GMS 7.0 TUTORIALS

Feature Objects

1   Introduction

This tutorial gives an introduction to feature objects. Feature objects are basic objects used in numerous ways in GMS.

1.1   Contents

1.2   Outline

This is what you will do:

1.   Create coverages

2.   Create conceptual models

3.   Create feature objects

4.   Select and modify feature objects

1.3   Required Modules/Interfaces

You will need the following components enabled to complete this tutorial:

- Map, GIS

You can see if these components are enabled by selecting the *File | Register*.

2   Getting Started

Let's get started.

1.   If necessary, launch GMS. If GMS is already running, select the *File | New* command to ensure that the program settings are restored to their default state.

3   Feature Objects

Feature objects have been patterned after Geographic Information Systems (GIS) objects and include points, nodes, arcs, and polygons (Figure 1). You can use feature objects in many ways in GMS, and they are used in several tutorials.
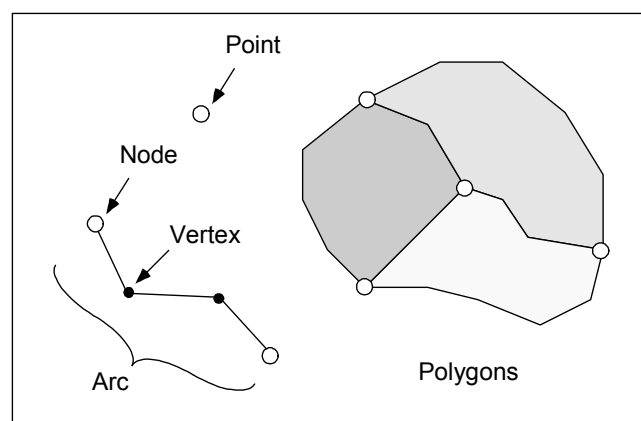

Figure 1.   Feature objects.

3.1   Points

Points are xy locations that are not attached to an arc. Points have unique ids and can be assigned properties. Points are typically used to represent wells.

3.2   Arcs

Arcs are sequences of line segments or edges which are grouped together as a single "polyline" entity. Arcs have unique ids and can be assigned properties.

3.3   Nodes and Vertices

The two end points of an arc are called "nodes" and the intermediate points are called "vertices." Nodes have unique ids and can be assigned properties. Vertices are used solely to define the geometry of the arc. Vertices cannot have properties.

3.4   Polygons

Polygons are a group of connected arcs that form a closed loop. A polygon can consist of a single arc or multiple arcs. If two polygons are adjacent, the arc(s) forming the boundary between the polygons is shared (not duplicated).

3.5   Coverages

Feature objects are grouped into coverages. Each coverage represents a particular set of objects and the attributes associated with those objects.

3.6   Coverages and Conceptual Models

Coverages

Let's create a coverage.

1. In the *Project Explorer*, right-click and select the *New|Coverage* command.

2. Click OK to exit the *Coverage Setup* dialog.

The **new coverage** item is now the active coverage, meaning that when we create feature objects, they will be added to this coverage.

3. In the *Project Explorer*, right-click on the "**new coverage**" and select the *Duplicate* command from the pop-up menu.

Coverages can be duplicated. All the feature objects and attributes from the original coverage are copied to the new coverage.

4. Right-click on the "**Copy of new coverage**" coverage and select the *Delete* command from the pop-up menu.

Conceptual Models

A conceptual model in GMS is an object that can be used to associate one or more related coverages.

1. Right click in the *Project Explorer* and select the *New|Conceptual Model* command from the pop-up menu.
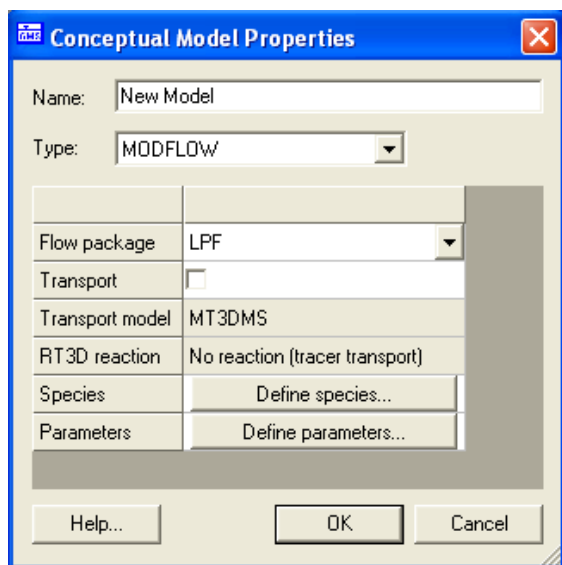

Figure 2.   The Conceptual Model Properties menu command.

Notice that conceptual models have a name and a type. The type corresponds with the type of model you will be creating (MODFLOW, FEMWATER etc). The type determines what other options are available in the spreadsheet.

2. Click OK to exit the *Conceptual Model Properties* dialog.

3. In the *Project Explorer* drag the "**new coverage**" below the "New Model" conceptual model.

4. Click *Yes* at the warning about attributes.

The attributes available to use in coverages depend on the settings in the conceptual model the coverage is in.

The coverage should now be below the conceptual model.

Figure 3.   The Project Explorer showing a coverage below a conceptual model.

3.7   Creating Feature Objects

Let's create some feature objects now.

1. Switch to the *Create Point* tool ⁜.

2. Click with the mouse to create points in any location.

3. Switch to the *Create Arc* tool ⌐.

4. Create several arcs by clicking with the mouse. Single-click to create arc vertices and double-click to end the arc.

Polygons must be created using the *Feature Objects | Build Polygons* menu command. Although you may have created a closed loop with one or more arcs, a polygon won't exist until you select the *feature objects | Build Polygons* menu command.

5. Create some polygons by creating closed loops with one or more arcs.

6. Select the *Feature Objects | Build Polygons* menu command.

There will now be a polygon where you created your closed loop of arcs. Until you use the *Build Polygons* command, you won't have polygons – only arcs. Feel free to experiment with the other feature object tools.

3.8   Selecting Feature Objects

There are different tools for creating feature objects and selecting feature objects. Refer to Figure 4 below. The different selection tools select different types of objects.

1. Hold the mouse cursor over a tool for a couple of seconds until the tool name appears.
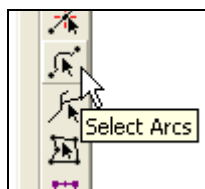
The *Select Tool* ↖ can be used to select all different types of feature objects. The other tools can only select one specific type of object. The *Select Tool* will probably be what you use most often, but you can use the other tools when necessary – for example if there are different types of objects close to each other.

2. Use the *Select Tool* ↖ to select different types of feature objects.

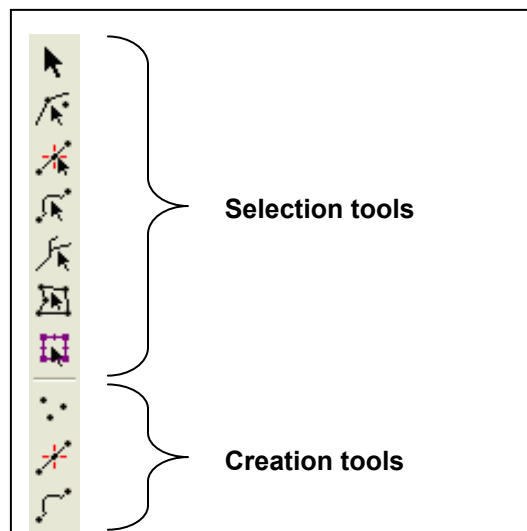3. Try out the other selection tools. Select different objects.

Figure 4.   Feature Object Tools.

3.9   Modifying Feature Objects

Dragging objects

Some feature objects, like points and vertices, can be moved to other locations by dragging them with the mouse. Other objects, like arcs and polygons, cannot be dragged, but you can move arcs and polygons by moving the nodes and vertices that are on them.

Points / Nodes

1.   Use the *Select Points/Nodes Tool* to select one of the points you created above.

2.   While holding down the left mouse button, drag the point to a different location.

3.   Use the same *Select Points/Nodes Tool* to drag a node on an arc.

Vertices

1.   Select the *Display Options* button .

2.   Make sure the *Map Data* item in the list on the left is highlighted and the *Map* tab on the right is visible.

3.   Turn **on** the *Vertices* option and click *OK*.

4.   Switch to the *Select Vertex* tool.

5.   Select and drag a vertex on one of the arcs that you created earlier.

Adding / Removing Vertices

Arcs can be modified by adding more vertices.

1. Switch to the *Create Vertex* ⚡ tool.

2. Click on one of the arcs you created earlier to add vertices to it.

By adding vertices and dragging them where you want them you can refine how the arc looks.

3.10 Grid Frames

Grid frames are used to build 2D and 3D grids. A grid frame defines the rectangular extent of the grid. Grid frames can be rotated and moved to better fit the area you want to model.

1. Select the Feature Objects|New Grid Frame menu command.

This creates a grid frame. You should see a purple rectangle on the screen.

2. Switch to the *Select Grid Frame* 🔲 tool.

3. Click on one of the lines of the grid frame to select it.

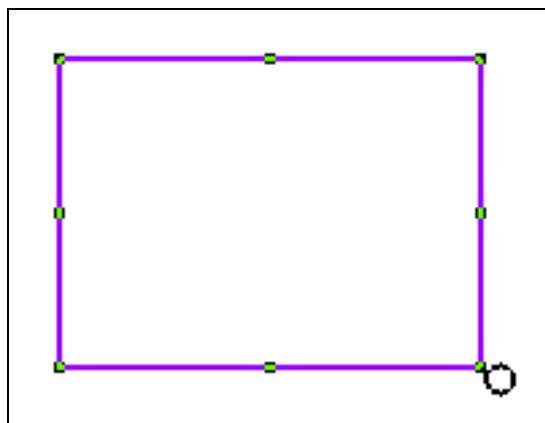4. Now click on the interior of the grid frame to drag it to a new location.

Figure 5.   Grid frame with handles.

Notice the handles in the corners and the middle of the edges of the grid frame. Also notice the circular handle used for rotation in the bottom right corner.

5. Click on the handles of the grid frame to resize it and rotate it.

4   Conclusion

This concludes the tutorial. Here are the things that you should have learned in this tutorial:

- Feature objects are points, nodes arcs and polygons.

- Feature objects are easily created and modified.

- Feature objects are organized in to coverages.