

Extending ArcIMS Using ArcXML

—Acetate Layer Objects and the SPATIALQUERY Element

This is the third of three companion tutorials for “Extending ArcIMS MapServices Using ArcXML,” an article by Mark Ho that appeared in the January–March 2002 issue of *ArcUser* magazine. These tutorials discuss editing and adding ArcXML elements and attributes in a map configuration file. This tutorial describes how to add objects to the acetate layer and manage data using the SPATIALQUERY element.

Edits to the map configuration file can be made by typing modifications using a simple text editor or modified elements and/or attributes can be copied and pasted directly from a text file, Tutorial3.txt, that is included with the sample dataset and located in the C:\Tutorial\Axlfile folder. If you choose to cut and paste from this file, do not add any special formatting (e.g., bolded characters, special fonts).

What You Will Need

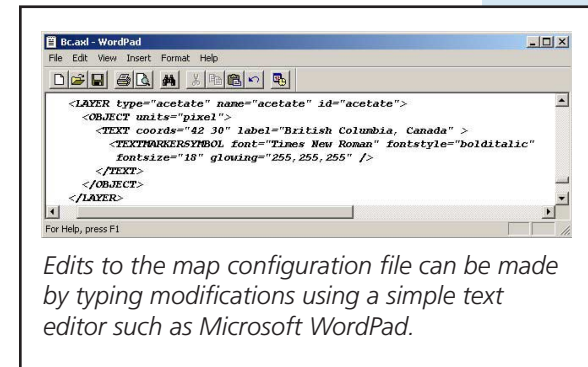
To successfully complete this tutorial, you must follow the instructions outlined in “Setting Up the Tutorials,” a PDF document available from the *ArcUser Online* Web site. When finished setting up, you will have

- ArcIMS Administrator opened with the BritishColumbia Image MapService running
- The Administrator Message Console opened
- A Web browser running the Bcsite HTML Viewer
- A text editor with the map configuration file (Bc.axl) open
- A version of the *ArcXML Programmer's Reference Guide* available

This tutorial assumes you have successfully completed the two previous tutorials on rendering and labeling. Refer to the first tutorial for instructions on refreshing the MapService or Web site.

Add Graphics with Acetate Layer Objects

Acetate layers, used only with Image MapServices and visible only in an HTML Viewer, add graphics separately from the data layers. Objects present in a default acetate layer include the north arrow, copyright text, and scale bar. You will add a new LAYER element, set its type to acetate layer and add objects inside this layer. First you will add title text, then a corporate logo. Both these objects will remain static regardless of panning or zooming by a user.



The code shown in Figure 1 creates the acetate layer and adds text object. The units attribute of the OBJECT element indicates how each object will be drawn on the acetate layer. Setting the units attribute to pixel attribute adds the object to the image using pixel coordinates with an origin at the bottom-left corner of the image.

1. Open the map configuration file, Bc.axl, with the text editor.
2. Scroll to the bottom of the map configuration file to the closing LAYER element (</LAYER>) for the Cities layer.
3. Between the closing LAYER element and the closing MAP element (</MAP>), add a new LAYER element with the attribute-value pairs as shown in Figure 1. The type attribute **must** be equal to acetate. Save the Bc.axl file.
4. In ArcIMS Administrator, refresh the BritishColumbia MapService.
5. In the Web browser, completely refresh the Bcsite Web site.

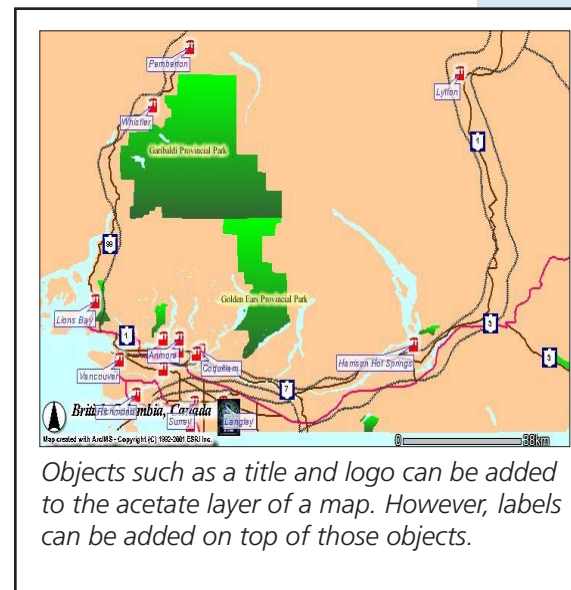
The title text should appear next to the north arrow. Pan and zoom around the Web site to verify that the title remains in the same position at any extent.

Figure 1

```
<LAYER type="acetate" name="acetate" id="acetate">
  <OBJECT units="pixel">
    <TEXT coords="42 30" label="British Columbia,
Canada" >
      <TEXTMARKERSYMBOL font="Times New Roman"
fontstyle="bolditalic"
      fontsize="18" glowing="255,255,255" />
    </TEXT>
  </OBJECT>
</LAYER>
```

Add an Image Based on a Point Object

Using the same principle, you will now add a corporate logo image to the acetate layer based on a point object. The url attribute points to the URL used by client to retrieve the image. The image attribute refers to the location of the image on the server's machine. Both attributes reference the same GIF image stored at C:\ArcIMS\Output (default location). Localhost is a generic word that refers to your local machine.



1. Add the code for the logo image as shown in Figure 2, placing it after the OBJECT defining the title and save the Bc.axl file.
2. In ArcIMS Administrator, refresh the BritishColumbia MapService.
3. In the Web browser, completely refresh the Bcsite Web site.

The ESRI logo should appear next to the title. Notice that feature labels will draw above the objects on the acetate layer. You can add a polygon object at that location. Ensure the overlap attribute for the polygon is set to false to prevent any labels from drawing above the box. The cords attribute of the POLYGON element defines the x,y pixel coordinates of the transparent box. Each x,y coordinate is separated by a semi-colon.

Figure 2

```

<LAYER type="acetate" name="acetate" id="acetate">
  <OBJECT units="pixel">
    <TEXT coords="42 30" label="British Columbia,
Canada" >
      <TEXTMARKERSYMBOL font="Times New Roman"
fontstyle="bolditalic"
      fontsize="18" glowing="255,255,255" />
    </TEXT>
  </OBJECT>
  <OBJECT units="pixel">
    <POINT coords="250 30">
      <RASTERMARKERSYMBOL shadow="255,255,255" size="30,37"
      url="http://localhost/output/esrilogo.gif"
      image="C:\ArcIMS\Output\esrilogo.gif" />
    </POINT>
  </OBJECT>
</LAYER>

```

Adding a Polygon

A simple polygon can also be added to the acetate layer. This example adds a gray box the bottom left corner of the map display. Feature labels will not draw over this acetate layer polygon.

1. Above the two existing acetate layer OBJECT elements, add a polygon object with a gray rendering and the overlap attribute is equal to false using the code shown in Figure 3. Save the Bc.axl file.
2. In ArcIMS Administrator, refresh the BritishColumbia MapService.
3. In the Web browser, completely refresh the Bcsite Web site.

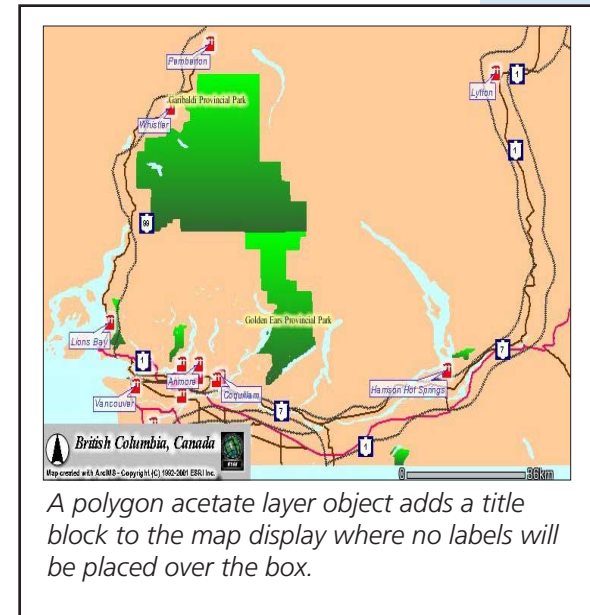


Figure 3

```
<LAYER type="acetate" name="acetate" id="acetate">
  <OBJECT units="pixel">
    <POLYGON coords="0 0;275 0;275 55;0 55;0 0" >
      <SIMPLEPOLYGONSYMBOL fillcolor="192,192,192"
        overlap="false"
        boundarytransparency="0.0" />
    </POLYGON>
  </OBJECT>
  <OBJECT units="pixel">
    ...
  </OBJECT>
  <OBJECT units="pixel">
    ...
  </OBJECT>
</LAYER>
```

Make Layer Objects Pan and Zoom

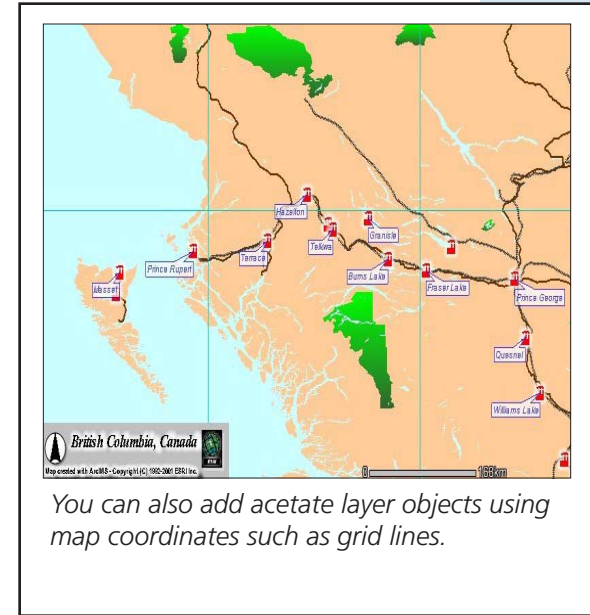
By using pixel as the units attribute for the OBJECT element, acetate layer objects are added on top of the image and will always remain at the same position no matter how much the user pans and zooms. Acetate layer objects can also be added using map coordinates so that objects pan and zoom with the feature data as a user interacts with the Web site. In this example, you will simulate grid lines placed at five-degree intervals for both longitude and latitude by drawing a line object that zigzags over the feature data.

1. **Above** the three existing acetate layer OBJECT elements, add a line object that sets the units attribute for the OBJECT element to "database" and add the code shown in Figure 4. Because there are many x,y coordinates in the LINE object, you may want to copy and paste this code directly from the Tutorial3.txt file, located at C:\Tutorial\Axlfile.
2. In the text editor, save the Bc.axl file.
3. In ArcIMS Administrator, refresh the BritishColumbia MapService.
4. In the Web browser, completely refresh the Bcsite Web site.

The grid lines will now appear over the feature data. Zoom and pan around the map and observe that the grid lines remain at the correct position.

Using the SPATIALQUERY Element

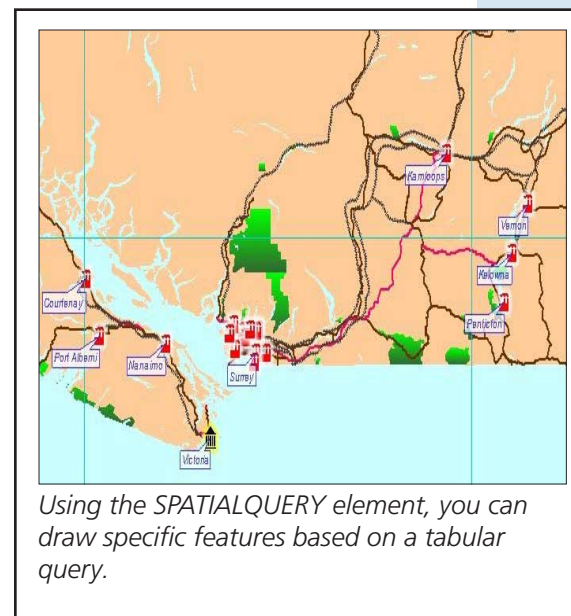
The SPATIALQUERY element draws features on a map based on a query. That query can be a tabular, spatial, or a combination of the two. You will perform three tasks using this element.



You can also add acetate layer objects using map coordinates such as grid lines.

Figure 4

```
<LAYER type="acetate" name="acetate" id="acetate">
  <OBJECT units="database">
    <LINE coords="-150 50;-105 50;-105 55;-150 55;-150 60;
-105 60;-105 70;-115 70;-115 40;-120 40;-120 70;-125 70;
-125 40;-130 40;-130 70;-135 70;-135 40;-140 40;-140 70">
    <SIMPLELINESYMBOL color="0,204,204" width="1" />
  </LINE>
</OBJECT>
<OBJECT units="pixel">
</OBJECT>
<OBJECT units="pixel">
</OBJECT>
<OBJECT units="pixel">
</OBJECT>
</LAYER>
```



Using the SPATIALQUERY element, you can draw specific features based on a tabular query.

- Add a tabular query to display cities that have populations greater than a specified number
- Join a DBF table with the shapefile table for the Cities layer
- Establish a spatial query that will draw only the cities within a defined polygon

Creating a Tabular Query

To display only specified cities, you will use the where attribute of the SPATIALQUERY element. The where attribute contains an SQL-like statement that queries the Cities shapefile table for all cities with a population greater than 15,000. An escape character, >, is necessary to specify the greater than character (>) inside the where attribute because the greater than character is also used by ArcXML to close elements. Because you will add child elements inside the SPATIALQUERY element, you will close this element with a separate close statement. Only cities that satisfy the tabular query will be displayed on the map.

1. In the text editor, reopen the map configuration file, Bc.axl.
2. Find the DATASET element inside the Cities' LAYER element.
3. Under the DATASET element, add the SPATIALQUERY with the attribute-value pair as shown in Figure 5. Save the Bc.axl file.
4. In ArcIMS Administrator, refresh the BritishColumbia MapService.
5. In the Web browser, completely refresh the Bcsite Web site. and make the Cities layer active.

Joining DBF and Shapefile Tables

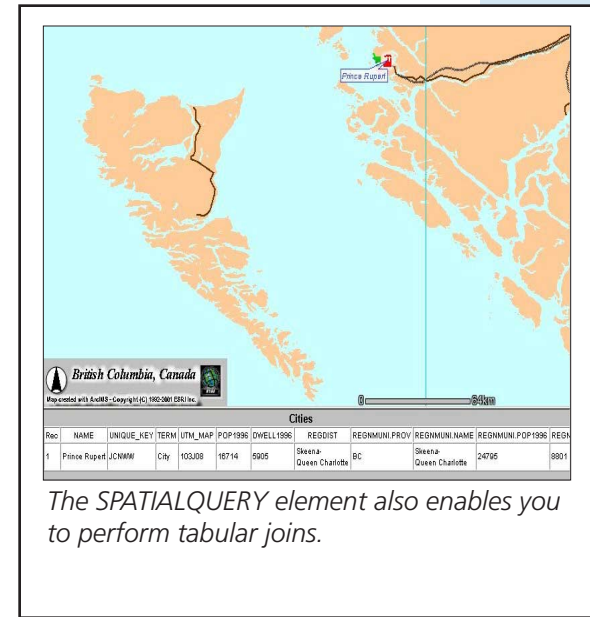
In the Web browser, make the Cities layer active and choose the Identify tool. A field named Regdist lists the regional district for each city. A second table named Regnmuni.dbf is located in the tutorial's data directory. Using the same SPATIALQUERY element, you will join this DBF table to the Cities' shapefile table. Once these tables are joined, you can display information about the regional district for each city.

Figure 5

```
<LAYER type="featureclass" name="Cities" visible="true" id="4">
<DATASET name="cities" type="point" workspace="shp_ws-0" />
<SPATIALQUERY where="POP1996>15000" >
</SPATIALQUERY>
<GROUPRENDERER>
```

The jointables element identifies the name of the DBF table located in the same folder as the Cities shapefile. The joinexpression attribute has three components. The first component lists the shapefile table name and common field. The second component lists the DBF file name and common field. The third component identifies the type of tabular join. An exact join is used for a one-to-one or a many-to-one tabular relationship, as in this example. A scan relation is used for a one-to-many or a many-to-many tabular relationship.

1. In the text editor, reopen the map configuration file, Bc.axl.
2. Find the SPATIALQUERY element inside the Cities' LAYER element.
3. Within the SPATIALQUERY element you just edited, add the attribute-value pairs shown in Figure 6. Save the Bc.axl file.
4. In ArcIMS Administrator, refresh the BritishColumbia MapService.



The SPATIALQUERY element also enables you to perform tabular joins.

- In the Web browser, completely refresh the Bcsite Web site.
- Make the Cities layer active, zoom in closely to a city, and use the Identify button to see the fields added from the joined table.

Figure 6

```
<LAYER type="featureclass" name="Cities" visible="true" id="4">
<DATASET name="cities" type="point" workspace="shp_ws-0" />
<SPATIALQUERY where="POP1996>15000"
jointables="regnmuni"
joinexpression="To=[cities.regdist],From=[regnmuni.name],Type=[exact]">
<GROUPRENDERER>
```

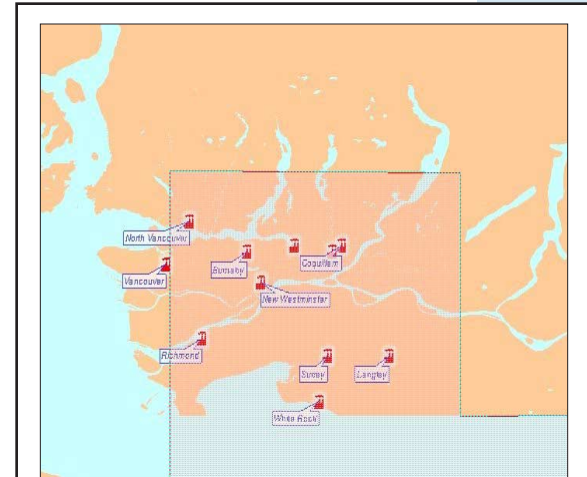
Fields from both tables should appear in the Identify results, including the regional district's population, number of dwellings, and area. Read the *ArcXML Programmer's Reference Guide* to learn more about how to use the SPATIALQUERY element to join tables, including ArcSDE layers.

Draw Cities Specified by a Polygon

In the Web browser, zoom in on Greater Vancouver, an area located north of the province's capitol, Victoria. A number of suburbs surround Vancouver. For clarity, you decide not to draw these suburbs and draw only Vancouver and those cities with a population greater than 15,000 located outside of the Vancouver area.

You could use an EXACT element to draw only specified cities. Using a spatial filter, a polygon that defines the envelope that will be used to perform the spatial query, is the method you will use for limiting the cities displayed. In this example, you will use the SPATIALFILTER child element within a SPATIALQUERY element to define a polygon ring that covers most of the province except for the area where the suburbs are located. The relation attribute must be set to area_intersection if the spatial filter shape is not a rectangle. The polygon ring can also be defined by a series of POINT elements with x and y attributes for each point.

- In the text editor, reopen the map configuration file, Bc.axl.
- Find the SPATIALQUERY element inside the Cities' LAYER element.
- Within the SPATIALQUERY element previously edited, add the SPATIALFILTER element that defines the polygon ring of the area to perform the spatial query as shown in Figure 7. Because there are many x,y coordinates in the polygon ring, you may want to copy and paste this code directly from the Tutorial3.txt file. Save the Bc.axl file.



You can specify a spatial filter area to define the spatial envelope for your query. In this case, you will perform the query for cities in all areas in the province except for those cities in the shaded area.

4. In ArcIMS Administrator, refresh the BritishColumbia MapService.
5. In the Web browser, completely refresh the Bcsite Web site.

Zoom into the area around Vancouver. Verify that suburbs such as Surrey, Richmond and Burnaby are not displayed.

Figure 7

```
<LAYER type="featureclass" name="Cities" visible="true" id="4">
<DATASET name="cities" type="point" workspace="shp_ws-0" />
<SPATIALQUERY where="POP1996>15000" jointables="regnmuni"
joinexpression="To=[cities.regdist],From=[regnmuni.name],Type=[exact]" >
  <SPATIALFILTER relation="area_intersection" >
    <POLYGON>
      <RING>
        <COORDS>-138.9 60;-114.1 60;-114.1 49;-122.5 49;-122.5 49.4;
          -123.1 49.4;-123.1 48.1;-138.9 48.1;-138.9 60
        </COORDS>
      </RING>
    </POLYGON>
  </SPATIALFILTER>
</SPATIALQUERY>
<GROUPRENDERER>
```

Summary

In this tutorial, you added objects to an acetate layer and used the SPATIALQUERY element to draw a data subset and perform a tabular join. To view the accumulated modifications from all three tutorials, see the final map configuration file in the C:\Tutorial\Axifile folder. For more information on ArcXML elements, see the *ArcXML Programmer's Reference Guide*. Visit www.esri.com/training for information on a two-day instructor-led class, *Customizing ArcIMS using ArcXML*, that is also available.