are those we need to display a pattern on the middle of each link path route; our first pattern model definition is finished.

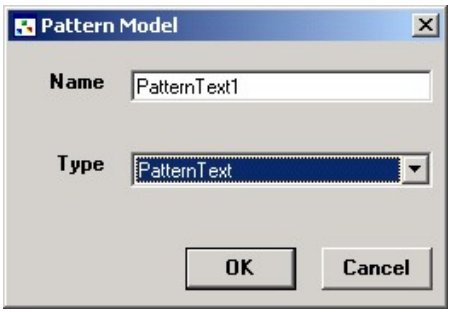


(2) Creating a Pattern Model Text

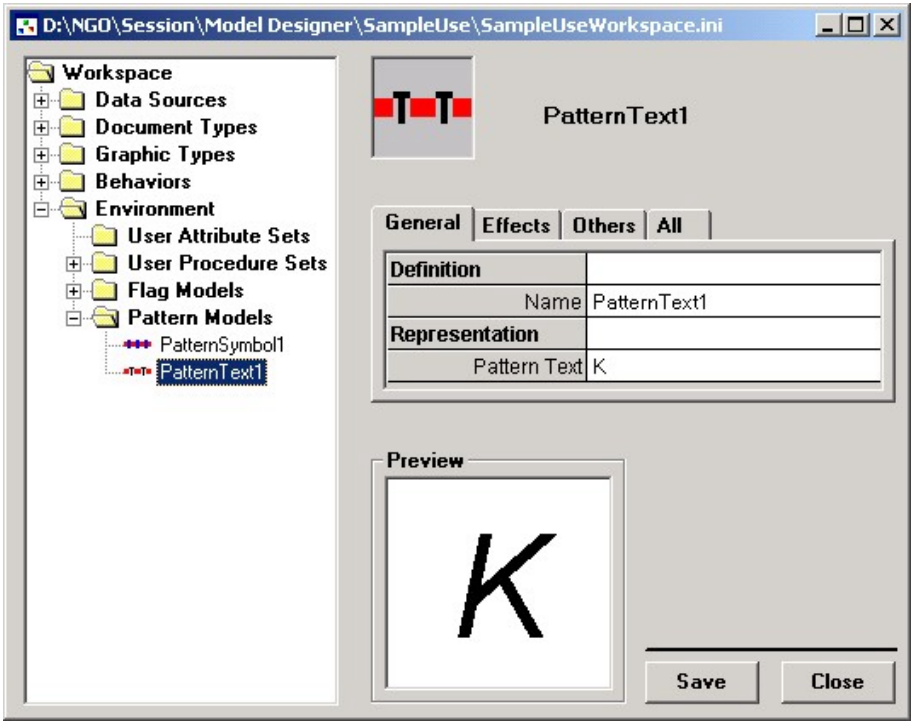
The second "PatternText1" pattern model we will create is a pattern model text that will display the "K" character along each link path route. The pattern color should automatically change according to the color of the link on which it will be displayed. The rules to repeat the pattern along the segment are as follows:

- Spacing between items: 5.0
- First item is 3.0 units away from link origin

As when you created your first pattern model, select the "Create" menu displayed when you right-click the "Pattern Models" tree entry to open the ArcGIS Schematics Designer "Pattern Model" dialog box. Enter the name that will be used to reference your second pattern model, select the "Pattern Text" value from the "Type" dropdown list, and click OK:



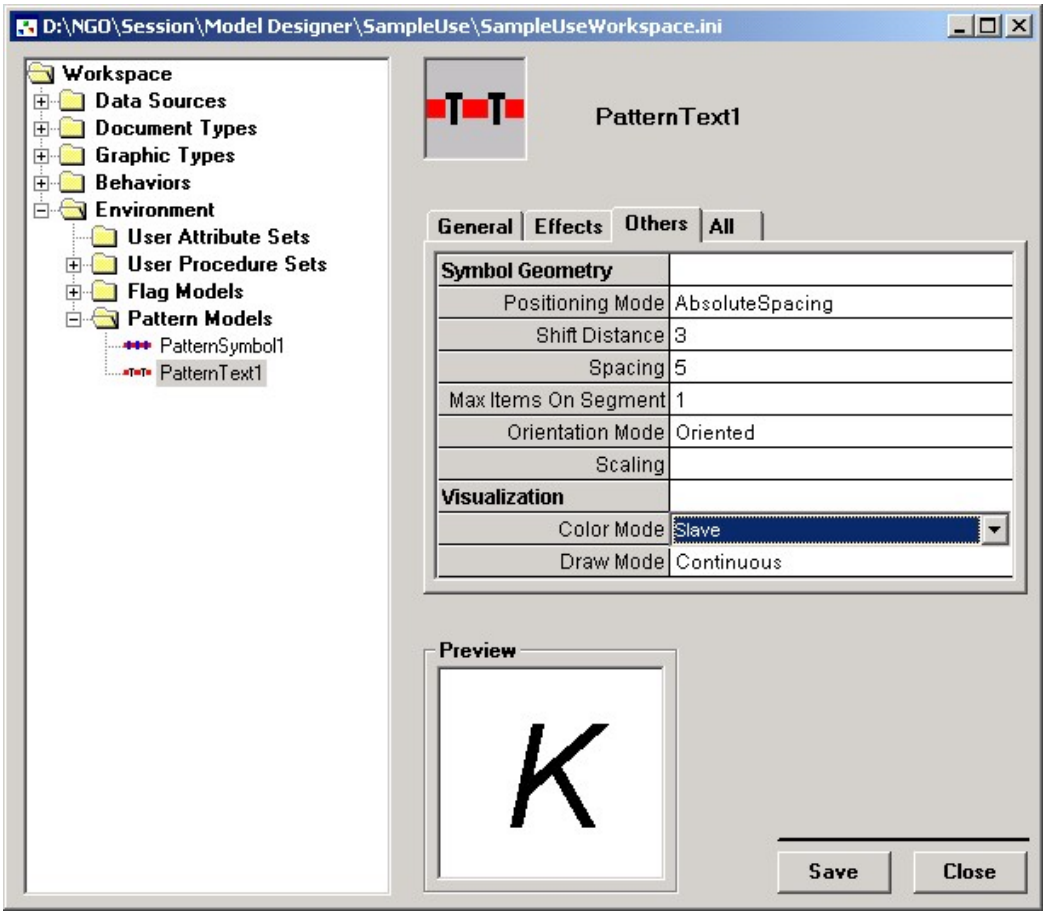
Select the new pattern model tree entry displayed below the "Pattern Models" tree entry and set the "K" character in the "Pattern Text" parameter field displayed in the "General" tab as in the following screenshot:



Next, click the "Others" tab to define the rules that will be used to repeat the patterns along the segment. Select the "AbsoluteSpacing" value from the "Positioning Mode" dropdown list. Set the "Shift Distance" value that will be used to display the first pattern item.

Set the "Spacing" value that will be used to space each pattern item on the link.

Select the "Slave" value from the "Color Mode" dropdown list so that the pattern color automatically changes according to the link color:



The second pattern model definition is finished. Save your workspace parameters.

➢ Step 17: Using Pattern Models to Highlight the Links According to the "Rate" Database Field

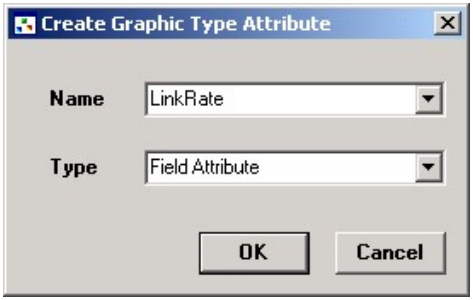
The "Rate" field returned by the link graphic type query stores the rate of each link as a double value.

In this step, we decide to take this information into account graphically; we are going to create the "DisplayLinkRate" bounded property composed by five bounded filters, with each filter corresponding to one range of values. This property will display the links according to the "Rate" field as follows:

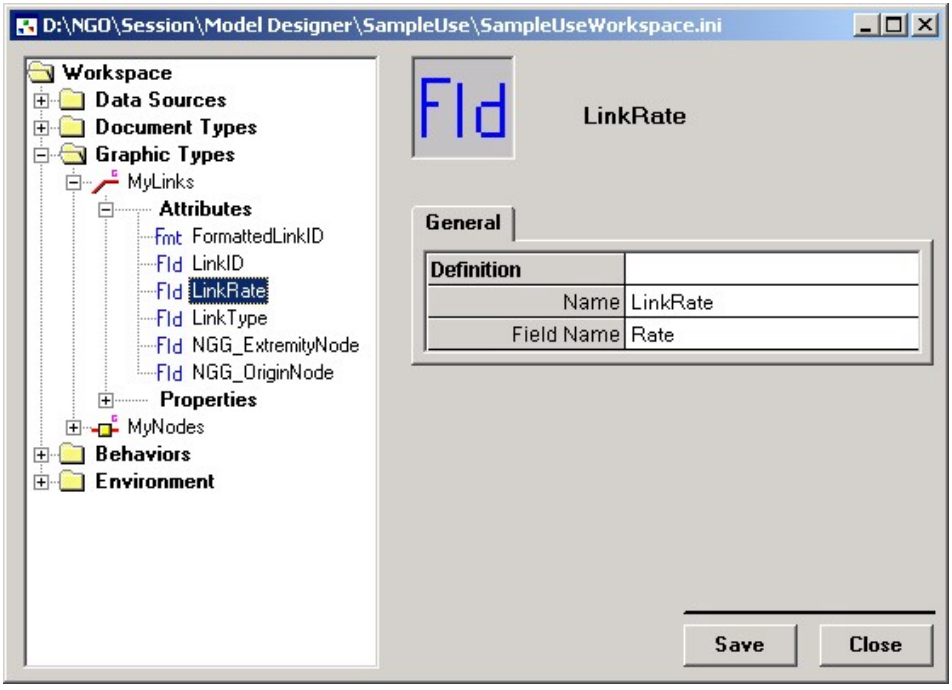
"Rate" Lower Value	"Rate" Upper Value	Filter Graphic Effects
0	200 000	Use the "PatternSymbol1" pattern model
200 000	400 000	Use the "PatternText1" pattern model
400 000	600 000	Use the "PatternSymbol1" and "PatternText1" pattern model
600 000	800 000	Display the link in blue
800 000	1 000 000	Display the link in red with the dashed dotted line style

(1) Creating the "LinkRate" Attribute Corresponding to the Link "Rate" Field
As the "DisplayLinkRate" property will use the "Rate" field returned by the query, we must begin to create an attribute corresponding to this field.

Right-click the "Attributes" tree entry displayed under the "MyLinks" graphic type and select the "Create" menu from the displayed popup menu to open the ArcGIS Schematics Designer "Create Graphic Type Attribute" form. Set the name that will be used to reference the new attribute in the "Name" field, select the "Field Attribute" value from the "Type" dropdown list, and click OK:



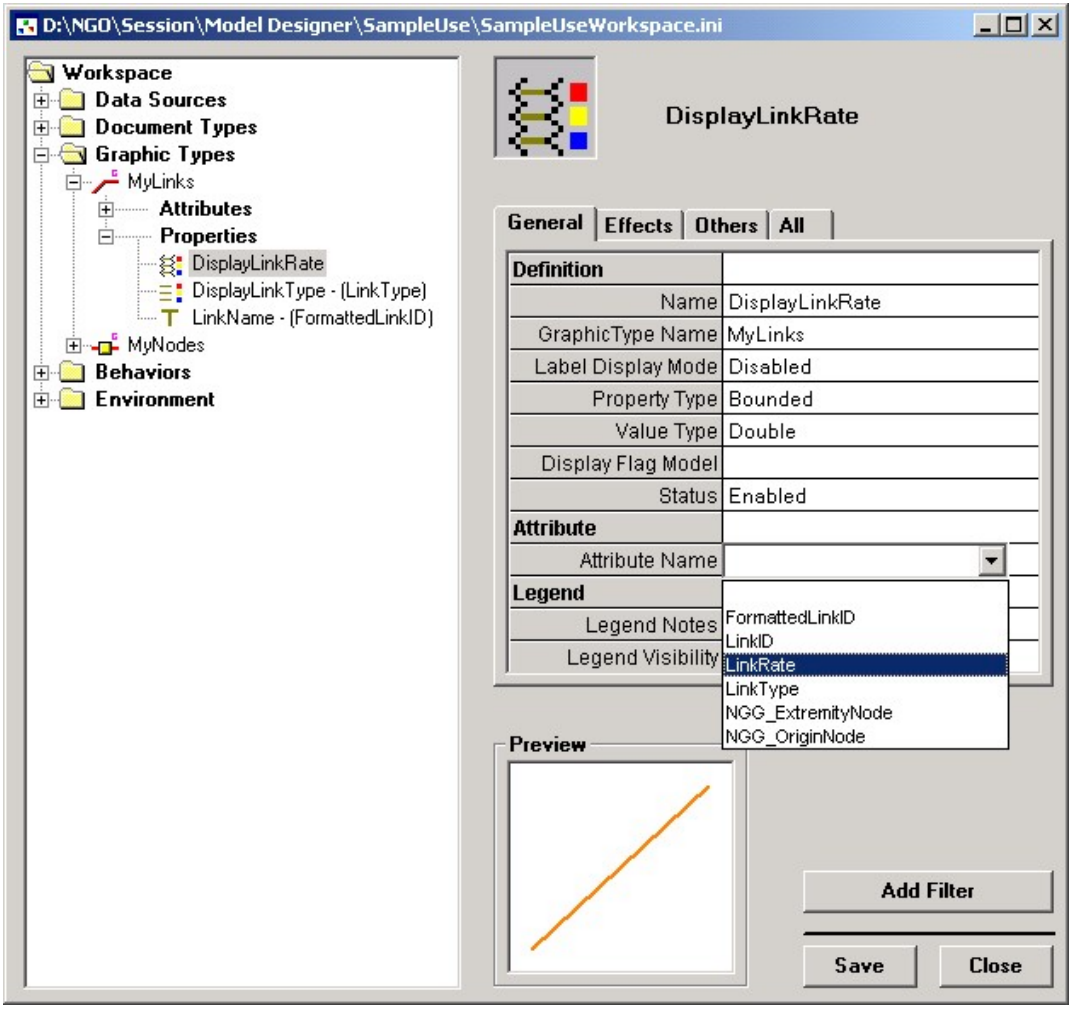
Fill the "Field Name" parameter by selecting the "Rate" field:



(2) Creating the "DisplayLinkRate" Bounded Property
Now you are going to create the "DisplayLinkRate" bounded property. This will display each link according to the "LinkRate" attribute value.

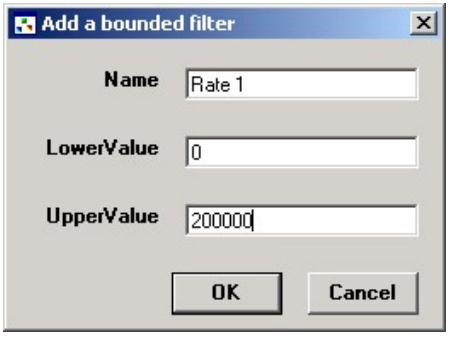
Right-click the "Properties" tree entry displayed under the "MyLinks" graphic type and select the "Create" menu from the displayed popup menu. In the "Create Property" form that opens, fill the "Property Name" field as in the following screenshot, select "Bounded" as type property, select "Double" from the "Value Type" dropdown list, and click OK:

Now associate this new property with the "LinkRate" attribute by selecting "LinkRate" from the "Attribute Name" dropdown list:

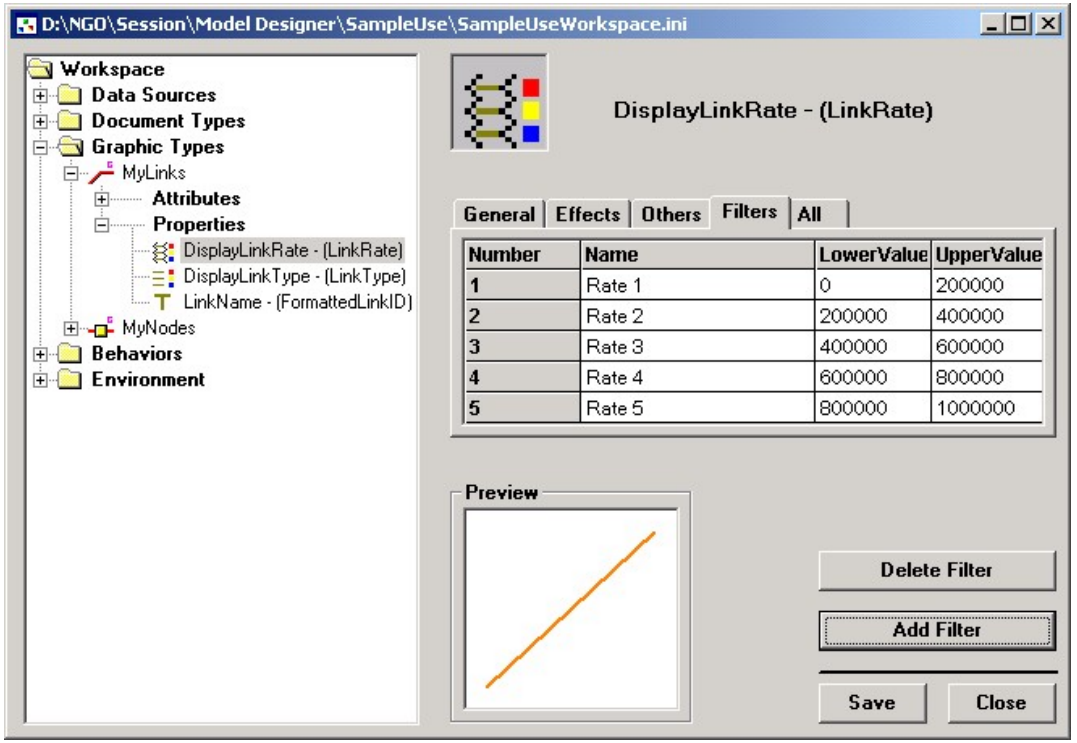


(3) Creating the "DisplayLinkRate" Bounded Filters

Click the Add Filter button on the lower-right corner of the ArcGIS Schematics Designer Editor window to create the property's first bounded filter. Fill the "Name" field in the ArcGIS Schematics Designer "Add a bounded filter" form and set the value that will be associated with this first filter (this value is one of the value taken by the "Type" field stored in the database). Click OK:



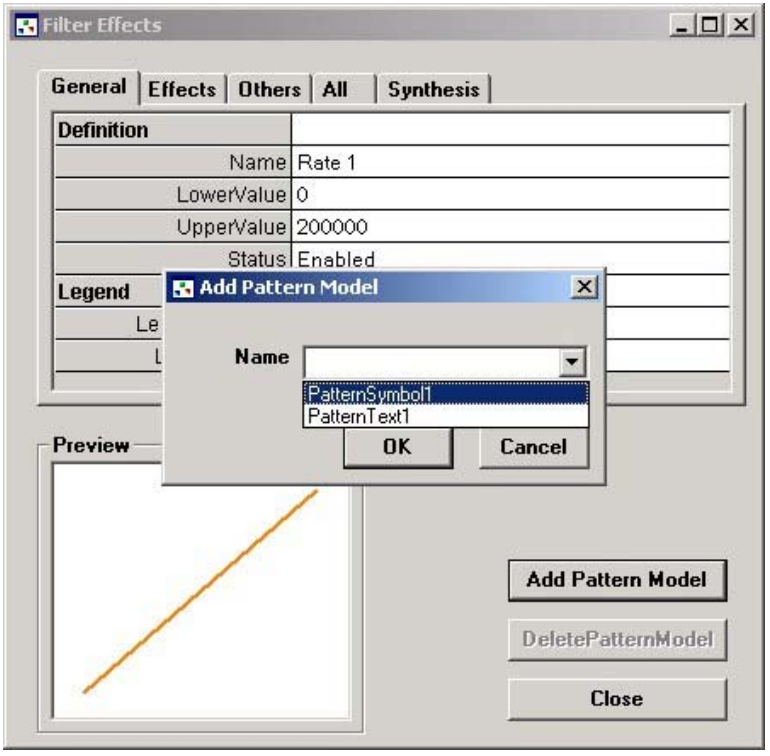
Repeat the preceding operation to create four other filters that correspond to the value ranges specified above.



(4) Defining the Graphic Effects Corresponding to Each Bounded Filter

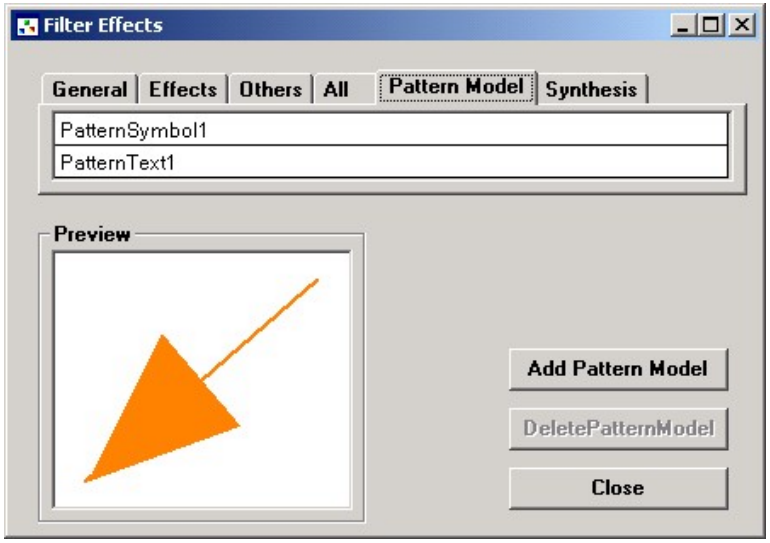
>> Defining the "Rate 1", "Rate 2", and "Rate 3" Bounded Filters Graphic Effects (Use the "PatternSymbol1" or/and the "PatternText1" Pattern Models to Display the Links)

From the "Filters" tab, select the "Rate 1" first bounded filter and click the ... button to open the "Filter Effects" form. Click the Add Pattern Model button in the right-bottom corner to open the "Add Pattern Model" form, and select the desired pattern model from the "Name" dropdown list:



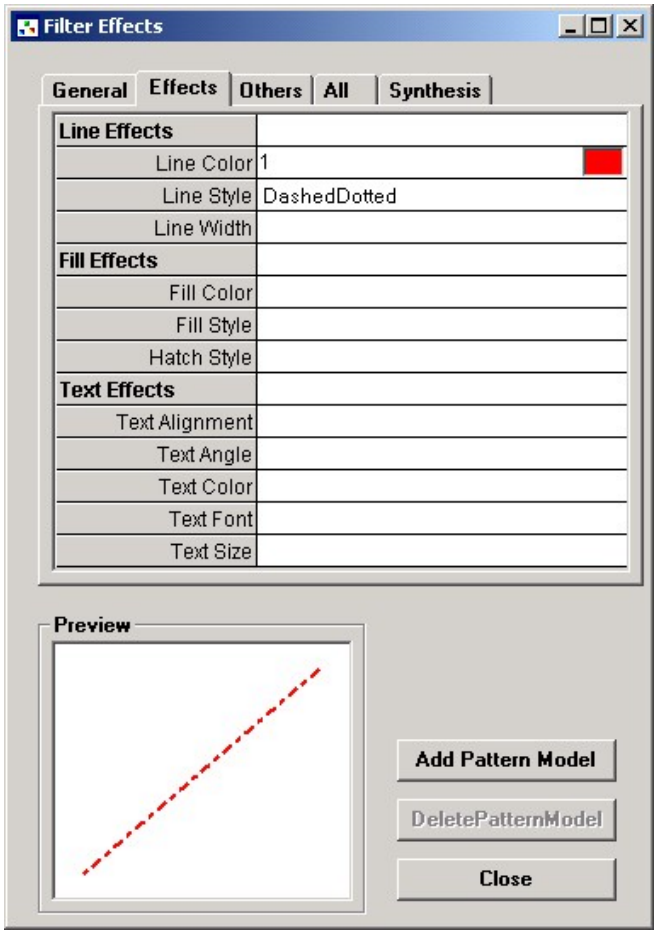
The "Pattern Model" tab is created. It shows the pattern models that have been added to represent the link.

Repeat the same operation for the "Rate 2" and "Rate 3" bounded filter. For the "Rate 3" bounded filter, the "Pattern Model" should appear as it does in the following graphic:



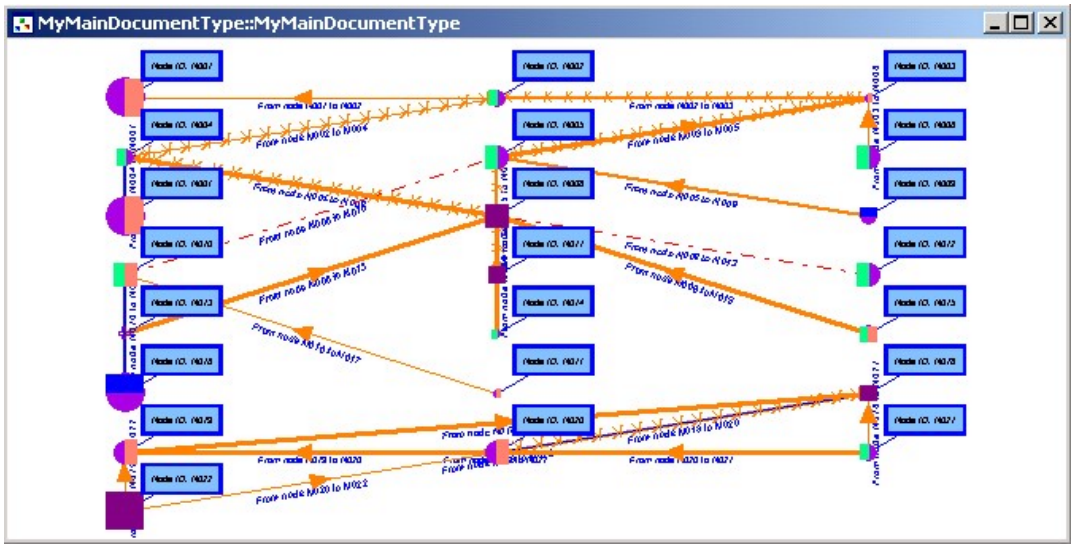
>> Defining the "Rate 4" and "Rate 5" Bounded Filters Graphic Effects (Setting the "Line Color" and/or the "Line Style" Parameter)

Click the ... button from the "Rate" second discrete filter to open the "Filter Effects" form related to the desired discrete filter graphic effects. Set the "Line Color" parameter displayed in the "Effects" tab. Repeat this operation for the "Rate 5" bounded filter and, for this last filter, specify the "Line Style", too:



(5) Testing Your Network Display

Now save all your workspace parameters and click the "Close" button to close the ArcGIS Schematics Designer Editor window. Click the "Open Document Form" icon, select the single "MyMainDocumentType" document type name from the "Document Type" dropdown list, and click OK. Your document opens as follows:

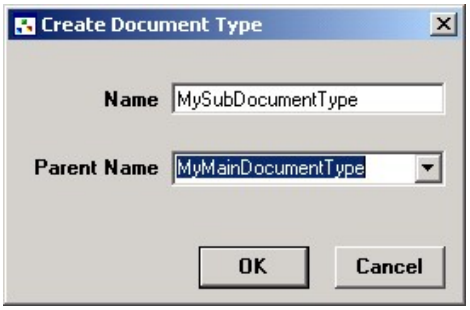


➢ Step 18: Creating a New Document Type for the Different Subnetworks

The "SubNet" field stored in the "Nodes" table can be used to filter out the graphic objects according to the subnetwork to which they belong. It can be a good idea to create a new type of document whose associated documents will correspond to each subnetwork stored in the database.

(1) Creating the "MySubDocumentType" New Document Type
Right-click the "Document Types" tree entry and select the "Create" menu. It automatically opens the ArcGIS Schematics Designer "Create Document Type" form.

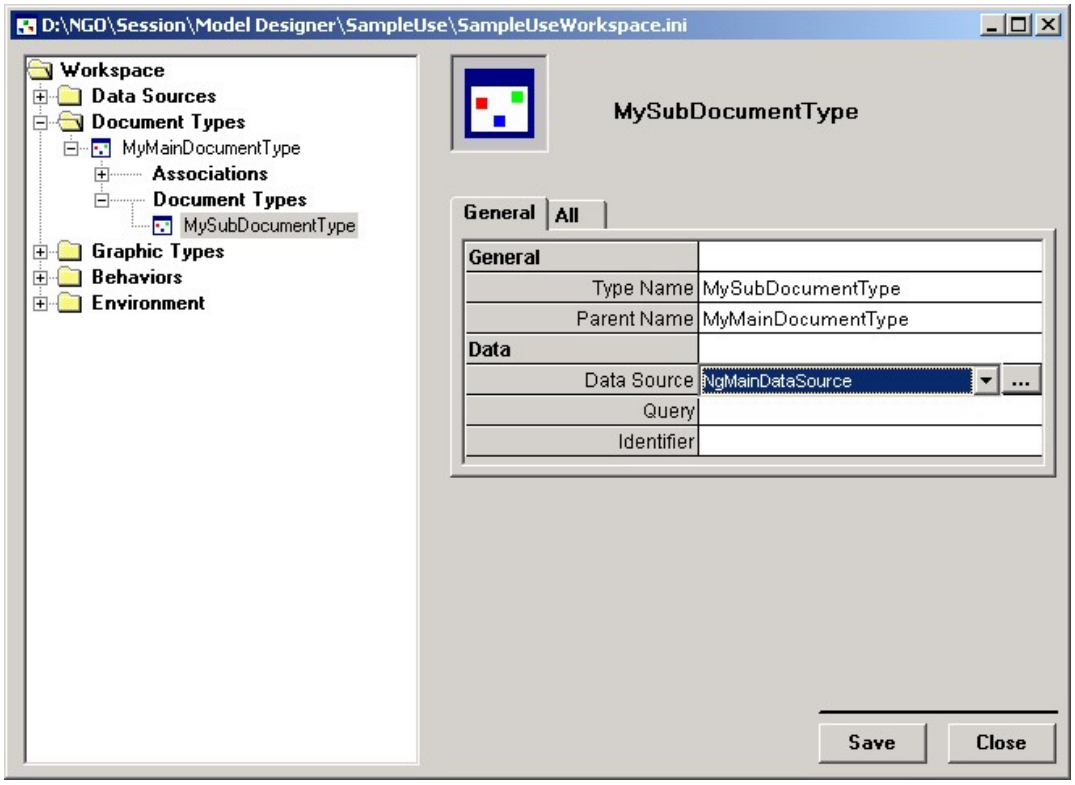
Fill the "Name" text box. Even if the "MyMainDocumentType" has no particular characteristics, it can be interesting that this new document inherits from the first one; in fact, if we decide to create specific behaviors for the parent document type, these behaviors will be automatically inherited at the child level. So, from the "Parent Name" dropdown list, select the single existing document type as follows:



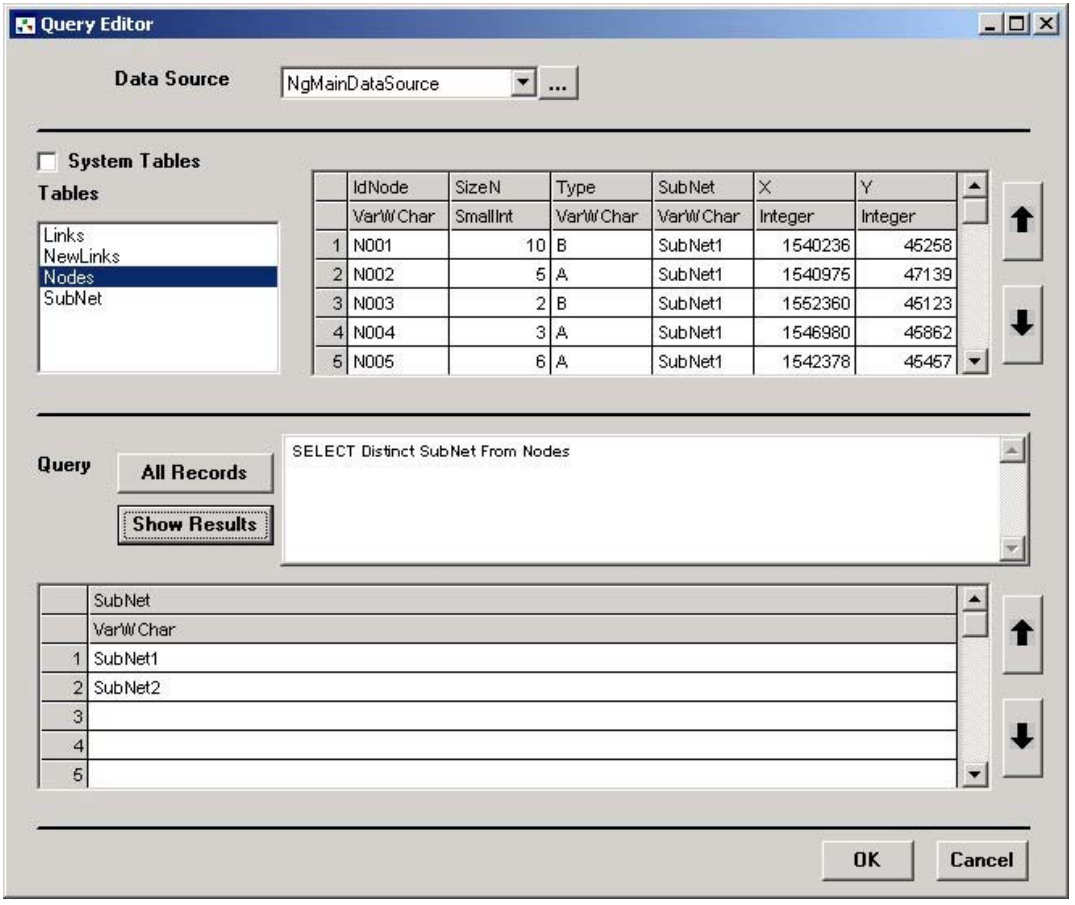
(2) Defining the "MySubDocumentType" Data Source and Query

As this new document type must filter out the graphic objects that will be associated with it according to the subnetwork these objects belong to, each subnetwork in the database builds a single document of this type: the query that will return all the documents of this type should return the distinct occurrences of the subnetworks stored in the database.

Select the "NgMainDataSource" from the "Data Source" dropdown list:

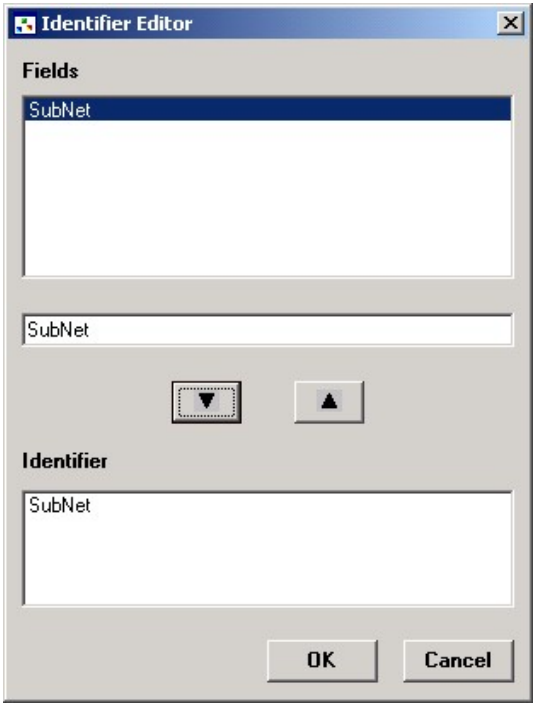


Click the ... button displayed when you select the "Query" field to open the ArcGIS Schematics Designer "Query Editor". Select the table called "Nodes" from the "Tables" list, and write the query that will return all the subnetworks stored in the database. Use the "Show Results" button to test your query and click OK to close the "Query Editor" form:



(3) Defining the "MySubDocumentType" Identifier

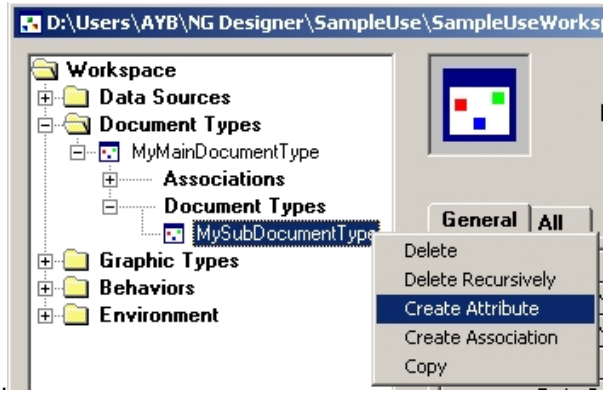
Now you must specify the name that will be used to reference each document of this type. The "SubNet" field returned by the query can be used to identify each document; click the ... button displayed when you select the "Identifier" field to open the ArcGIS Schematics Designer "Identifier Editor" and use the ▼ button to select this field:



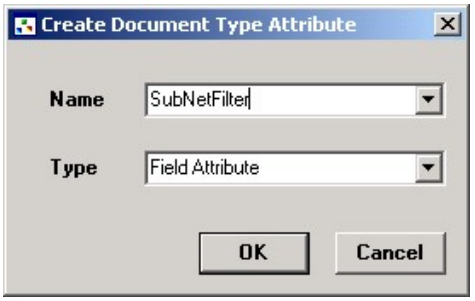
(4) Creating Attributes

When such a document type is created to filter out graphic objects stored in the database, we must define the document type attribute that will later be used to filter the objects associated with a selected document in this document type. That way these graphic objects will be automatically associated with each document of this type. In this case, it is the "SubNet" field that we will need.

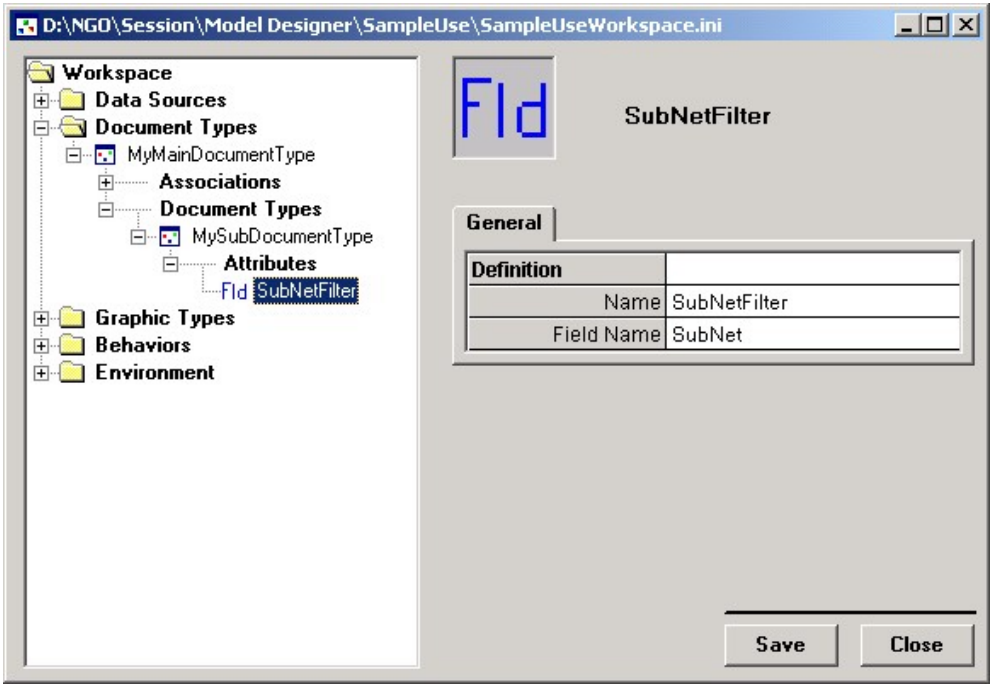
Right-click the "MySubDocumentType" entry and select the "Create Attribute" menu to open the ArcGIS Schematics Designer "Create Document Type Attribute" form:



Fill the "Name" dropdown list, select "Field Attribute" value from the "Type" dropdown list, and click OK:



Next, fill the "Field Name" parameter by selecting the "SubNet" field:



➢ Step 19: Creating a New Node Type to Filter Out Nodes According to Their Subnetworks

In this step, we will create the new graphic type node that will be used to filter out all the nodes stored in the database according to the subnetwork to which they belong.

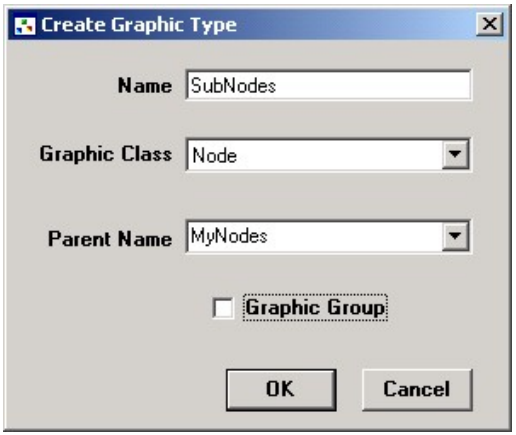
(1) Creating the "SubNodes" New Node Type
Right-click the "Graphic Types" tree entry and select the "Create" menu that automatically opens the ArcGIS Schematics Designer "Create Graphic Type" dialog box. Fill the "Name" text box and select the "Node" graphic class.

Because it will be interesting to carry all the properties created for the already defined "MyNodes" node type over to the new node type, we can:

- Select the "MyNodes" type from the "Parent Name" dropdown list

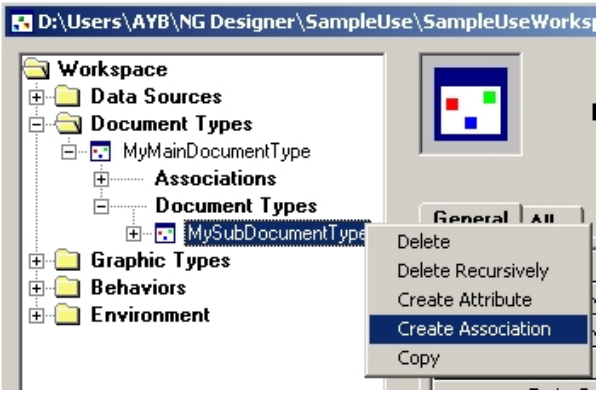
and

- Check off the "Graphic Group" option so that this report becomes automatic.

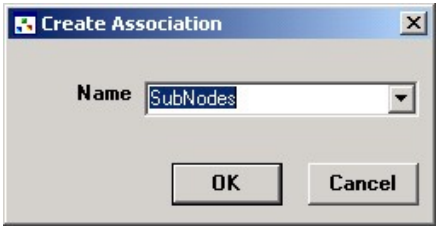


(2) Associating the New Node Type with the New Document Type
Even if the new node type definition is not finished, it is often useful to associate the new graphic type at this step of its creation. In fact, in the following step, when we define the query related to these nodes, we will need to filter these nodes according to the document chosen (i.e., if the chosen document is "SubNet1", the application has to automatically filter the nodes belonging to this "SubNet1" subnetwork, etc.) The "SubNetFilter" attribute we have created for the "MySubDocumentType" will be necessary for the node type query definition.

Right-click the "MySubDocumentType" entry and select the "Create Association" menu that automatically opens the ArcGIS Schematics Designer "Create Association" dialog box:



From the "Name" dropdown list, select the new "SubNodes" graphic type and click OK:



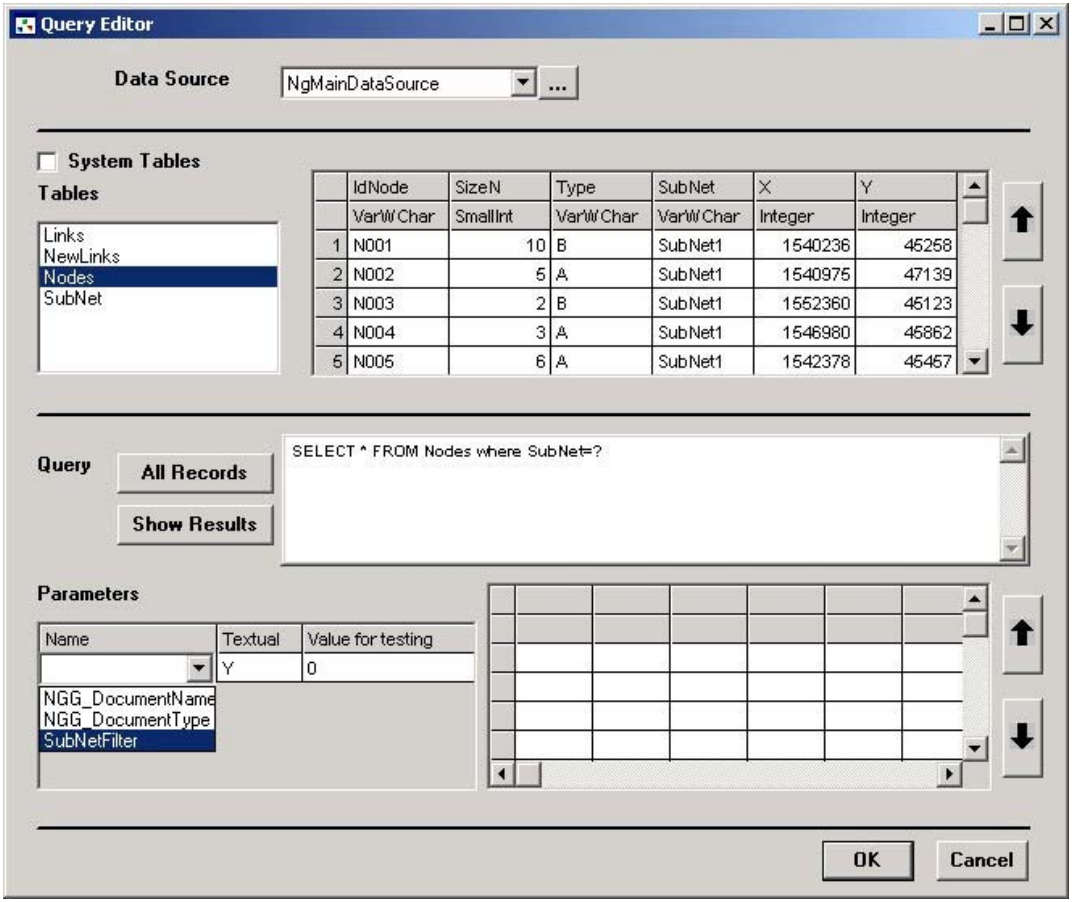
(3) Redefining the New Node Type Query

As the new node type inherits from the "MyNodes" graphic type, the default query set for this new graphic object type is the "MyNodes" query. This query must be redefined so that it returns the nodes related to one subnetwork only.

From the "Query" parameter field displayed in the "General" tab related to the new node type, click the ... button to open the "Query Editor" window.

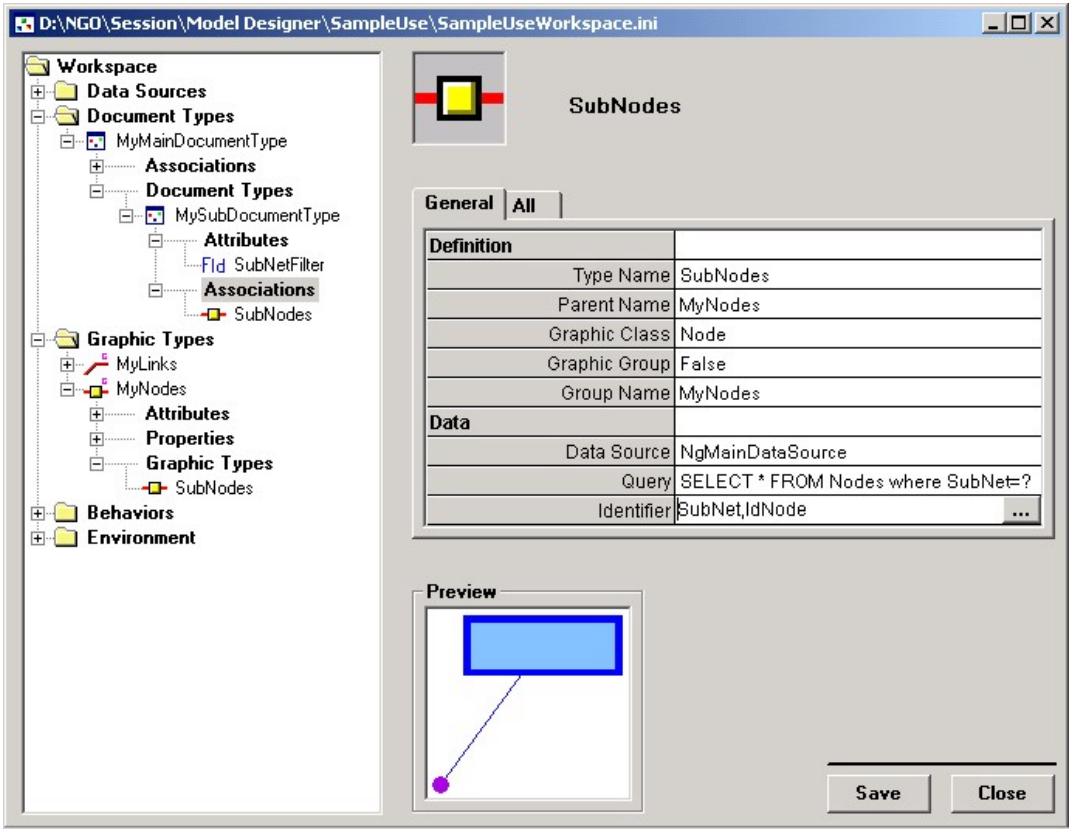
Write in the "Query" area the query that will return all the nodes related to a given document (i.e., related to one subnetwork); this query is parameterized. The parameter must correspond to the chosen document (i.e., to the document's "SubNetFilter" attribute value).

As the node type is already associated with the "MySubDocumentType", this attribute is available from the Parameters Name dropdown list:

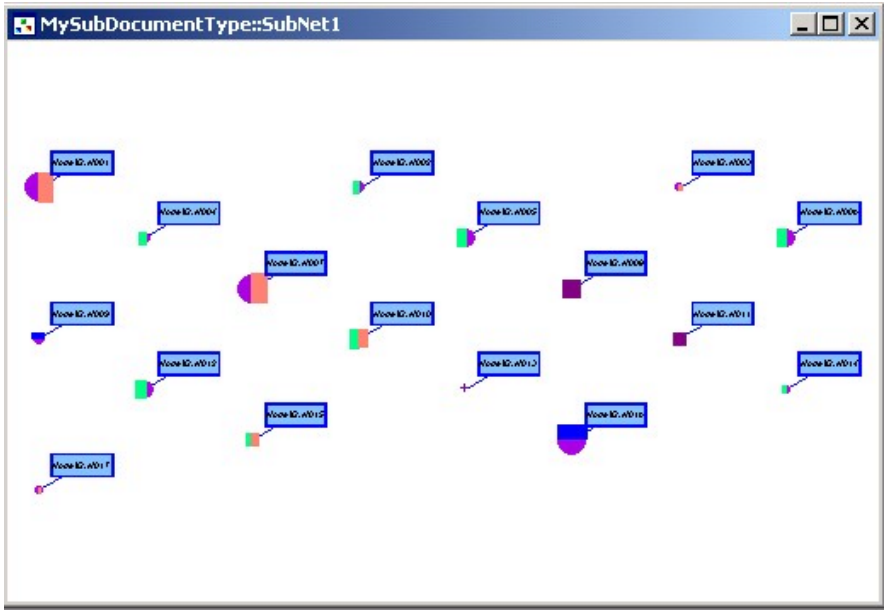


(4) Redefining the New Nodes Identifier

Due to the inheritance, the node identifier is "MyNodes" by default. This identifier can be redefined: for example, as shown in the following graphic, you can build up the node identifiers by concatenating the document name and the node identifier stored in the database so that each node graphic object has a unique identifier:



(5) Testing the Subnetworks Display
The new node type definition is finished. Click the "Save" button to save all your new workspace parameters and click the "Close" button to close the ArcGIS Schematics Designer Editor window. Now click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, or click "Open Document Form" from the "Document" menu. Select the "MySubDocumentType" document type name from the "Document Type" dropdown list. Choose the desired document name from the "Document Name" dropdown list and validate. Your new schematic document opens as follows:



Note #1: The document names available from the "Document Name" dropdown list are those returned by the document type query.

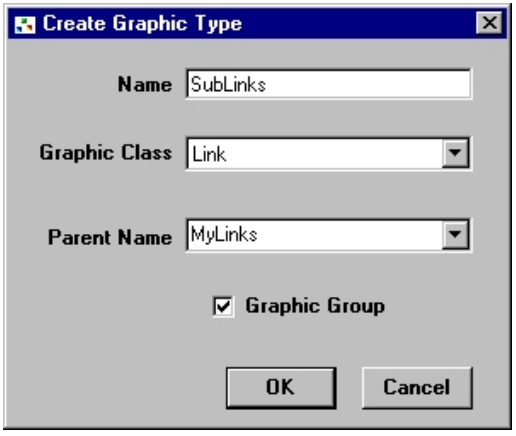
Note #2: The new node type inherits from the "MyNodes" type, so all properties defined for the parent node type are automatically reported on the child node type. As the query set for the new node type returns the same parent fields needed by these inherited properties, the properties representation is effective.

➢ Step 20: Creating a New Link Type to Filter Out the Links According to Their Subnetworks

In this step you will create a new graphic type link that will be used to filter out all the links stored in the database according to the subnetwork to which they belong.

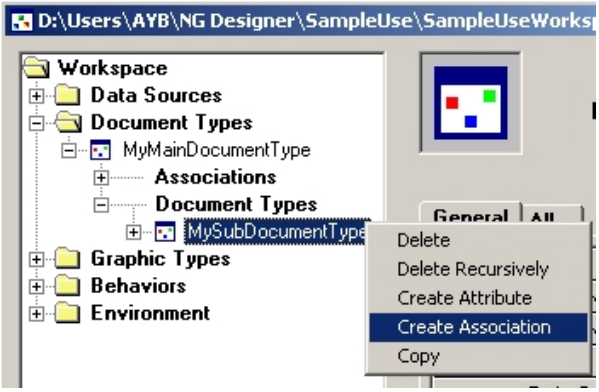
(1) Creating the "SubLinks" New Link Type
Right-click the "Graphic Types" tree entry and select the "Create" menu that automatically opens the ArcGIS Schematics Designer "Create Graphic Type" dialog box.

Fill the "Name" text box and select the "Link" graphic class. As for the "SubNodes" node type, we decide that this new link type inherits from "MyLinks". Check the "Graphic Group" option so that the inheritance is complete:

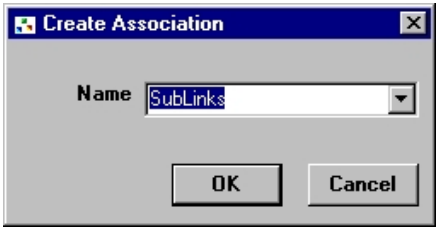


(2) Associating the New Link Type with the New Document Type
As for the node type, we are now going to associate the new link type with the "MySubDocumentType" document type so that the "SubNetFilter" attribute we have created for the "MySubDocumentType" will be available for the link type query definition.

Right-click the "MySubDocumentType" entry and select the "Create Association" menu that automatically opens the ArcGIS Schematics Designer "Create Association" dialog box:



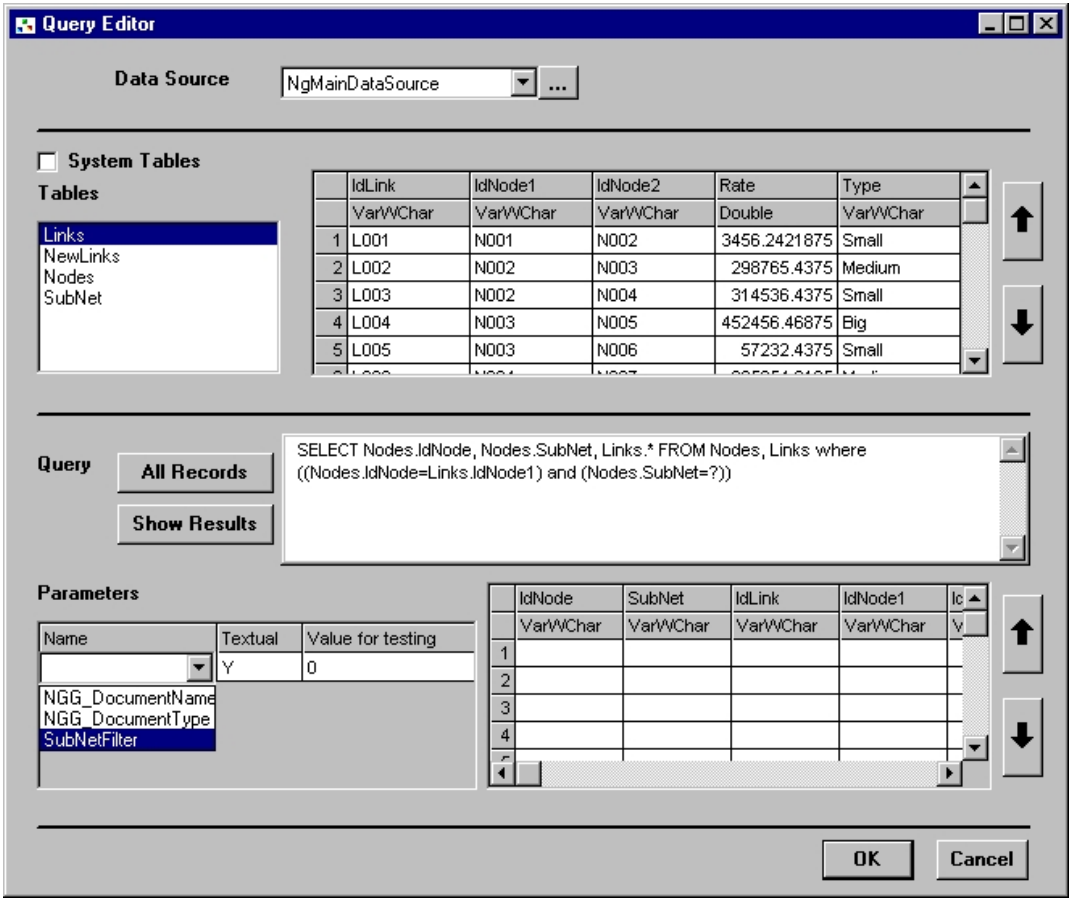
From the "Name" dropdown list, select the new "SubLinks" graphic type and click OK:



(3) Redefining the New Link Type Query

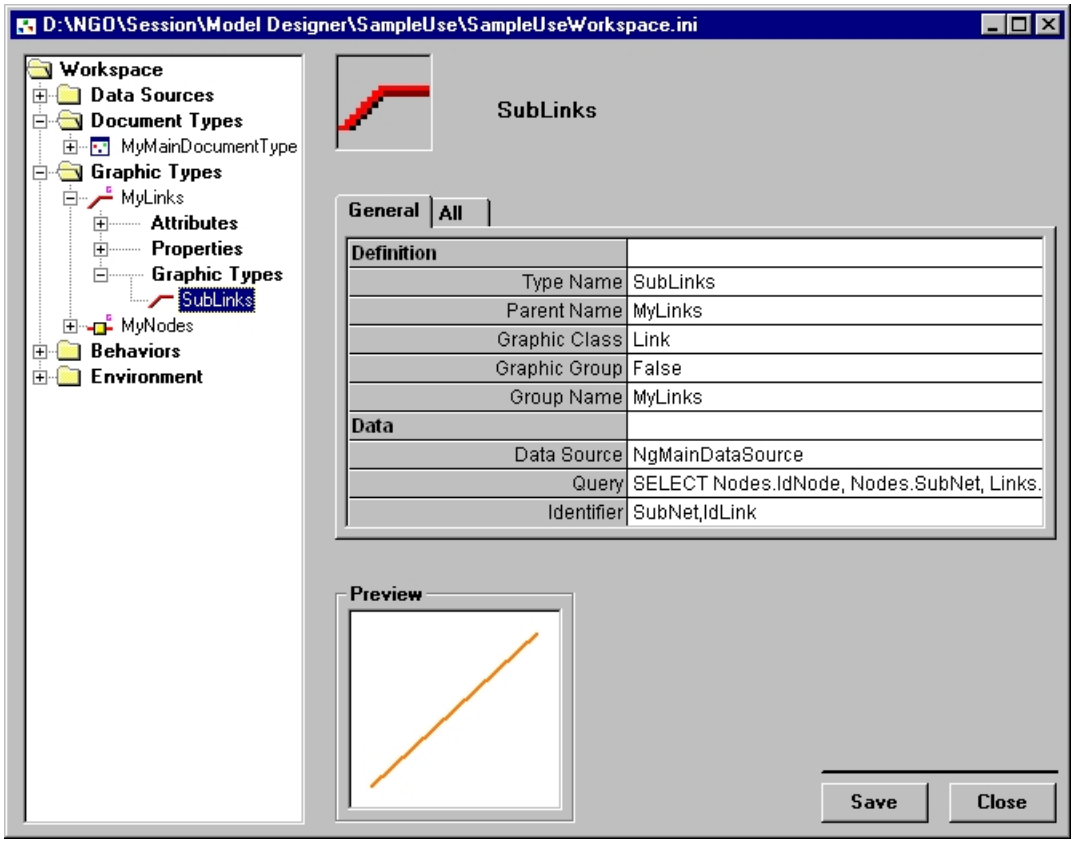
From the "Query" parameter field displayed in the "General" tab related to the new link type, click the ... button to modify the default inherited query set for this graphic type. The "Query Editor" window automatically opens.

Write the query that will return all the links related to a given document (i.e., related to one subnetwork) in the "Query" area. The "SubNodes" query is parameterized, and the parameter must correspond to the chosen document (i.e., to the document's "SubNetFilter" attribute value):



(4) Redefining the New Link Identifiers

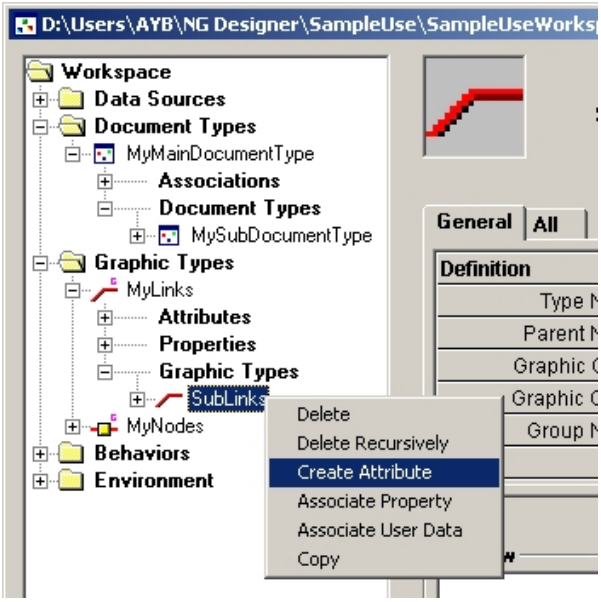
The default inherited identifier can be redefined: for example, as shown in the following screenshot, we can build up the link identifiers by concatenating the document name and the link identifier stored in the database so that each link graphic object has a unique identifier:



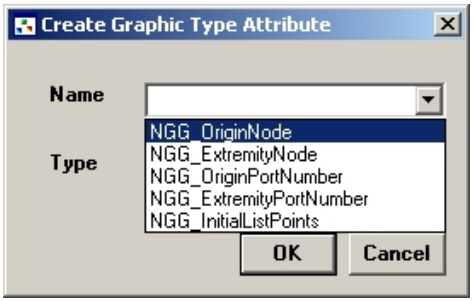
(5) Creating the "NGG_OriginNode" and "NGG_ExtremityNode" Link's Mandatory Attributes
A link can be displayed only when NGO core knows which origin and extremity node the link connects. The node identifiers have been redefined: each "SubNodes" node is identified by concatenating their subnetwork and their database identifier.

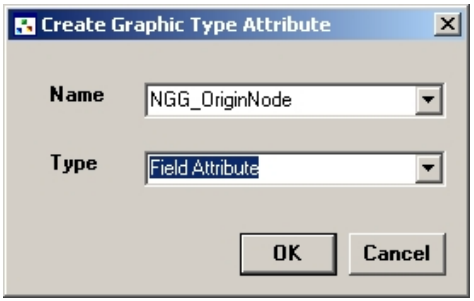
So, even if the NGG_OriginNode and NGG_ExtremityNode attributes defined for the "MyLinks" parent link type are automatically inherited at the "SubLinks" level, they must be redefined at the child level.

Right-click the "MyLinks" tree entry corresponding to your link type and select the "Create Attribute" menu:

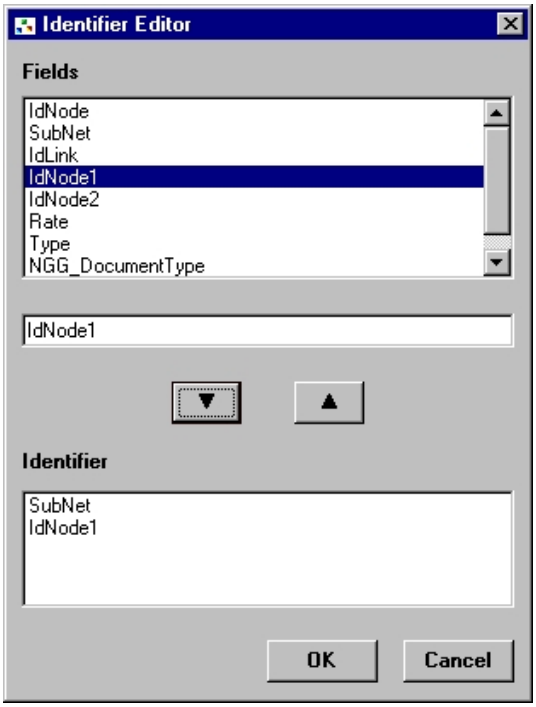


From the ArcGIS Schematics Designer "Create Graphic Type Attribute" dialog box, choose the "NGG_OriginNode" predefined attribute name from the "Name" dropdown list, select "Field Attribute" from the "Type" dropdown list, and click OK:





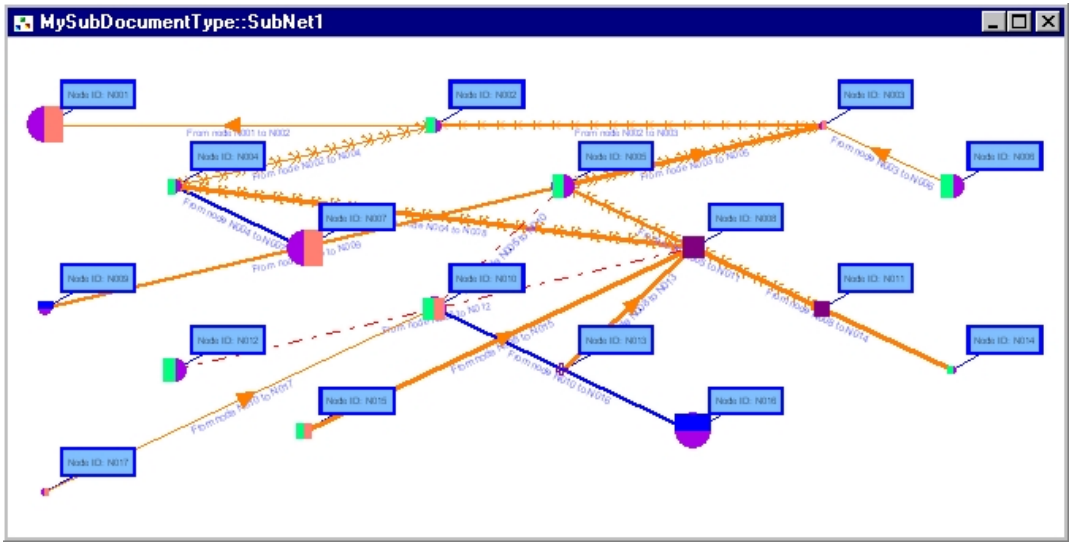
An "Attributes" new tree entry is automatically created below the "SubLinks" graphic type tree entry, and the "NGG_OriginNode" new attribute itself is referenced under this new entry. From the "Field Names" parameter, click the ... button to open the ArcGIS Schematics Designer "Identifier Editor". Select the fields that will be used to identify each link's origin node. Here, the "SubNet" and "IdNode1" fields returned by the link type query are the fields used to identify the link origin.



Repeat this operation to create the second "NGG_ExtremityNode" mandatory attribute obtained by concatenating the "SubNet" and "IdNode2" fields returned by the link type query.

(6) Testing the Subnetworks Display

The new link type definition is finished. Click the "Save" button to save all your new workspace parameters and click the "Close" button to close the ArcGIS Schematics Designer Editor window. Click the "Open Document Form" icon on the ArcGIS Schematics Designer toolbar, or click "Open Document Form" from the "Document" menu. Select the "MySubDocumentType" document type name from the "Document Type" dropdown list. Select the desired document name from the "Document Name" dropdown list and validate. Your new schematic document opens as follows:



➢ Step 21: Redefining the Inherited "NodeName" and "LinkName" Properties Displayed on the Subnetwork Documents

Due to the inheritance, the "NodeName" and "LinkName" properties defined for the "MyNodes" and "MyLinks" graphic type are automatically reported on the "SubNodes" and "SubLinks" graphic type. Inherited properties can be redefined at the child level.
In this step, we will redefine these property labels as follows:

- In the subnetwork document, the "NodeName" property will only display the "IdNode" field stored in the database.

- In the subnetwork document, the "LinkName" property will display the link name as follows: "IdLink: OriginNode-ExtremityNode".

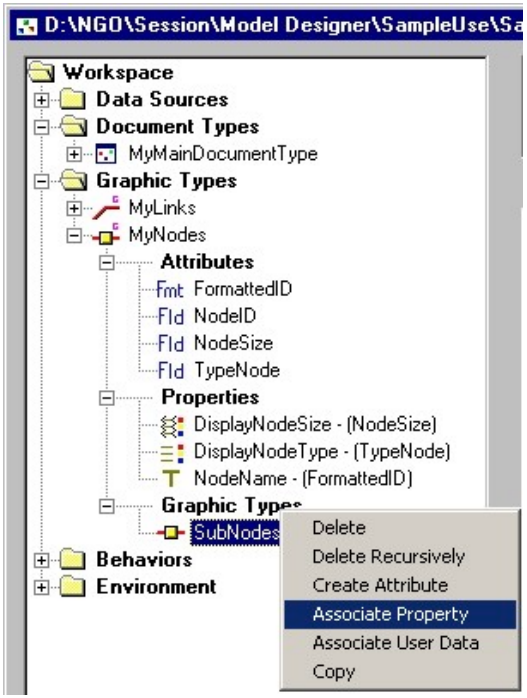
>> Redefining the "NodeName" Property
The "NodeID" attribute field defined for the "MyNodes" graphic type corresponds to the "IdNode" field stored in the database.

As the "SubNodes" graphic type inherits from the "MyNodes" one, this attribute is automatically inherited at the child level.

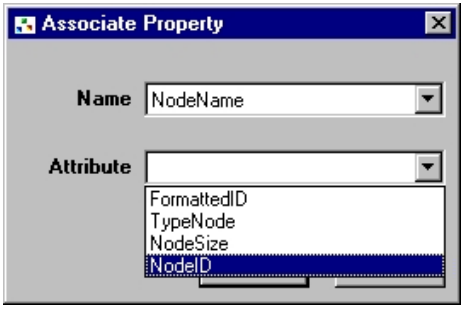
At the "MyNodes" graphic type level, the "NodeName" property is associated with the "FormattedID" attribute. In the subnetwork document, we want to associate this inherited property with the inherited "NodeID" attribute.

For the "SubNodes" graphic type, the "NodeName" property redefining only consists in the reassociating of this inherited property with the inherited "NodeID" attribute.

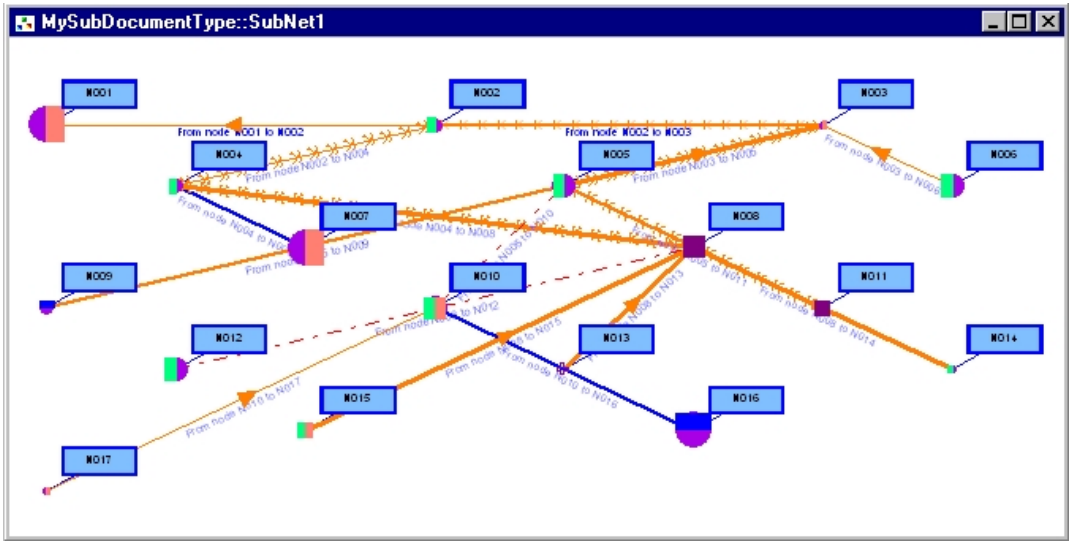
Right-click the "SubNodes" entry and select the "Associate Property" menu to open the ArcGIS Schematics Designer "Associate Property" dialog box:



Select the inherited "NodeName" property from the "Name" dropdown list, select the "NodeID" attribute among all the inherited attributes available from the "Attribute" dropdown list, and click OK:



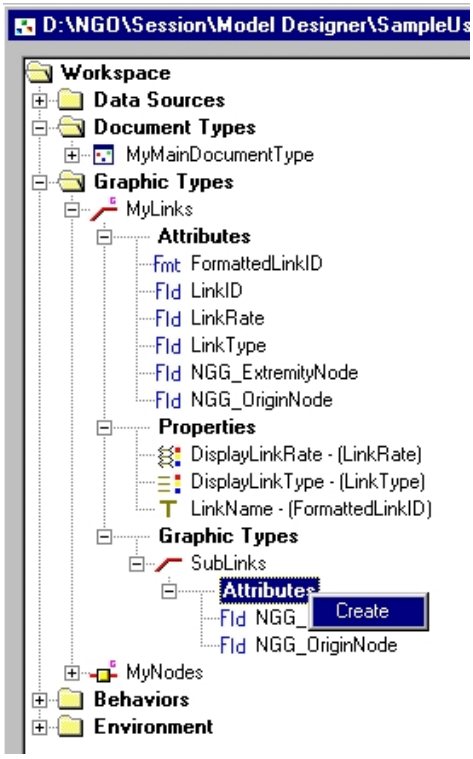
Save your new workspace parameters and test one of the subnetwork document displays:



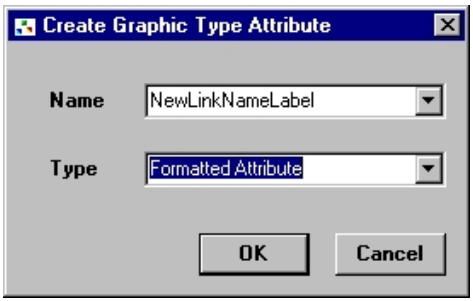
>> Redefining the "LinkName" Property

At the "MyLinks" graphic type level, the "LinkName" property is associated with the "FormattedLinkID" attribute. In the subnetwork document, we want to change the inherited property label so that this property displays a formatted label built as follows: "IdLink: OriginNode-ExtremityNode".

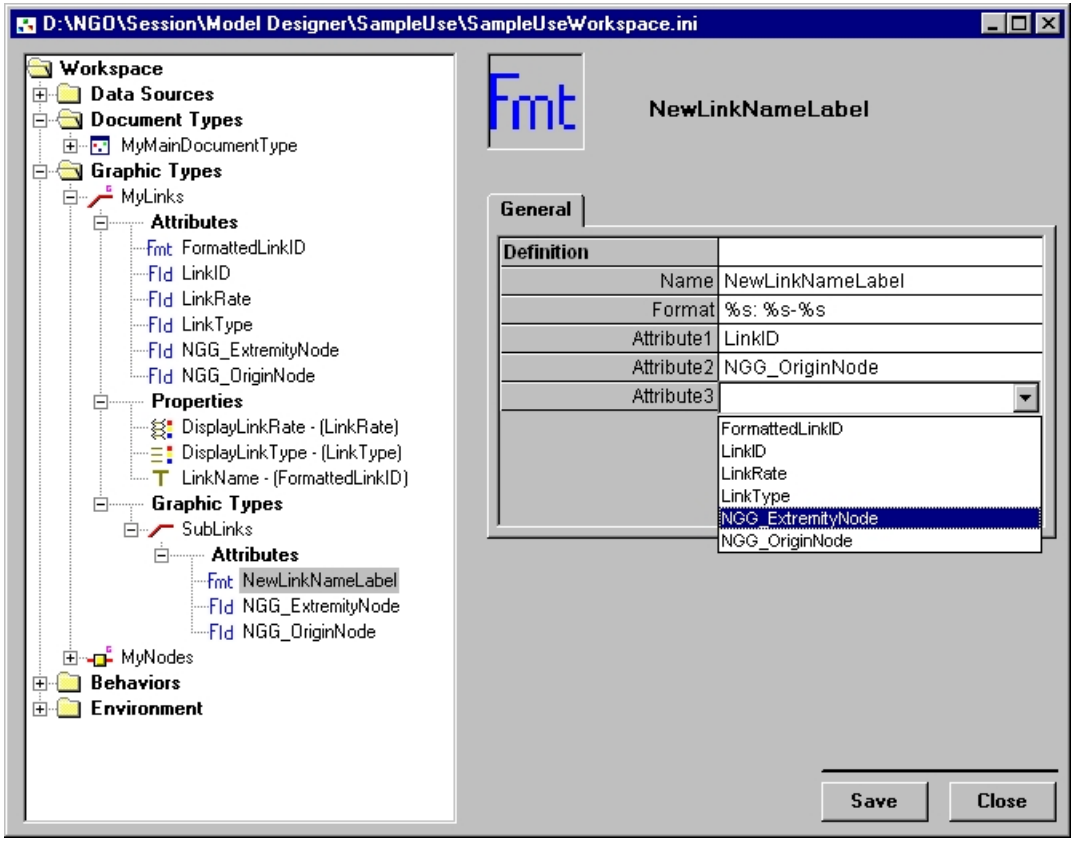
We must start by creating a new formatted attribute at the "SubLinks" level to build this new label. Right-click the "Attributes" tree entry displayed below the "SubLinks" entry and select the "Create" menu:



When the "Create Graphic Type Attribute" form opens, enter a name in the "Name" field and select "Formatted Attribute" from the "Type" dropdown list:

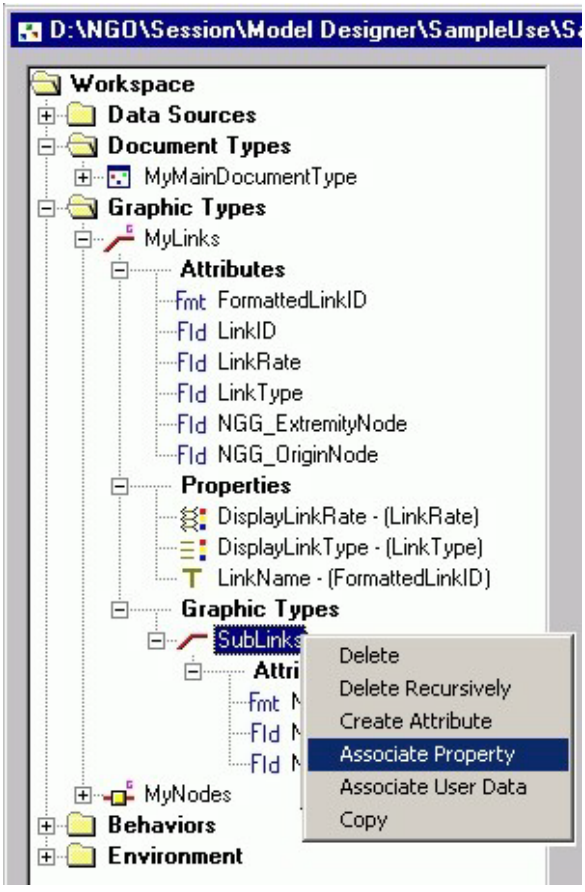


Next, define the new attribute's format and select the three attributes that will be used to build this attribute from the "Attribute1", "Attribute2", and "Attribute3" dropdown list. Note that all the inherited attributes from the "MyLinks" graphic type are available in these three attribute dropdown lists.



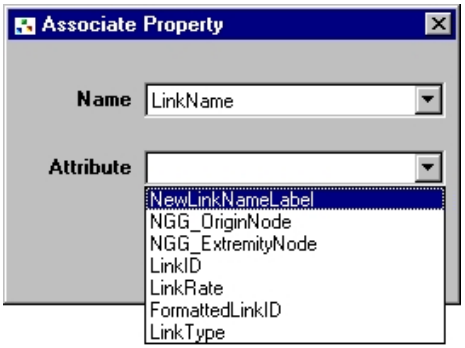
Now the "LinkName" property redefining only consists of the reassociating of this inherited property with the new "NewLinkNameLabel" attribute defined at the "SubLinks" level.

Right-click the "SubLinks" entry and select the "Associate Property" menu to open the ArcGIS Schematics Designer "Associate Property" dialog box:

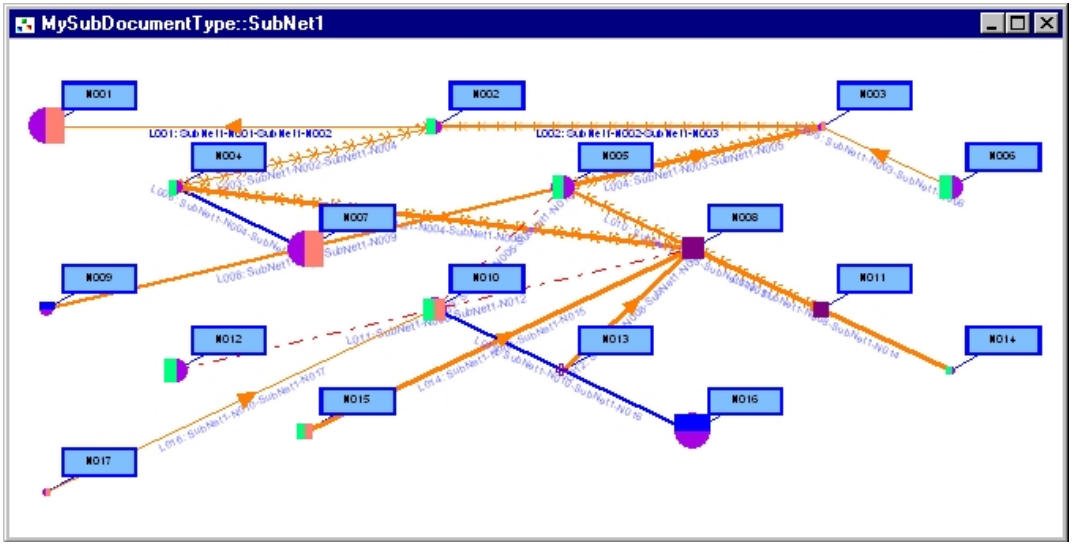


Select the inherited "LinkName" property from the "Name" dropdown list, select the "NewLinkNameLabel" attribute among all the attributes available from the "Attribute" dropdown list, and validate.

Note that the "Attribute" dropdown list lists all the inherited attributes from the "MyLinks" graphic type as well as the single "FormattedLinkID" attribute we have just defined at the "SubLinks" level.



Save your new workspace parameters and test one of the subnetwork document displays:



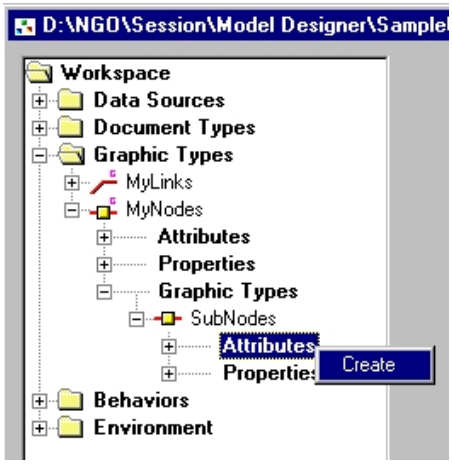
➢ Step 22: Using Database Coordinates to Display Your Nodes

Until now, because no coordinates have been specified for nodes, our graphic objects are automatically placed on a grid.

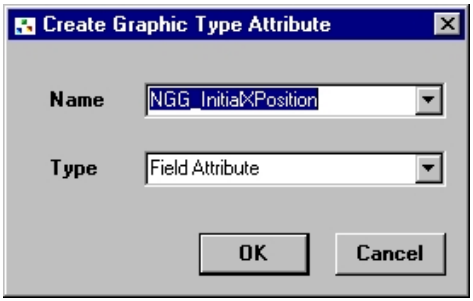
In this step, we will use nodes x,y coordinates stored in the database to display nodes.
These coordinates can be automatically taken into account if we define two new specific attributes on the node graphic type: the "NGG_InitialXPosition" and "NGG_InitialYPosition" predefined attributes.

In this example, we will define these attributes at the "SubNodes" graphic type level. So, the nodes displayed in the "MyMainDocumentType" document will be displayed without their database coordinates, and the nodes displayed in a subnetwork document will be positioned with their real coordinates.

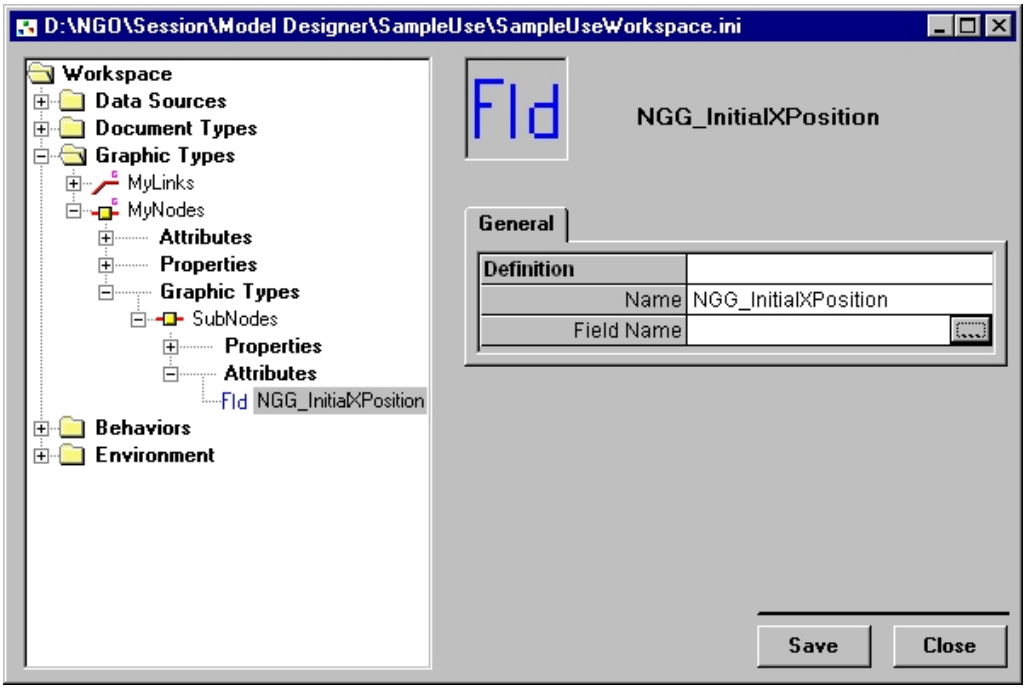
(1) Right-click the "Attributes" tree entry displayed under the "SubNodes" entry and select the "Create" menu to open the "Create Graphic Type Attribute" form:



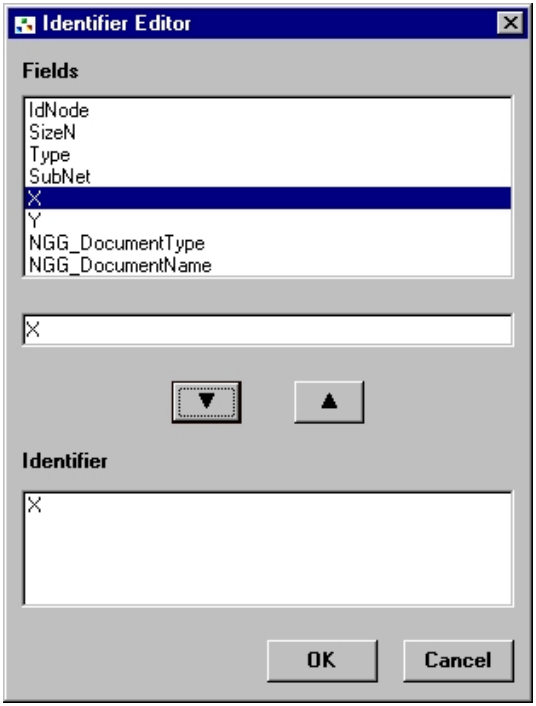
(2) Select the predefined "NGG_InitialXPosition" attribute name from the "Name" dropdown list. As the x coordinates are clearly stored in a single field in the database, select "Field Attribute" from the "Type" dropdown list and validate:



(3) From the new attribute "General" tab, click the ... button displayed in the "Field Name" field to open the ArcGIS Schematics Designer "Identifier Editor".

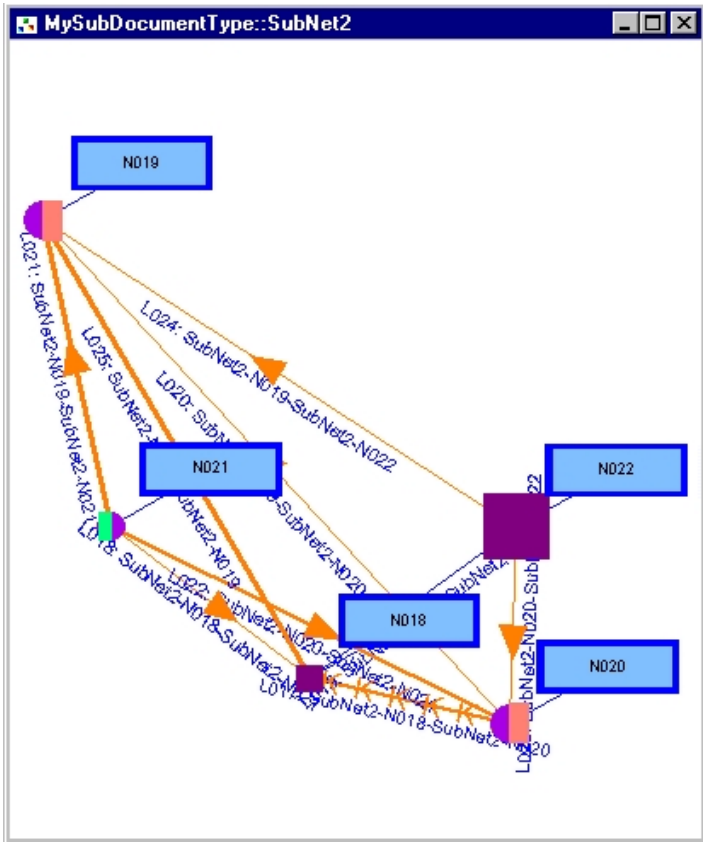


Next, select the "X" field returned by the "SubNodes" query. This field stores each node X-coordinate:



Repeat these three steps to create the "NGG_InitialYPosition" attribute that will be used to display the nodes according to their Y-coordinates.

Save your workspace parameters and test one of your subnetworks view displays:



➢ Step 23: Defining the Behaviors That Will Impact the Views

Let's now go one step further in the application design process by defining the application behaviors.

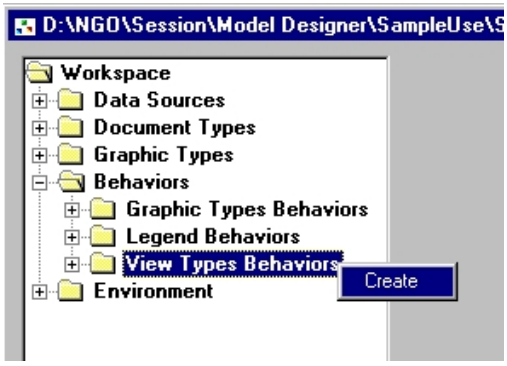
In this Help page, we will define a behavior impacting any view when it is right-clicked.

Generally, the main useful commands needed from a view are as follows:

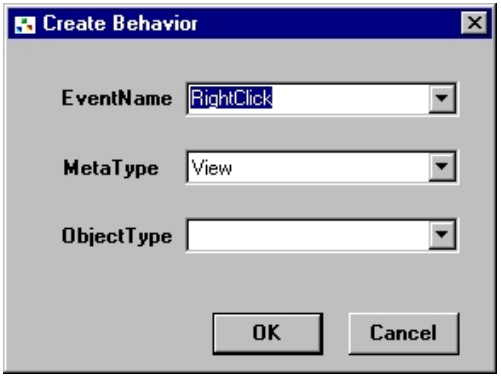
- Turning the legend subwindow display on/off
- Fitting all the graphic objects in the view
- Repositioning the graphic objects displayed in the view according to their last saved position

We are going to create a behavior that will display a popup menu for launching these three commands.

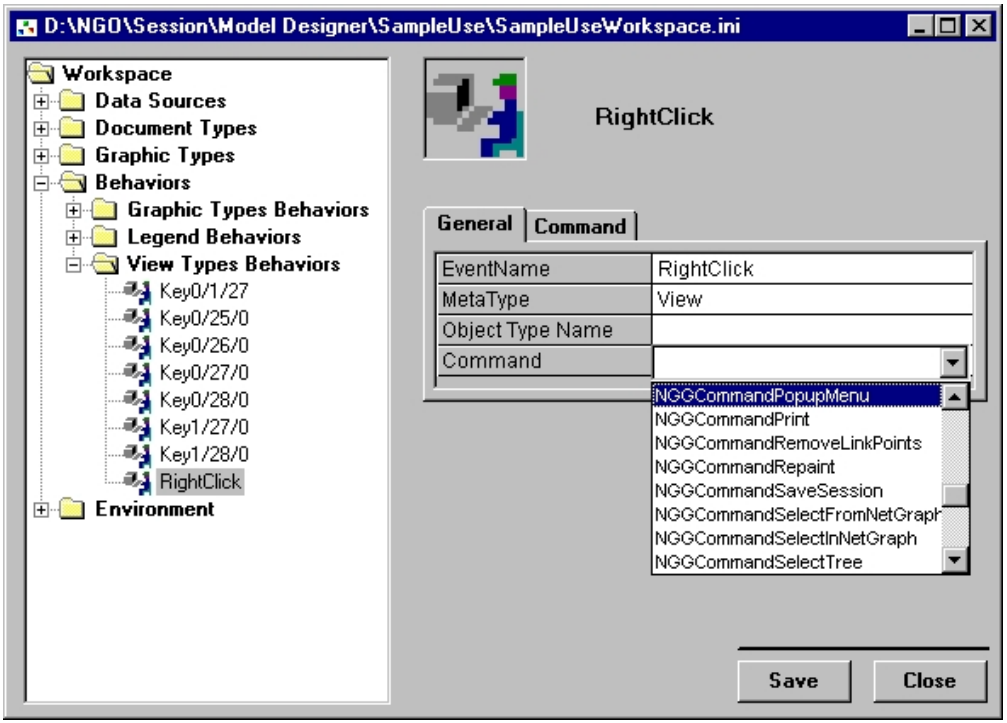
(1) Right-click the "View Types Behaviors" tree entry displayed under the "Behaviors" main entry and select the "Create" menu to open the "Create Behavior" form:



Select the "RightClick" predefined event name from the "EventName" dropdown list. As the "Create Behavior" form has been opened from the "View Types Behaviors" tree entry, the "MetaType" dropdown list is already filled with the "View" value:



(2) Now, from the new behavior "General" tab, select "NGGCommandPopupMenu" from the "Command" dropdown list as follows:



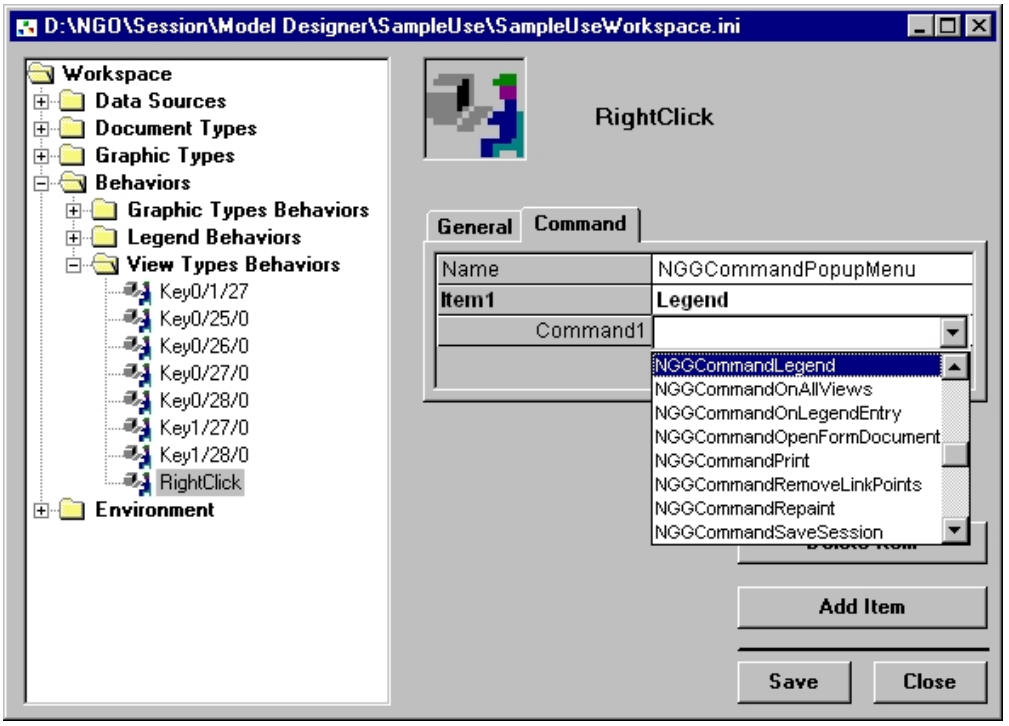
Click the "Command" tab and define the command that will correspond to the first popup menu item:

- Set the first item name that will appear in the popup menu

and

- Select "NGGCommandLegend" from the "Command1" dropdown list

The first item definition is finished; selecting this item will allow you to turn the legend subwindow on and off depending on if it is already displayed or not.



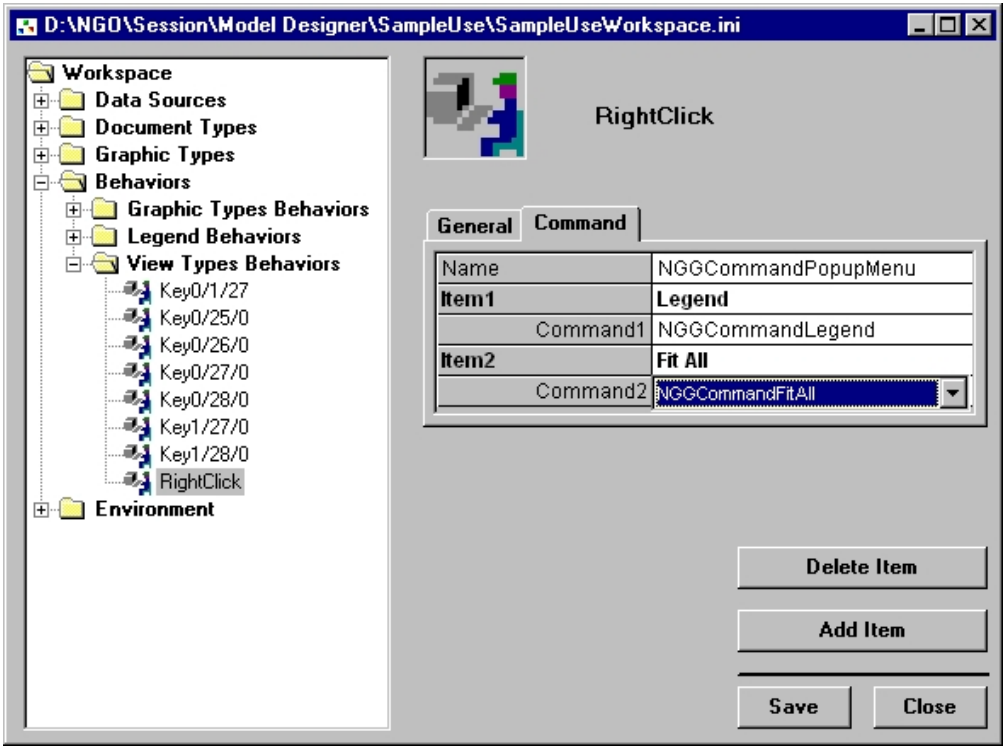
(3) Next, click the Add Item button to create the second popup menu item and define its related parameters as follows:

- Set the second item name that will appear in the popup menu

and

- Select "NGGCommandFitAll" from the "Command2" dropdown list

The second item definition is finished; selecting this item will allow all the graphic objects displayed to fit in any view:



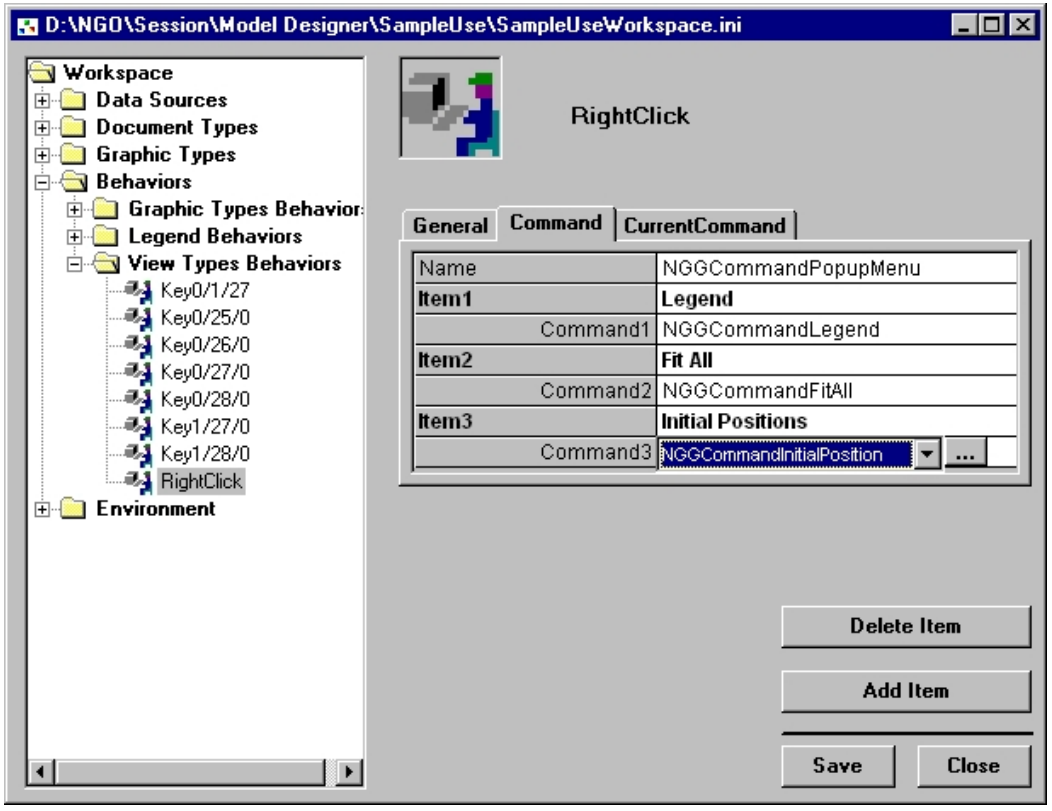
(4) Click the Add Item button to create the third popup menu item and define its related parameters as follows:

- Set the third item name that will appear in the popup menu

and

- Select "NGGCommandInitialPosition" from the "Command3" dropdown list

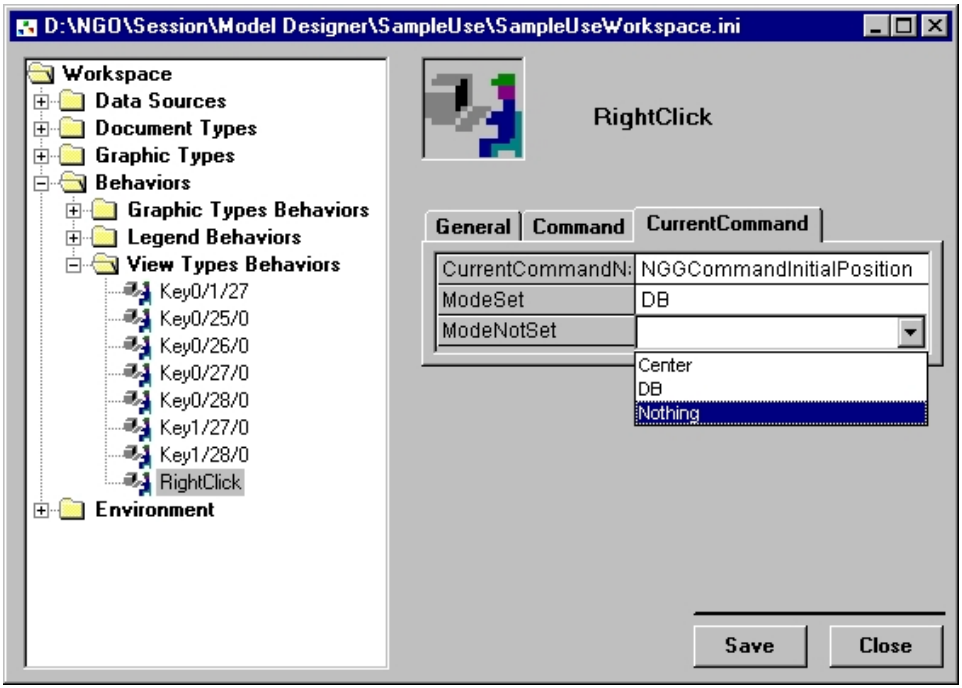
As this command is parameterized, click the ... button that automatically appears on the right of the "Command3" field to display its associated "CurrentCommand" tab:



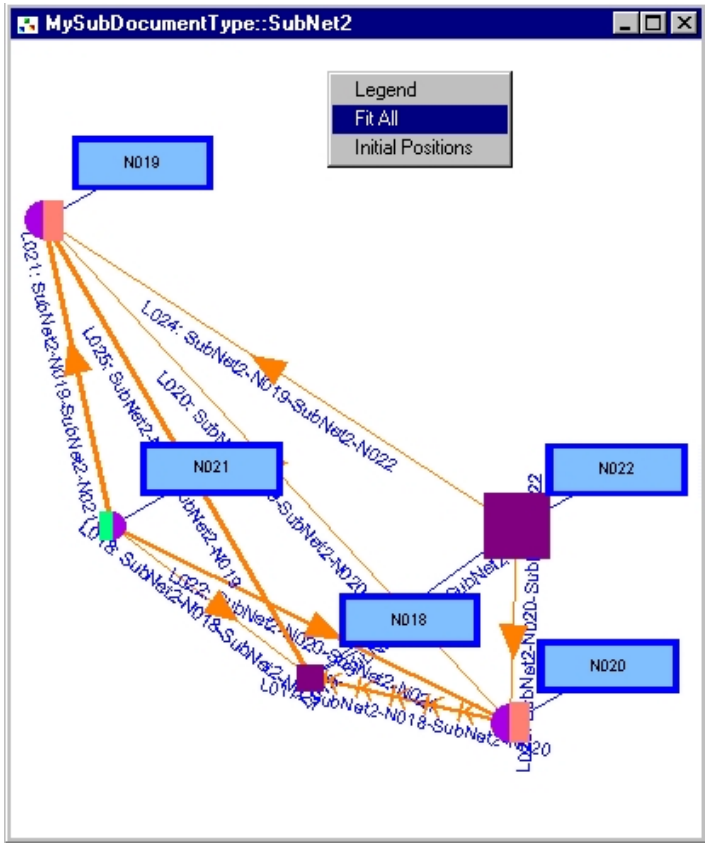
Select this tab and define the "ModeSet" and "ModeNotSet" parameter values as follows:

- For the "ModeSet" parameter, select the "DB" value from the dropdown list so that all graphic objects positioned with the "NGG_InitialXPosition" and "NGG_InitialYPosition" attributes are restored in their database positions.

- For the "ModeNotSet" parameter, select the "Nothing" value from the dropdown list so that graphic objects that do not contain "NGG_InitialXPosition" and "NGG_InitialYPosition" attributes are not moved.



(5) Save your workspace parameters, close the ArcGIS Schematics Designer Editor window, and test your popup menu display:



Note: The "Initial Positions" item has a different impact when it is called from a view associated to the "MyMainDocumentType" or from a subnetwork view. In the first case, graphic objects are not repositioned. In the second case, their database coordinates are restored.

➢ Step 24: Redefining the Default "LeftDblClick" Behavior Impacting a Legend Property Filter Entry

When your workspace was created, ArcGIS Schematics Designer automatically created some behaviors.

For the legend property filter, the "LeftDblClick" behavior allows you to automatically select the graphics objects associated with the property filter.

In this example, we will modify this behavior so that it chains the automatic selection of the graphics objects associated with the property filter and the centering of these objects in the view.

Because the "NGGCommantFit" command, which centers the graphic objects selected set in a view, can only be triggered from a view, you will have to delegate the selection from the legend property filter to the view. Two steps are necessary to define the new behavior:

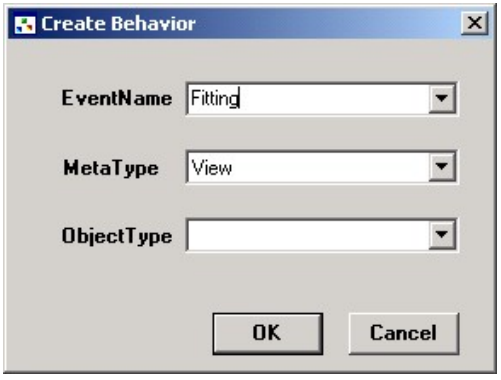
1) Defining a user-event on the view that triggers the fitting of a graphic objects selected set

2) Modifying the "LeftDblClick" behavior already defined on the legend property filter so that it chains the selection of the associated graphic objects and the fitting of these objects in the view.

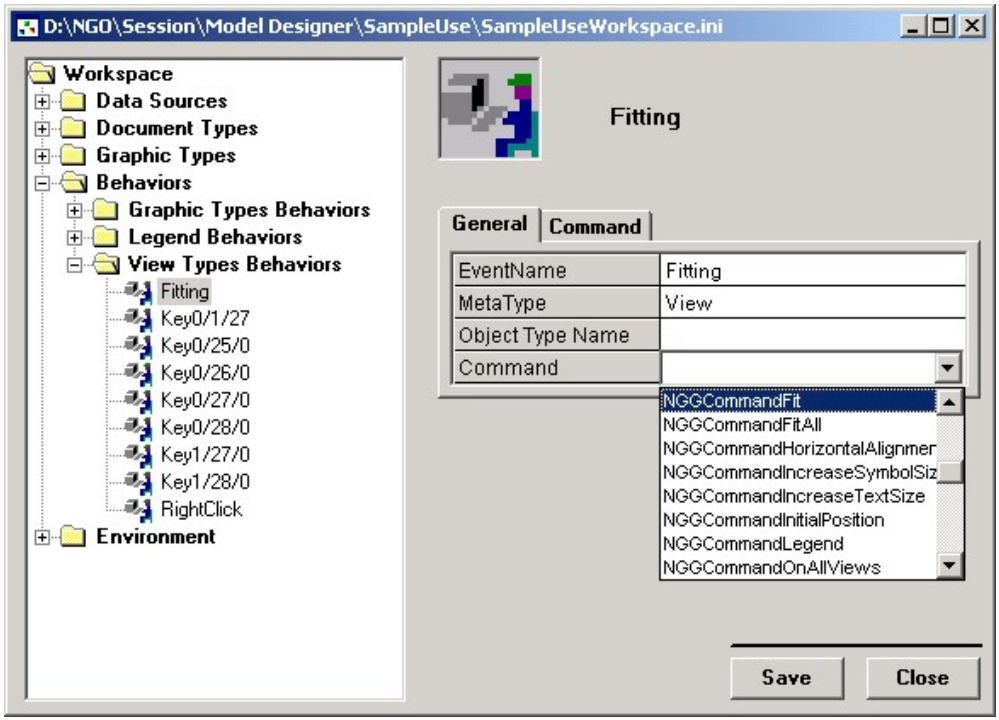
(1) Defining the "Fitting" User-Event

Right-click the "View Types Behaviors" tree entry displayed below the "Behaviors" main entry and select the "Create" menu to open the "Create Behavior" form.

Set the user-event name that will be used to reference this behavior in the "EventName" zone and validate:



Now from the new behavior "General" tab, select "NGGCommandFit" from the "Command" dropdown list as follows:

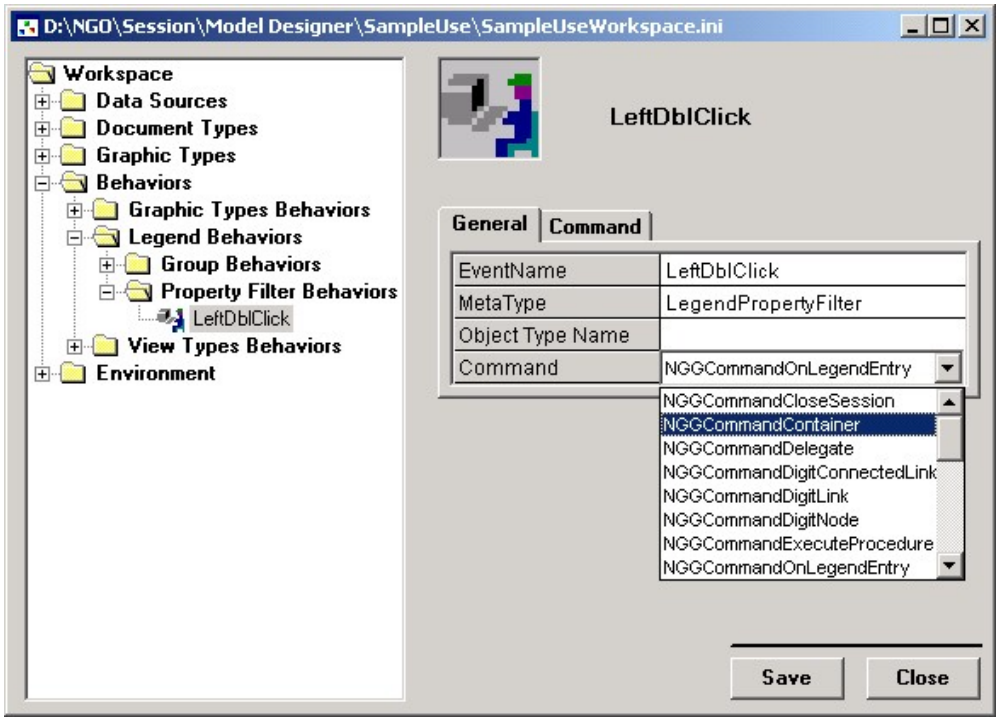


As this command is not parameterized, the first step is finished.

(2) Redefining the "LefDblClick" Behavior Impacting Legend Property Filters

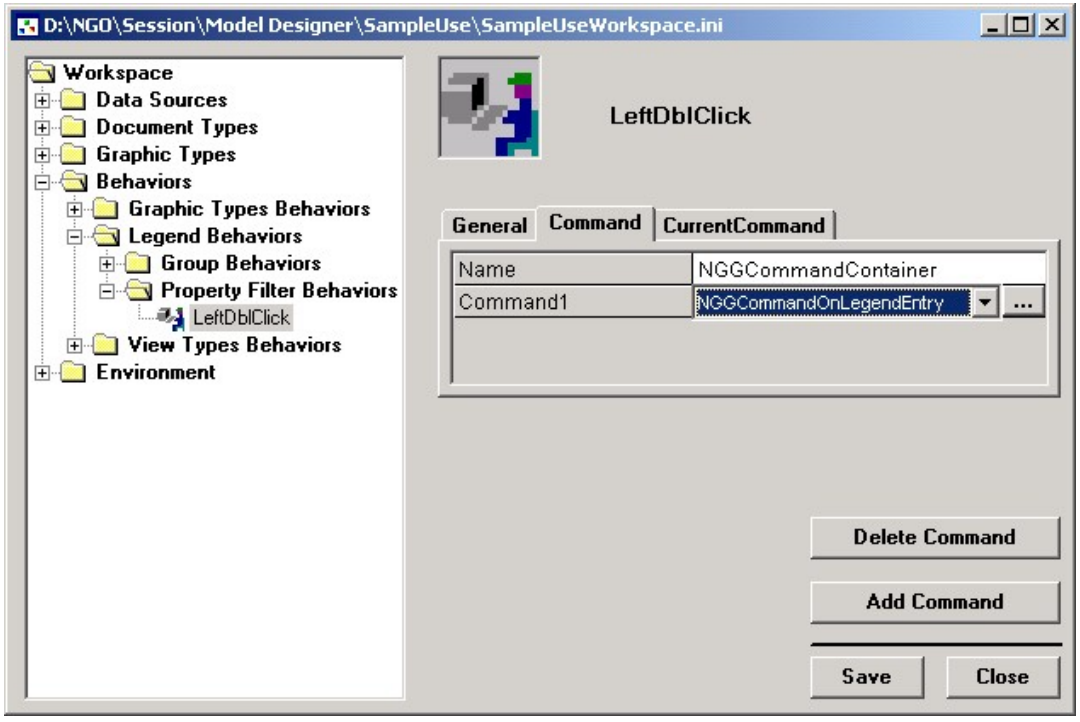
Select the "LeftDblClick" behavior entry displayed below the "Property Filter Behaviors" tree entry.

From the "General" tab, modify the "Command" parameter by selecting "NGGCommandContainer" from the dropdown list. (Note: The NGGCommandContainer is the command used to chain several commands.)

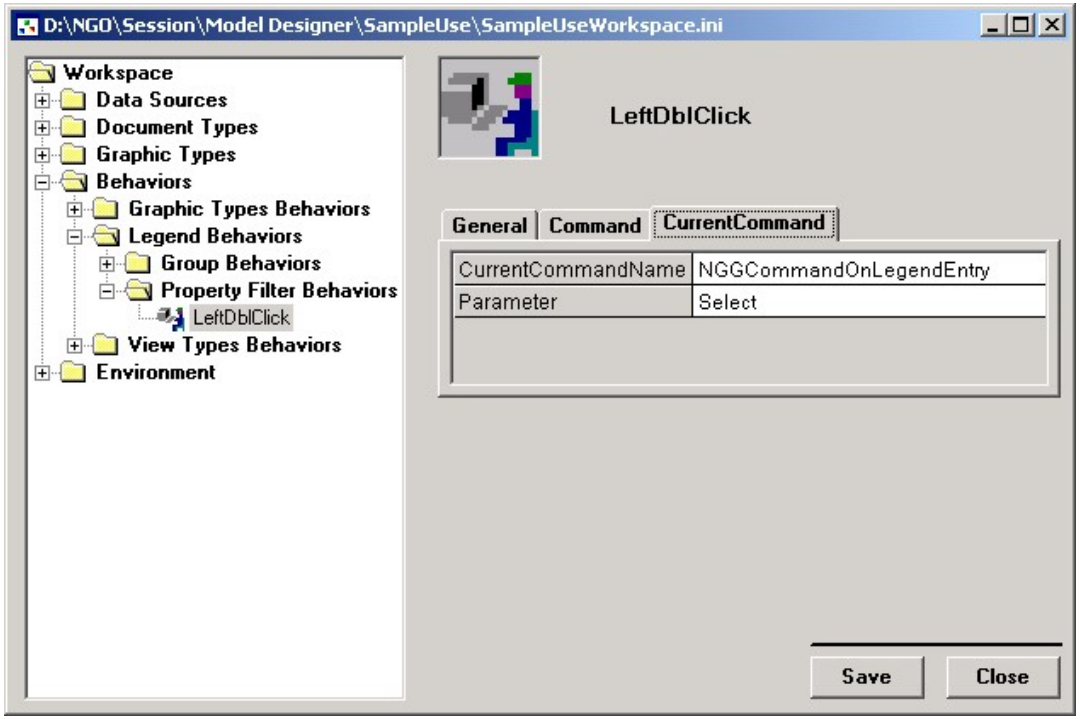


Click the "Command" tab. From the "Command1" dropdown list, select the "NGGCommandOnLegendEntry".

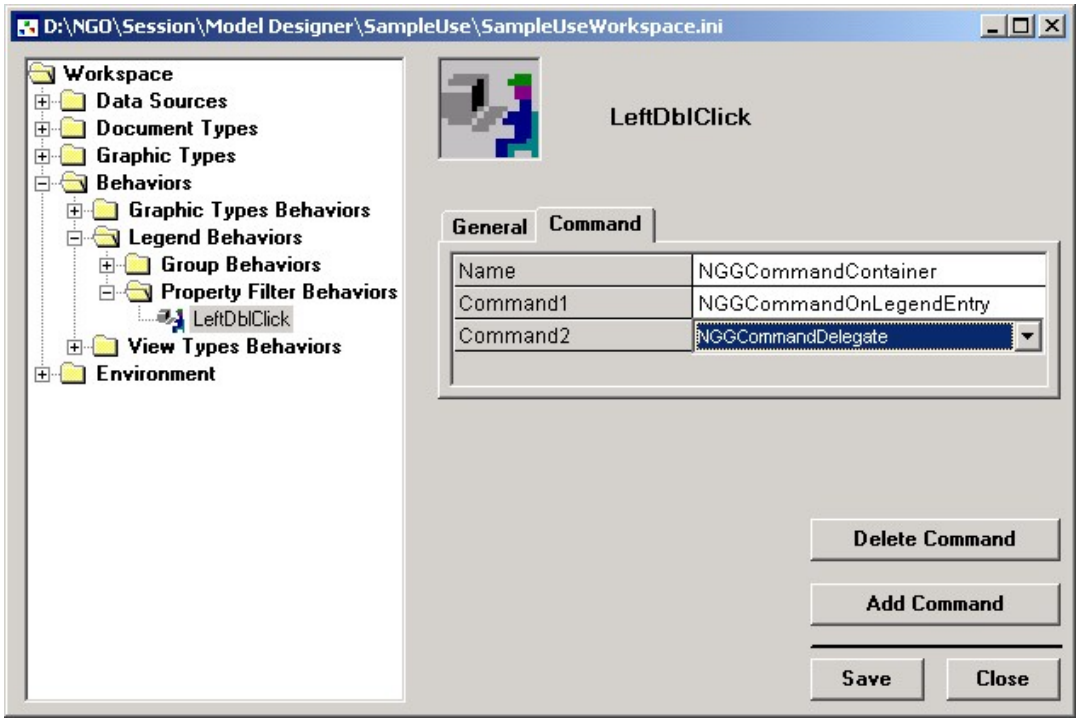
Click the ... button that automatically appears on the right of the "Command1" field to display its associated "CurrentCommand" tab:



Click the "CurrentCommand" tab that lets you specify the current "NGGCommandOnLegendEntry" parameters. Keep the default parameters and click the "Command" tab.

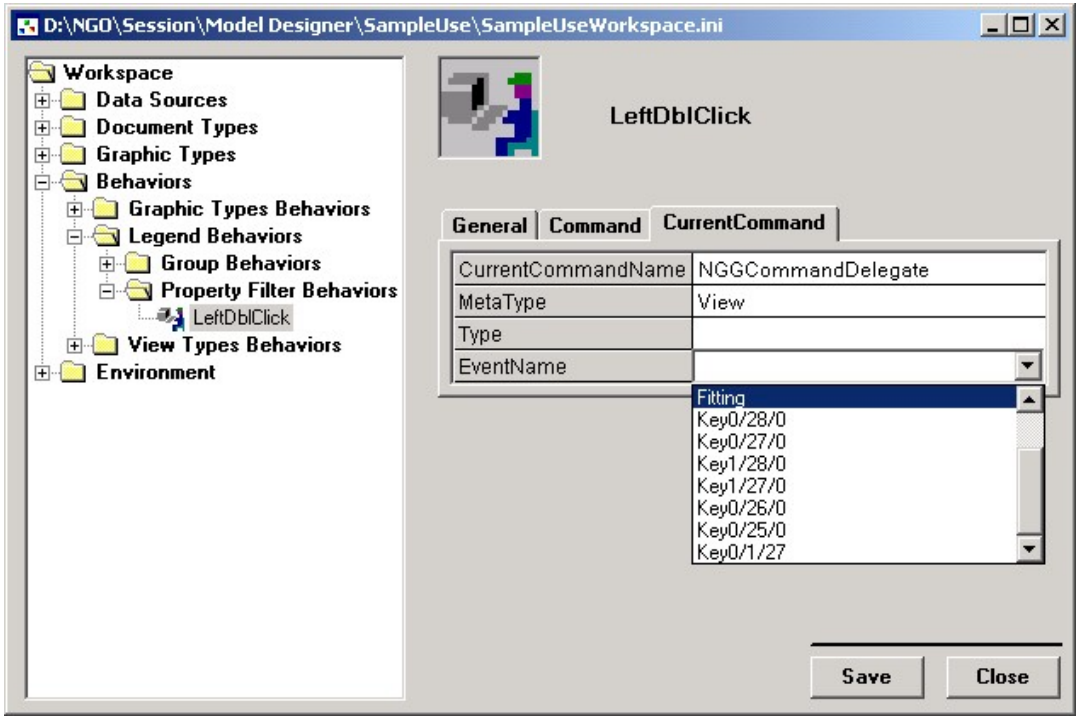


Click the Add Command button to create the second command we want to chain with the first one. Select "NGGCommandDelegate" from the "Command2" dropdown list:



Click the ... button that automatically appears on the right of the "Command2" field to display its associated "CurrentCommand" tab and select this tab.

As we want to delegate the behavior from the legend property filter to the view, select "View" from the "MetaType" dropdown list. Next, select the "Fitting" newly created user-event name from the "EventName" dropdown list:



This "LeftDblClick" behavior definition is now finished. Save your workspace parameters, close the window, and test your new behavior.

➢ Step 25: Defining the Behaviors That Will Impact Graphic Object Types

In this step we will create behaviors that will impact the "MyNodes" and "MyLinks" graphic types when an object of this type is right-clicked.

For example, for the "MyNodes" type, this behavior can display a popup menu that allows you to:

1. Rotate all the nodes by 45 degrees.
2. Center the clicked node in the view.
3. Activate or deactivate the "DisplayNodeType" property graphic effects.
4. Activate or deactivate the "DisplayNodeSize" property graphic effects.

If the first, third, and fourth popup menu items correspond to a single parameterized command, the second one must chain several commands. In fact, the command used to center an object in a view works on a selected object only. As right-clicking a node doesn't select it, we will have to select the node before centering it.

The "NGGCommandContainer" used to chain several commands cannot be directly called from a popup menu item. The solution consists of defining a user-event to trigger this command chaining that we will call from the popup menu item through a "NGGCommandDelegate" command.

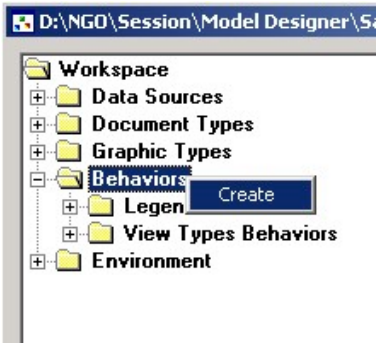
For the "MyLinks" type, we can also display a popup menu that allows you to:

1. Activate or deactivate the "LinkName" property label.
2. Activate or deactivate the "DisplayLinkType" property graphic effects.
3. Activate or deactivate the "DisplayLinkRate" property graphic effects.

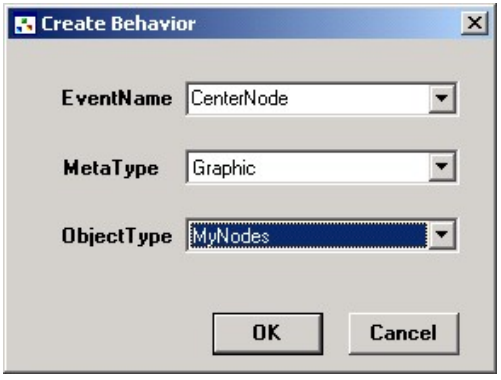
>> Defining the Sample Behavior Related to the Node Types

(1) Defining the "CenterNode" User-Event

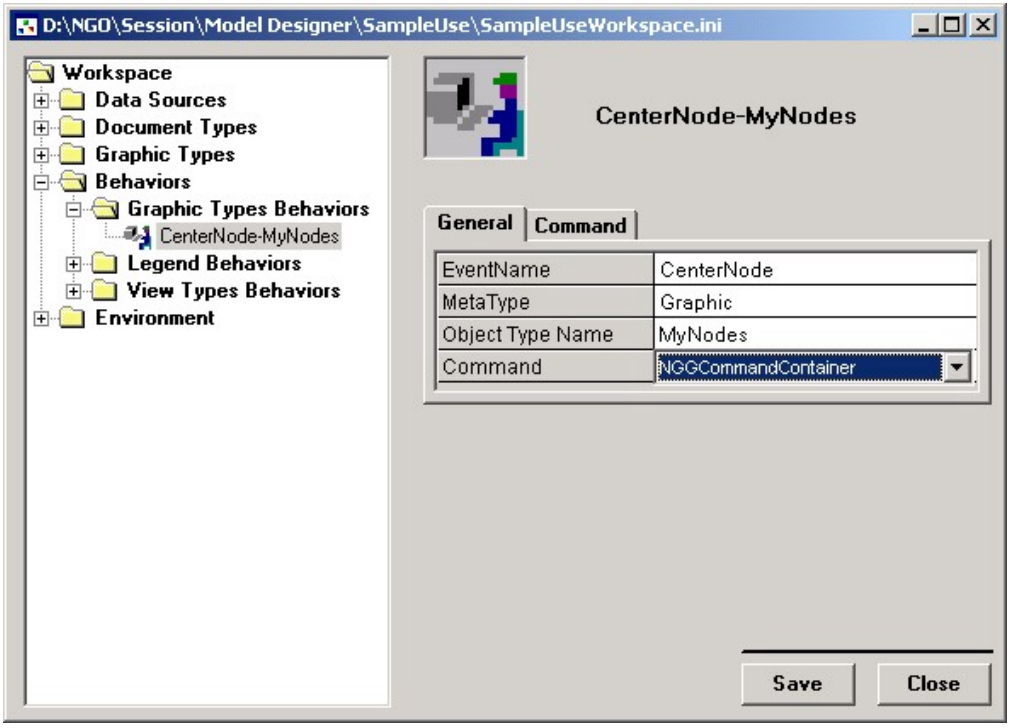
Right-click the "Behaviors" tree entry and select the "Create" menu to open the "Create Behavior" form:



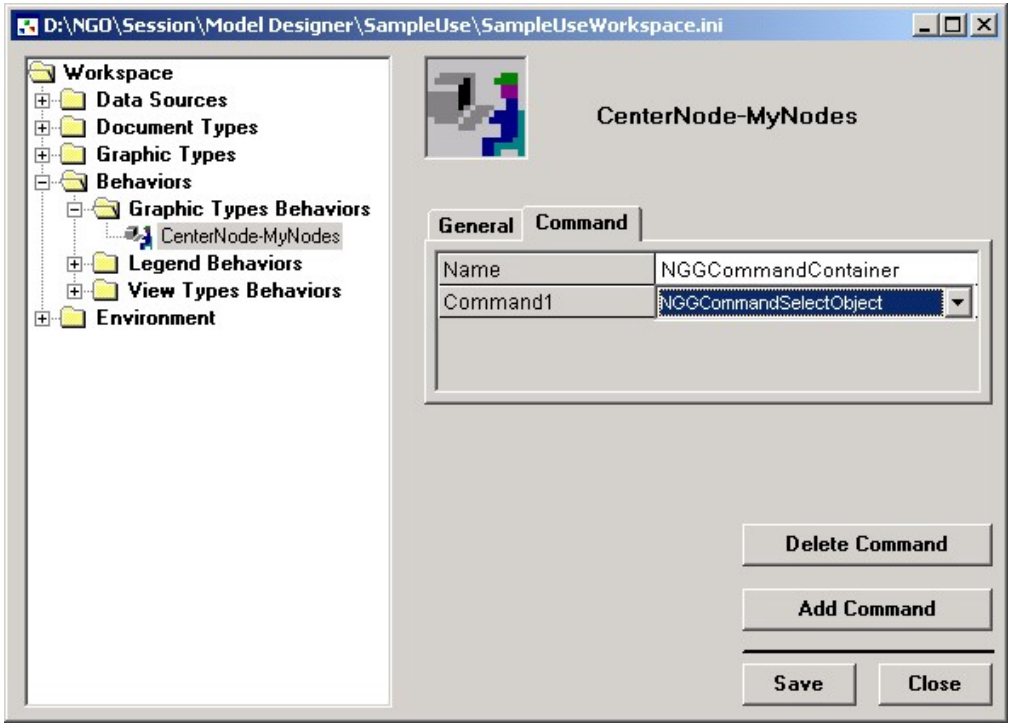
Set the user-event name that will be used to reference this behavior in the "EventName" zone, select "Graphic" from the "MetaType" dropdown list, choose the "MyNodes" graphic type, and validate:



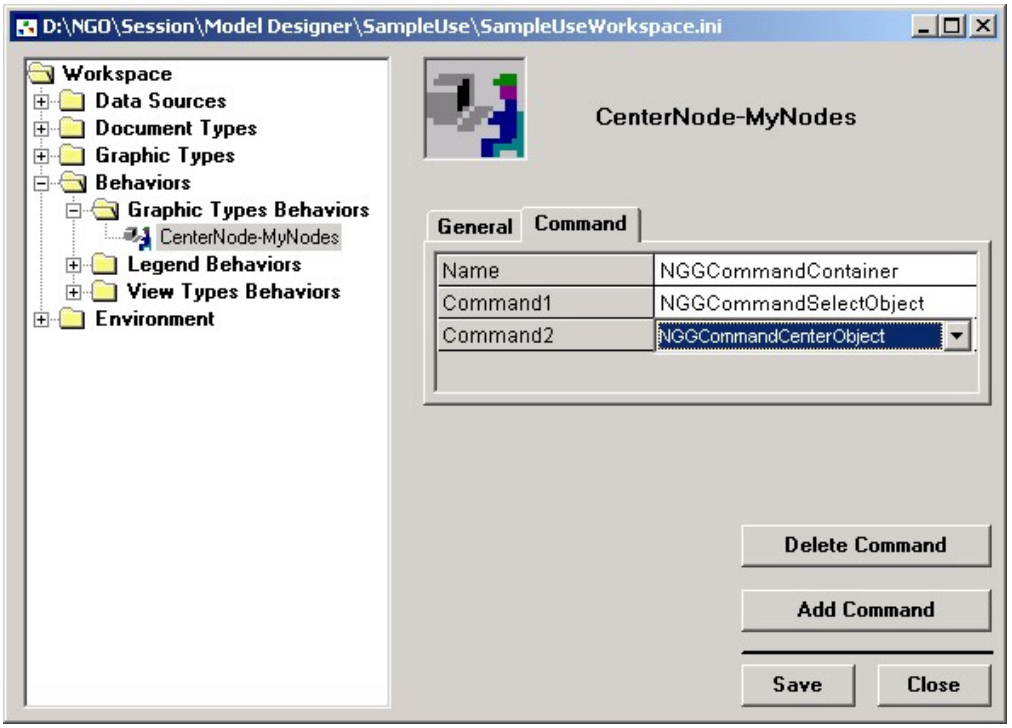
Now, from the new behavior "General" tab, select "NGGCommandContainer" from the "Command" dropdown list as follows:



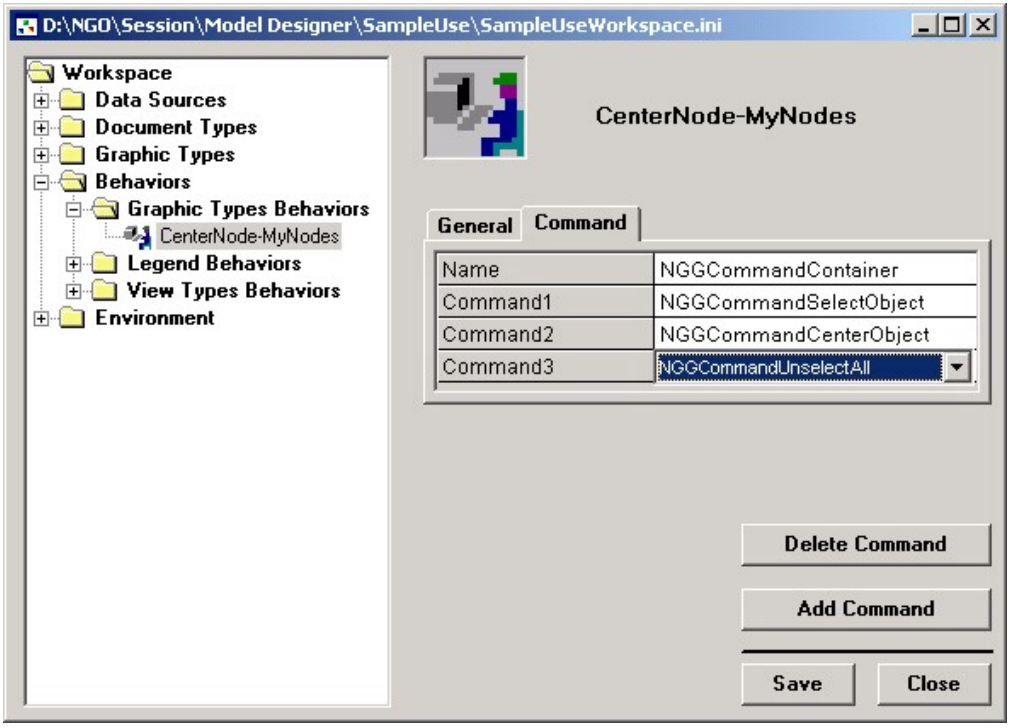
Next, click the "Command" tab. From the "Command1" dropdown list, select "NGGCommandSelectObject":



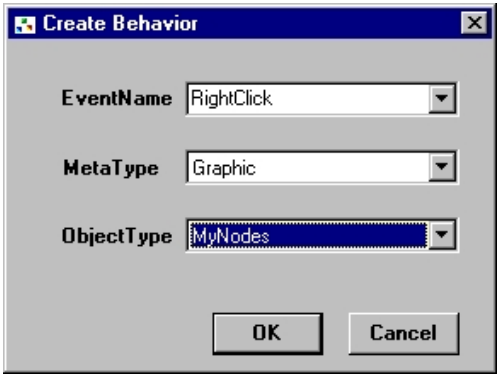
Click the Add Command button to create the second command that will chain with the first one. Select "NGGCommandCenterObject" from the "Command2" dropdown list:



As shown in the following screenshot, this user-event definition can end by calling the "NGGCommandUnselectAll" command so that object just selected is automatically unselected after it is centered in the view:

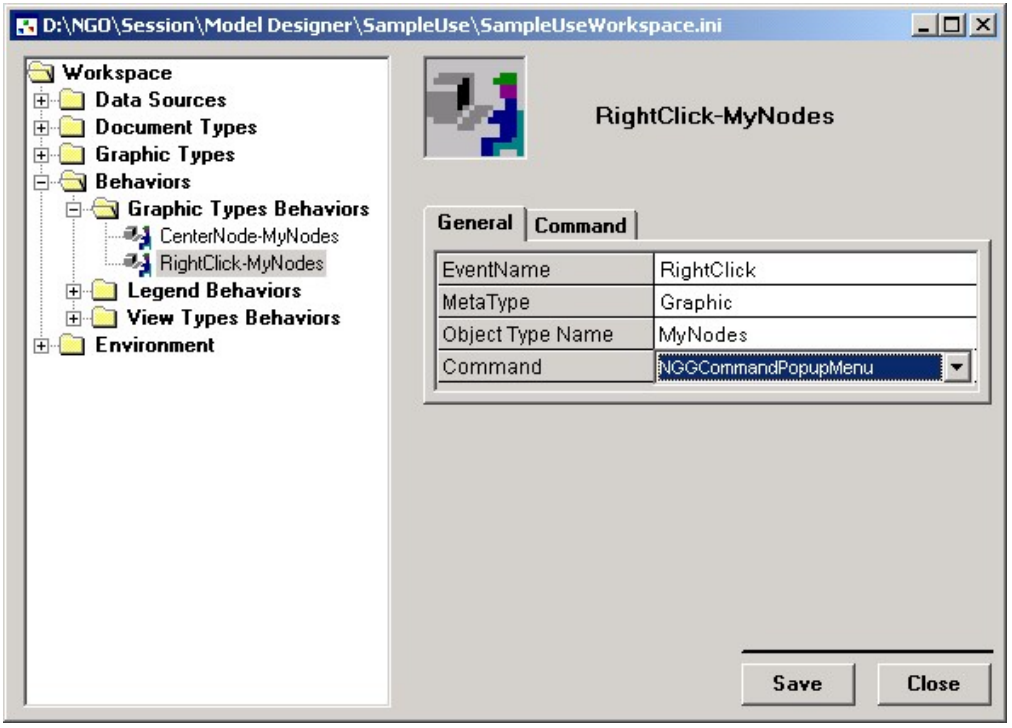


(2) Defining the "RightClick" Behavior Impacting the "MyNodes" Graphic Objects
Right-click the "Behaviors" tree entry and select the "Create" menu to open the "Create Behavior" form:



Select “RightClick” from the "EventName" dropdown list, select "Graphic" from the "MetaType" dropdown list, choose the "MyNodes" graphic type, and validate.

Now, from the new behavior "General" tab, select "NGGCommandPopupMenu" from the "Command" dropdown list as follows:

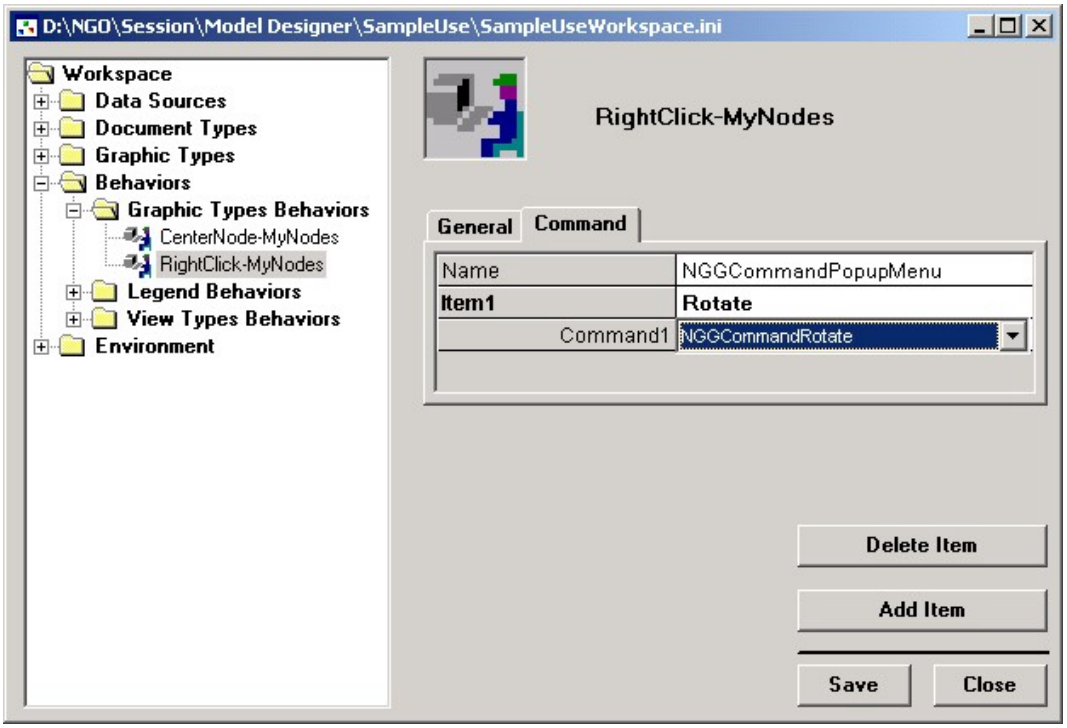


Click the "Command" tab and start defining the command that will correspond to the first popup menu item parameter:

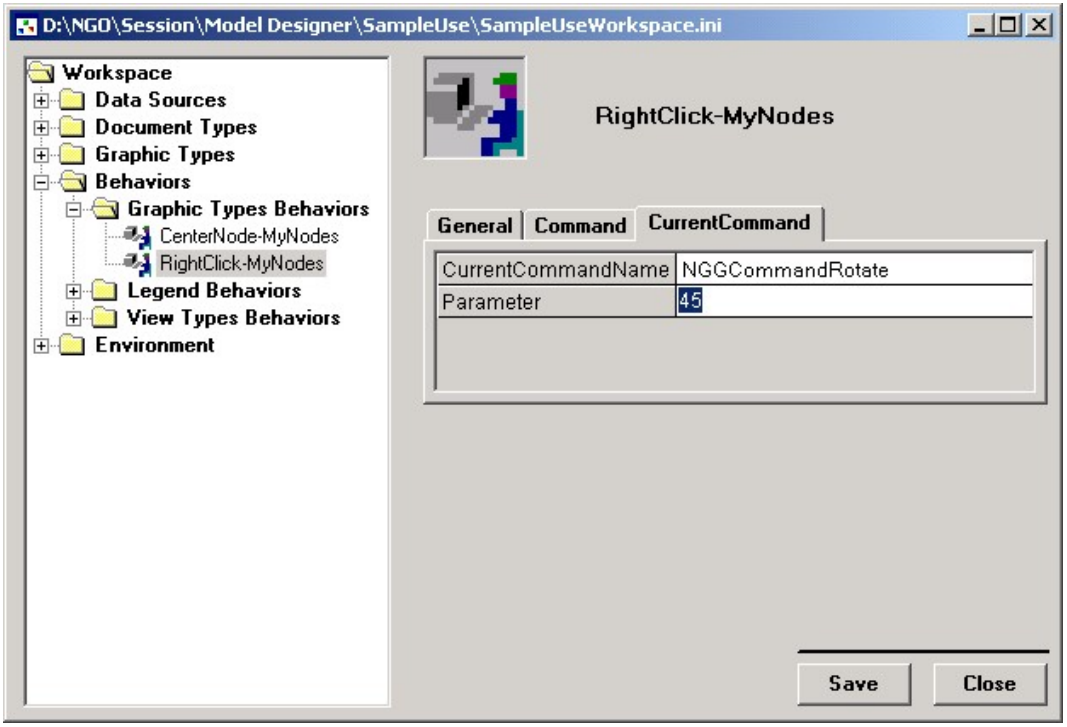
- Set the first item name that will appear in the popup menu

and

- Select the "NGGCommandRotate" from the "Command1" dropdown list:



Click the ... button that automatically appears on the right of the "Command1" field to display its associated "CurrentCommand" tab. Select this tab and specify the "Parameter" value that corresponds to the angle that will be used to rotate the nodes:



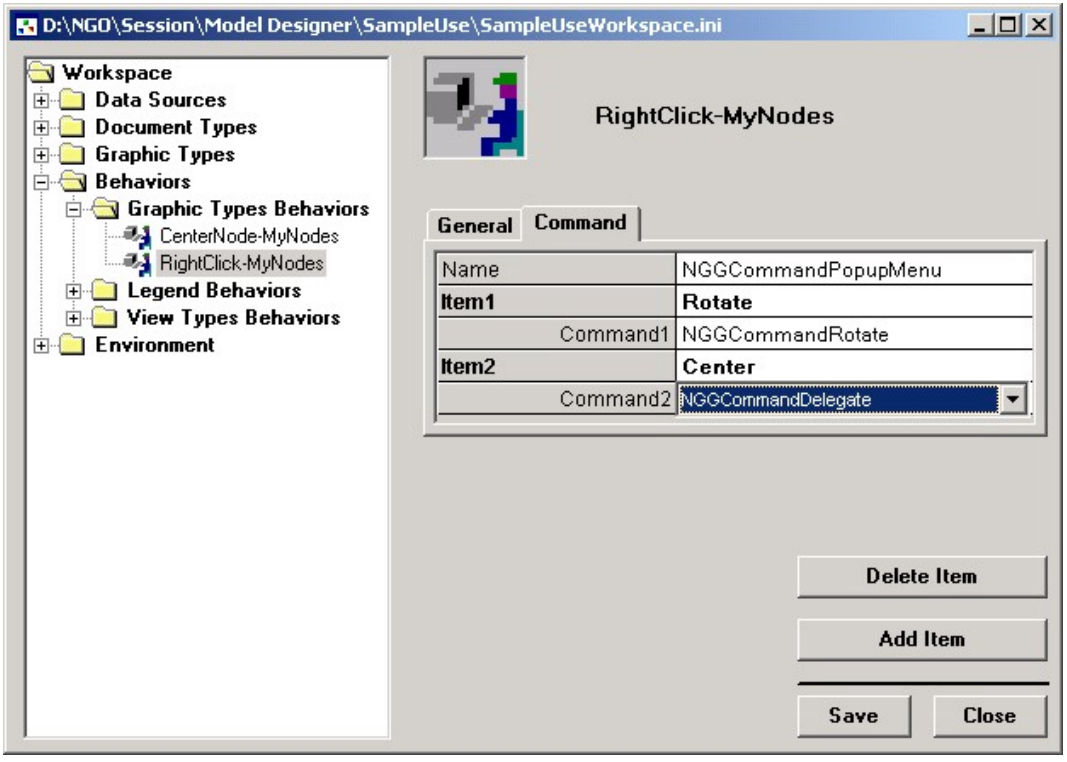
Select the "Command" tab and click the 

button to set the second popup menu item parameters:

- Set the second item name that will appear in the popup menu

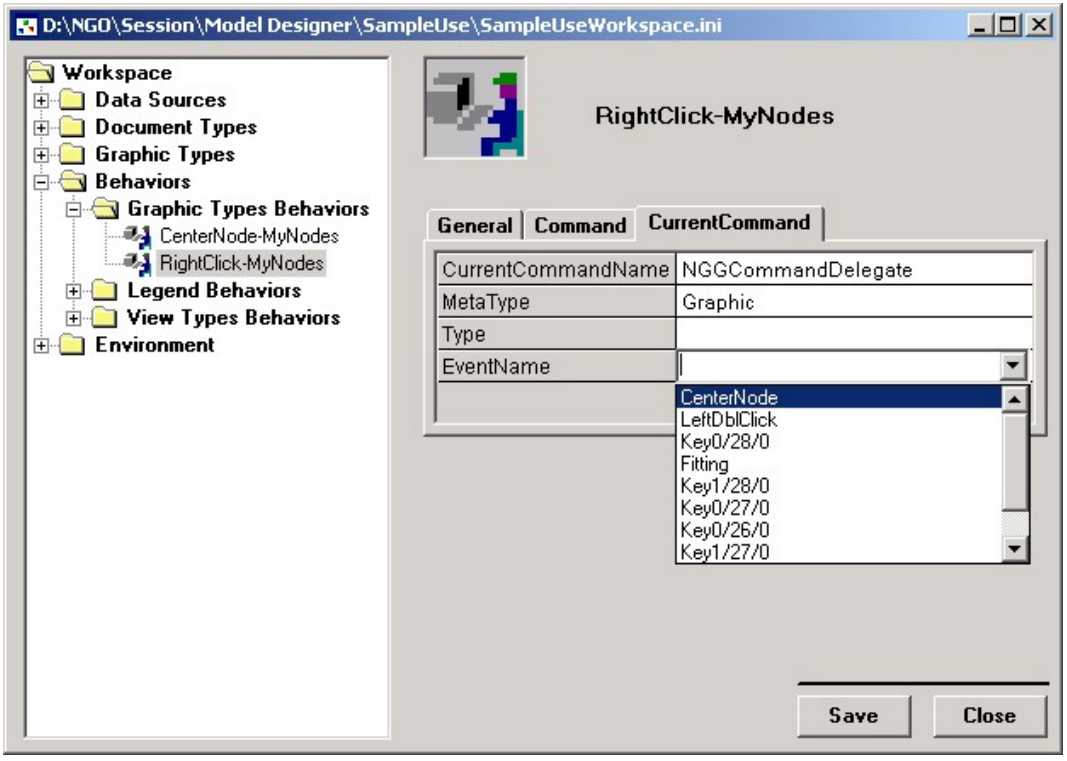
and

- Select the "NGGCommandDelegate" from the "Command2" dropdown list:



Click the ... button on the right of the "Command2" field to display its associated "CurrentCommand" tab and select this tab.

The "MetaType" parameter default value is the right one. We just have to set the "EventName" parameter value; select the "CenterNode" behavior from the dropdown list:

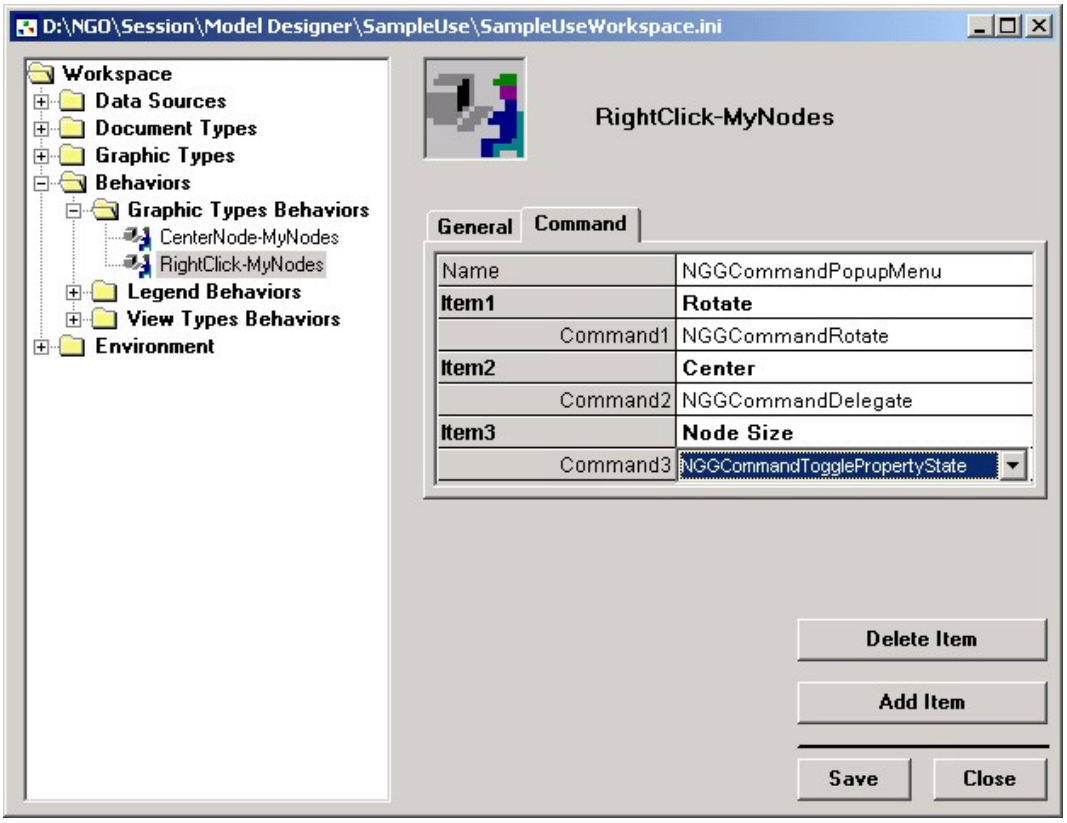


Select the "Command" tab and click the Add Item button to set the third popup menu item parameters:

- Set the third item name that will appear in the popup menu

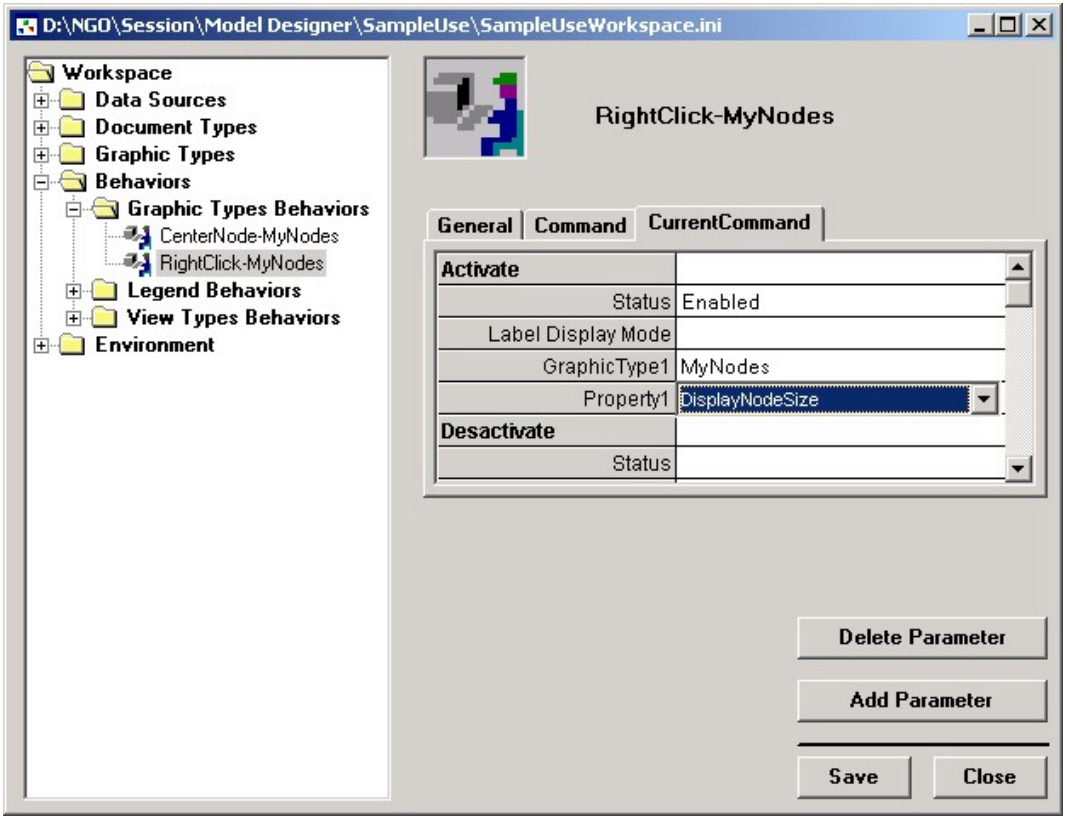
and

- Select the "NGGCommandTogglePropertyState" from the "Command3" dropdown list:



Click the ... button on the right of the "Command3" field to display its associated "CurrentCommand" tab and select this tab.

Select "Enabled" from the "Status" dropdown list so that the property graphic effects are turned on/off according to the property current status. Select "MyNodes" from the "GraphicType1" and select the related property, "DisplayNodeSize":

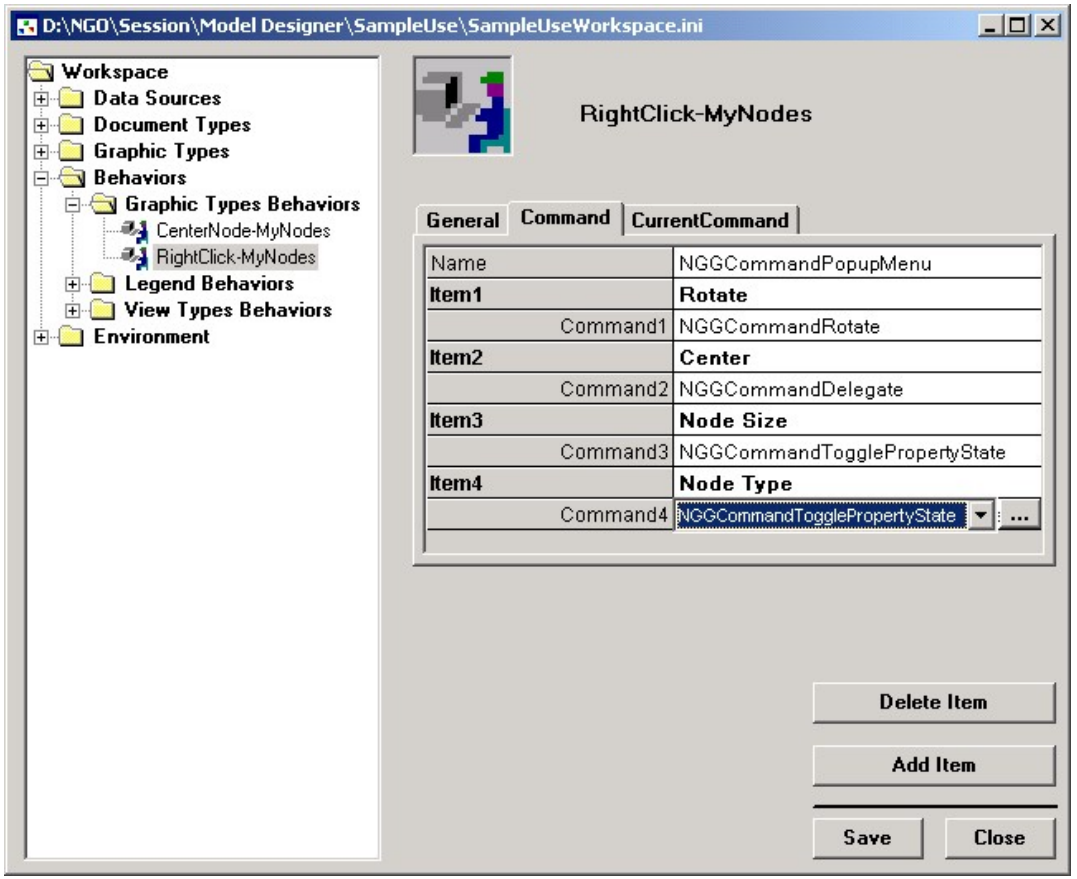


Select the "Command" tab and click the Add Item button to set the last popup menu item parameters:

- Set the item name that will appear in the popup menu

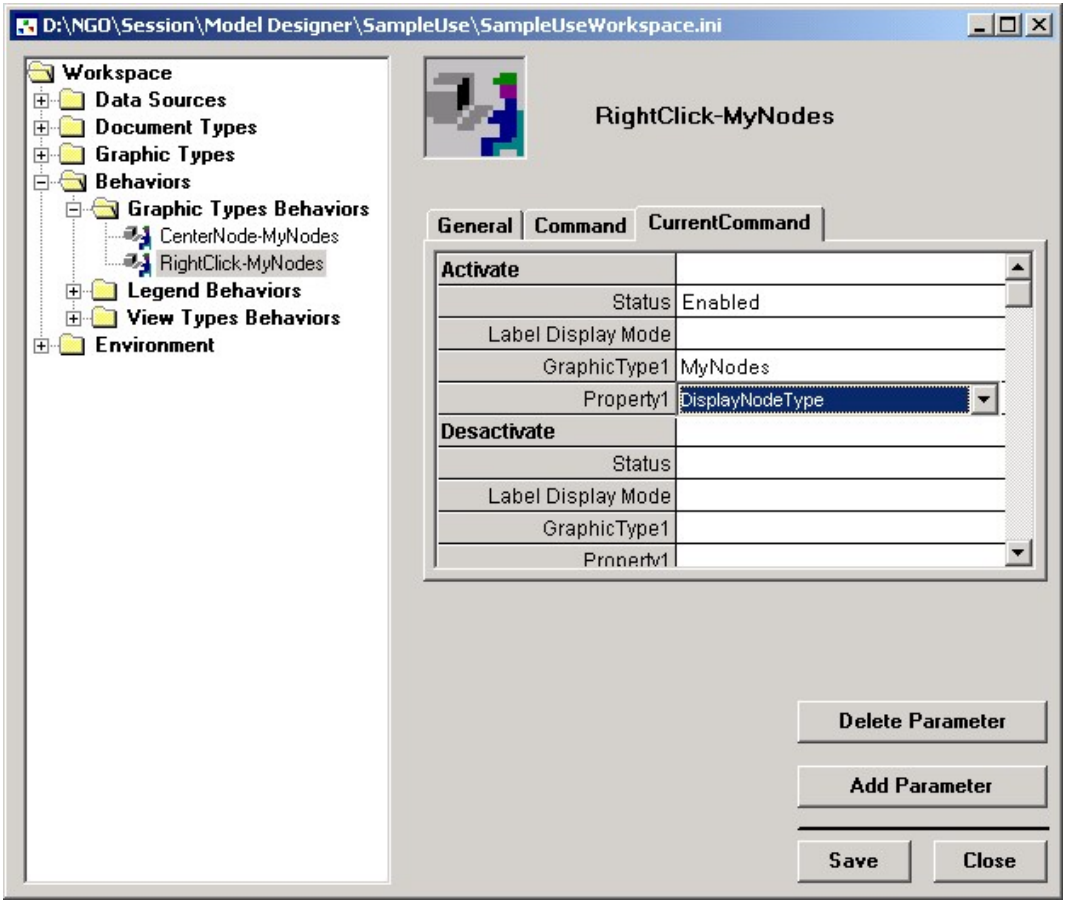
and

- Select the "NGGCommandTogglePropertyState" from the "Command4" dropdown list:



Click the ... button on the right of the "Command4" field to display its associated "CurrentCommand" tab and select this tab.

Select "Enabled" from the "Status" dropdown list, select "MyNodes" from the "GraphicType1" field, and select the related property—"DisplayNodeType":



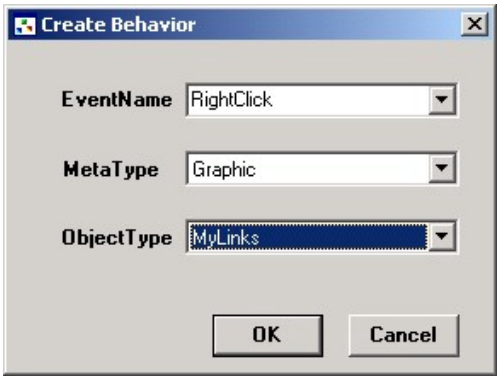
This behavior definition is now finished. Save your workspace parameters, close the window, and test the behavior.

Note that if this behavior is defined for the "MyNodes" type, it is also available for the inherited "SubNodes" type.

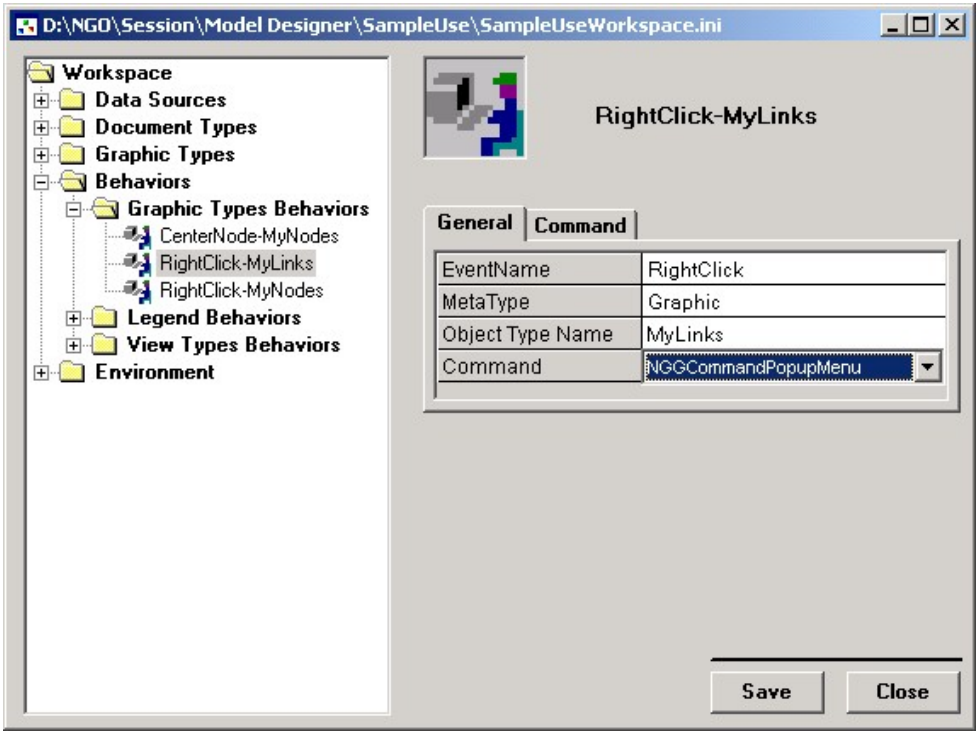
>> Defining the Sample Behavior Related to the Link Types

As for the nodes, right-click the "Graphic Types Behaviors" tree entry and select the "Create" menu to open the "Create Behavior" form.

Select "RightClick" from the form's "EventName" dropdown list, select the "MyLinks" graphic type, and validate:



From the new behavior "General" tab, select "NGGCommandPopupMenu" from the "Command" dropdown list as follows:

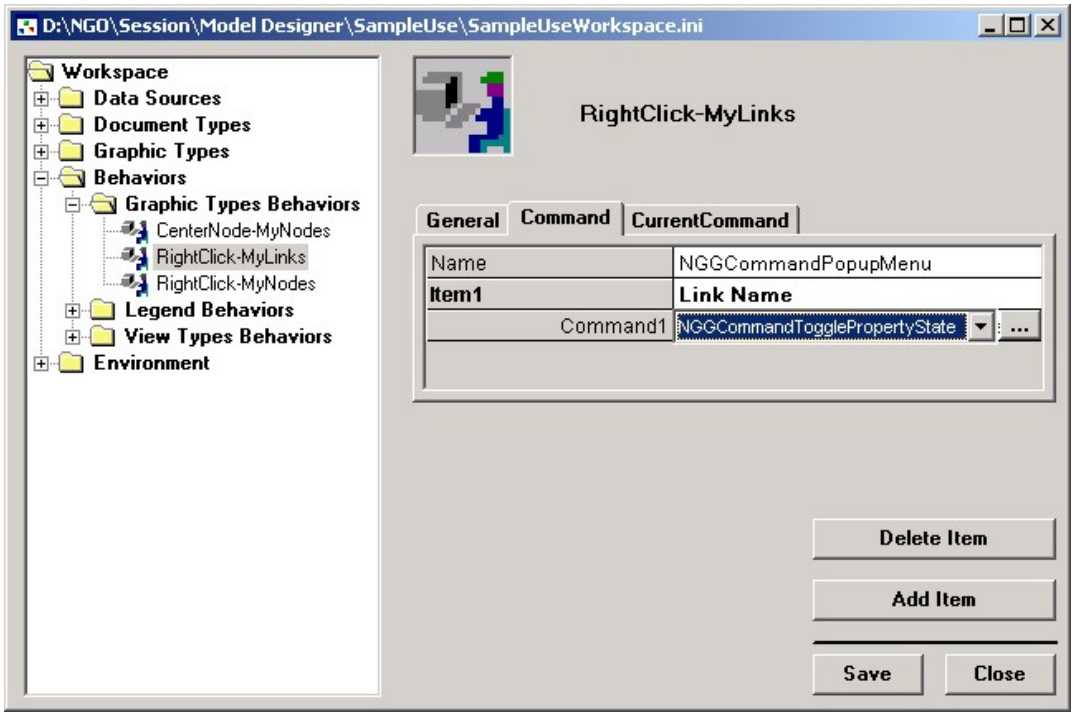


Click the "Command" tab to start defining the command that will correspond to the first popup menu item:

- Set the first item name that will appear in the popup menu

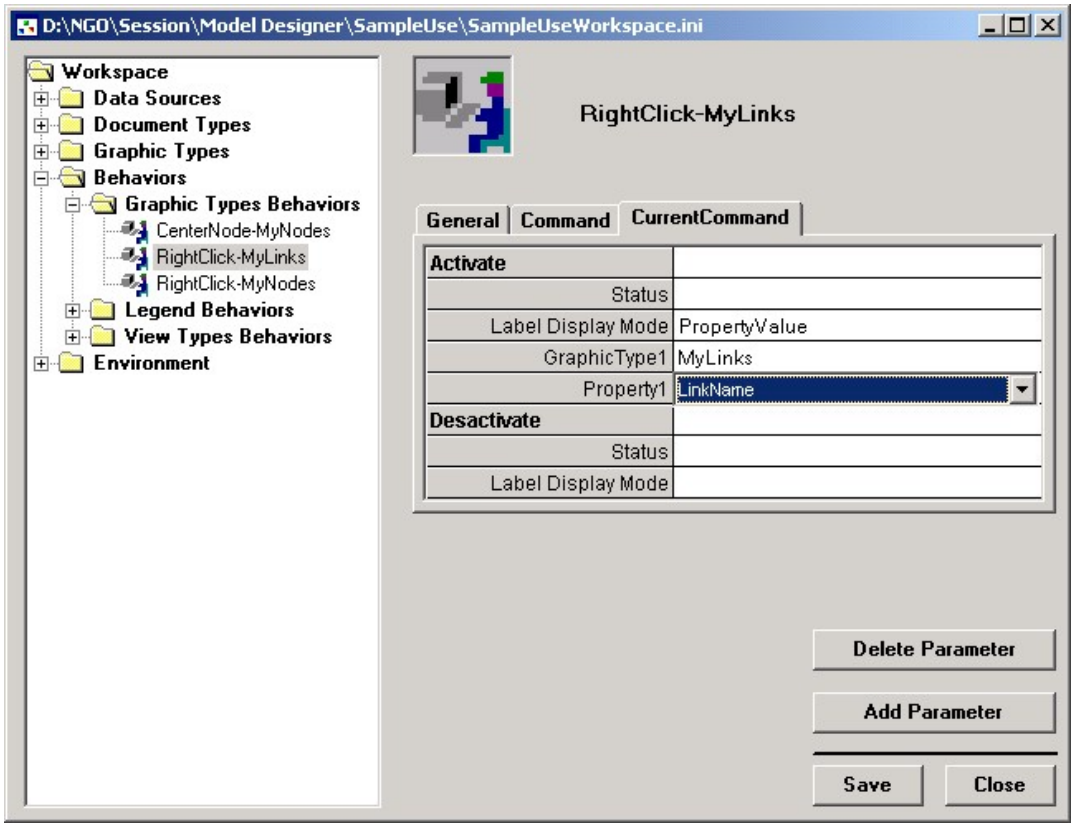
and

- Select "NGGCommandTogglePropertyState" from the "Command1" dropdown list:



Now click the ... button on the right of the "Command1" field to display its associated "CurrentCommand" tab and select this tab.

Select "PropertyValue" from the "Label Display Mode" dropdown list so that the property label is turned on/off according to the property current status. Select "MyLinks" from the "GraphicType1" field and select the related property—"LinkName":

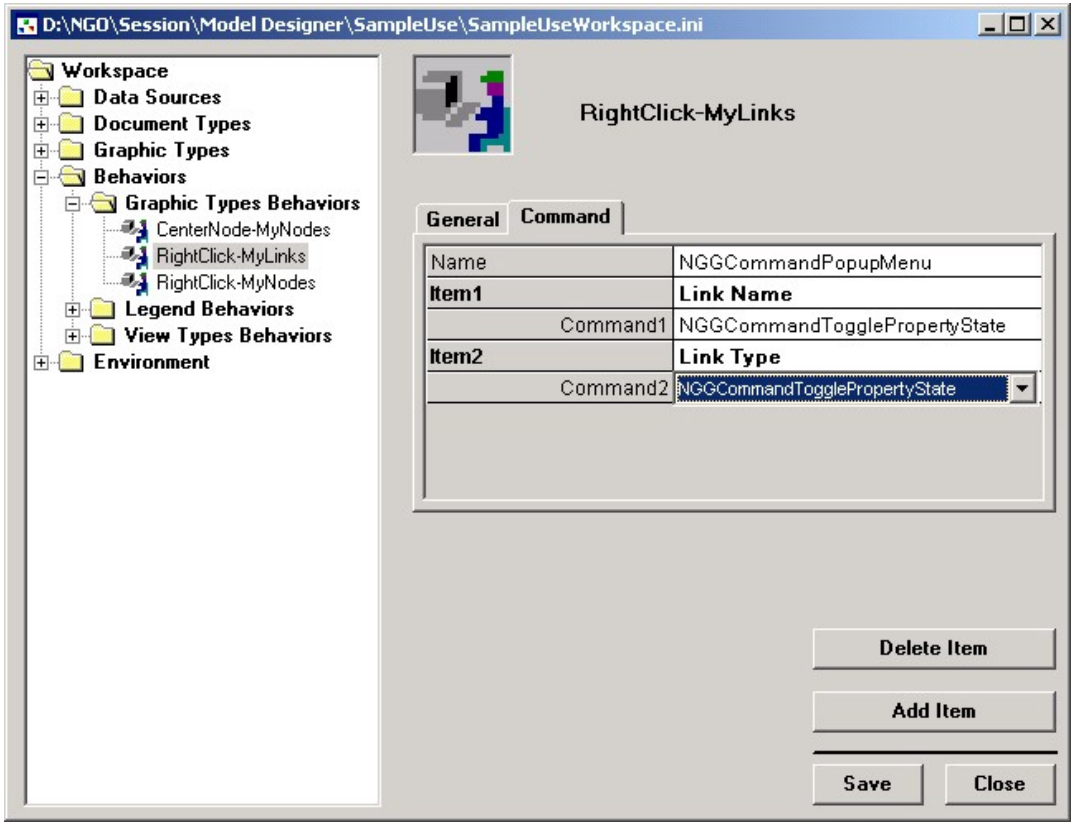


Select the "Command" tab and click the Add Item button to set the second popup menu item parameters:

- Set the second item name that will appear in the popup menu

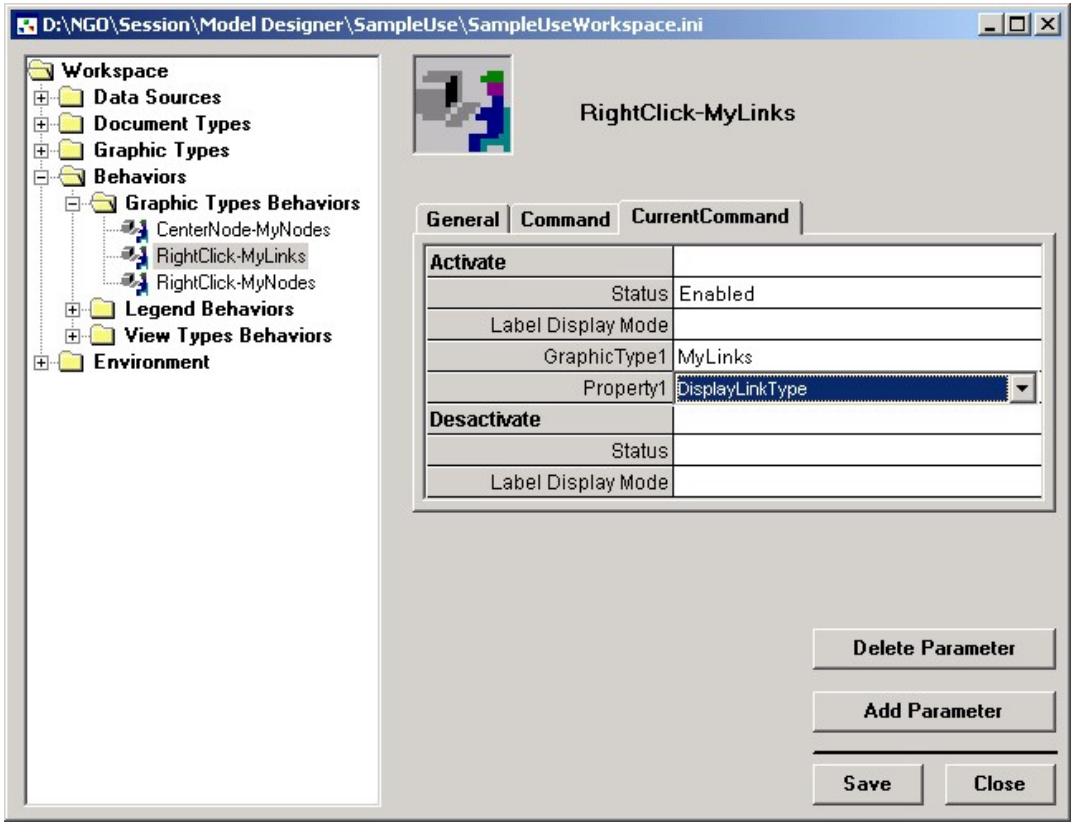
and

- Select "NGGCommandTogglePropertyState" from the "Command2" dropdown list:



Click the ... button on the right of the "Command2" field to display its associated "CurrentCommand" tab and select this tab.

Select "Enabled" from the "Status" dropdown list so that the property graphic effects are turned on/off according to the property current status. Select "MyLinks" from the "GraphicType1" field and select the related property—"DisplayLinkType":



Select the "Command" tab and click the Add Item button to create the last popup menu item parameters. This item must turn the graphic effects related to the "DisplayLinkRate" property on and off according to its current state. The definition is similar to the second item you just created.

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