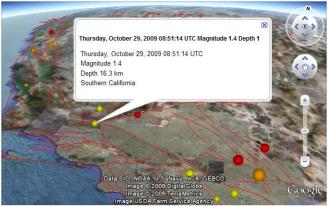
Sample Script Building Dynamic Web Geomashups

MicroImages has prepared a demonstration of an automated, regularly-scheduled geomashup application that downloads updated geospatial data from the Internet, processes and combines the data with other geospatial data, and posts the result on a web page for viewing in the Google Earth browser plug-in (see the Technical Guide entitled *Geomedia Publishing: Today's Earth-quakes in California and Nevada*). The key component of this application is a custom processing script written in the TNT Geospatial Scripting Language (SML) that is run hourly by the TNTmips Pro Job Processing System.

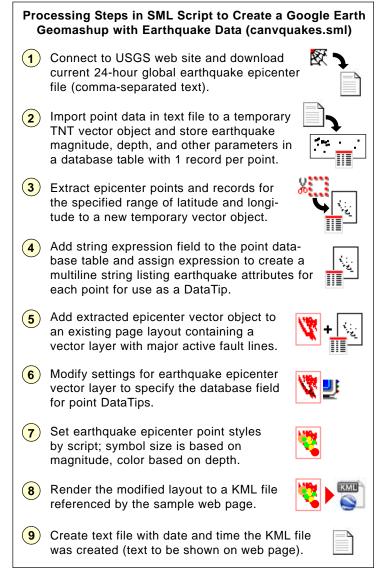
The data in this example are global earthquake epicenter locations and associated attributes. These data are posted and continuously updated as a comma-separated text file by the U.S. Geological Survey Earthquake Hazards Program (at http:// earthquakes.usgs.gov/eqcenter/catalogs/). This sample SML script (canvquakes.sml, excerpted on the reverse of this page) takes advantage of the many capabilities in SML:

- the HTTP_CLIENT class for connecting to web servers and downloading data;
- the MIE classes for importing data; and
- the KML class, which allows a script to render a layout containing various geospatial layers into a KML file that anyone can then view in the Google Earth desktop application or in a browser with the Google Earth plug-in.



Google Earth plug-in displaying KML earthquake overlay produced by the sample script and the native Google global imagery. The feature balloon information shown when an earthquake epicenter marker is clicked is tranferred to the KML file from the TNT DataTip settings.

The box above right summarizes the script processing steps, from downloading the text file to rendering a layout with styled earthquake points and reference fault lines to a finished KML file. The earthquake epicenter points in the TNT layout are converted to placemarks in the KML file. The script takes advantage of several automated features of the KML rendering procedure in SML. First, any vector element attribute information that is set for viewing in a DataTip in the TNT products is automatically converted to a "description" for the resulting placemark in the KML file. Google Earth shows this description in a pop-up "fea-



ture balloon" when each placemark is clicked. The sample script therefore sets up a DataTip for each earthquake epicenter point using a string expression field it creates in the vector point database table. The expression for this field creates a listing of multiple earthquake attributes that are read from various other fields in the table.

The KML rendering procedure in the SML script also automatically assigns 3D marker symbols (sphere or cube) from the Google Earth marker library to any TNT vector points that are styled using the TNT predefined point symbols (circle or box). The sample script therefore assigns epicenter point symbols using a query that references preset styles in a style object stored in a reference TNT Project File. Marker size is set to vary with earthquake magnitude, and the marker color is determined by the depth of the earthquake below the ground surface.

Automated running of this sample script on a repeating schedule in the TNTmips Pro Job Processing System is discussed in the TechGuide entitled *System: Scheduling Automatically Repeating Jobs.* (over) Many sample scripts have been prepared to illustrate how you might use the features of the TNT products' scripting language for scripts and queries. These scripts can be downloaded from www.microimages.com/downloads/scripts.htm.

Script Excerpts fo	r canvquakes.sml
1 Download USGS daily global earthquake summary file	5 Read page layout with major fault lines and add the earthquake epicenter vector to it.
<pre>class STRING address\$ = "earthquakes.usgs.gov"; class STRING url\$ = "http://earthquakes.usgs.gov/eqcenter/catalogs/eqs1day-M1.txt"; class STRING textfile\$ = _context.ScriptDir + "/Download/eqs1day-M1.txt"; class HTTP_CLIENT http; clear();</pre>	class STRING layoutfile\$ = _context.ScriptDir +
http.SetTimeOut(15); err = http.Connect(address\$, 80);	class GRE_GROUP group; group = layout.FirstGroup; get handle for the single group in the layout
http.DownloadFile(url\$, textfile\$); download the text file Import the comma-delimited text file of earthquake	add the earthquake epicenter vector to the group in the layout class GRE_LAYER_VECTOR quakeLayer; quakeLayer = GroupQuickAddVectorVar(group, CaNv_Quakes);
class RVC_OBJECT tempfile; tempfile.MakeTempFile(1); set up new vector object in tempfile class RVC_OBJITEM fqObjItem; class RVC_DESCRIPTOR fqDescript; fqDescript.SetName("GlobalQuakes"); object item for vector with global daily earthquake epicenters	(7) Set the earthquake epicenter point styles by script using a previously saved style script file that uses point styles already created and saved in a style object in a reference. Project File. These styles use the predefined filled circle symbol with different colors assigned by earthquake depth; Render to KML automatically converts these predefined circle symbols into a shaded sphere symbol in Google Earth.
fqDescript.SetDescription(""); fqObjItem.CreateNew(tempfile.GetObjItem(), "VECTOR", fqDescript);	set previously-created style object with point styles to use
set up class for import/export of vector from/to text; the class method to import the object takes an RVC_OBJITEM rather than an RVC_VECTOR class instance.	<pre>class STRING styleFile\$ = _context.ScriptDir +</pre>
set existing format file that records all import settings including additional database fields and the coordinate reference system for the earthquake data	<pre>quakeLayer.StyleObject = ptStyles; set up earthquake point styling by script; read style script from saved file to avoid syntax check prob- lems with Table.Field references in the guery</pre>
class STRING formatFilename\$ = context.ScriptDir + "/resources/eqFormat.fmt"; mieTV.FormatFilename = formatFilename\$;	class STRING ptStyleQry; ptStyleQry = TextFileReadFull(sprintf("%s/resources/QuakeStyle.qry", context.ScriptDir));
err = mieTV.ImportObject(textfile\$, fqObjItem); printf("mie ImportObject returned %d\n\n", err);	<pre>quakeLayer.Point.StyleMode = "ByScript"; quakeLayer.Point.Script = ptStyleQry;</pre>
3 Copy epicenter points within the specified latitude/ longitude range to a new temporary vector object	8 Render the layout to a KML file. print("Rendering updated layout to KML.");
class RVC_VECTOR CaNv_Quakes; CreateTempVector(CaNv_Quakes, "Planar"); CreateTempVector(CaNv_Quakes, "Planar");	class DATETIME dt; dt.SetCurrent(); dt.ConvertToUTC(); get current datetime and convert to UTC
class STRING ptQry;	class STRING datetime\$; datetime\$ = dt.GetString(); datetime\$ += " UTC"; printf("update datetime: \n", datetime\$); String with datetime for web page
ptQry = "if (CLASS.Lat > 32.5 && CLASS.Lat < 42.0 && CLASS.Lon > -124.75 && CLASS.Lon < -114.0) return true;";	open text file and write datetime string (overwrite)
class RVC_VECTOR GlobalQuakes; Class instance for the global earth- quake vector object, needed for the VectorCopy Elements function	<pre>class STRING dtFilename\$ = _context.ScriptDir + "/datetime.txt"; class FILE dtFile = fopen(dtFilename\$, "w"); fwritestring(dtFile, datetime\$); fclose(dtFile);</pre>
open the global earthquake vector object GlobalQuakes.OpenByName(fqObjItem.GetFilePath(), fqObjItem.GetObjectPath(), "Read");	class STRING kmlName\$ = _context.ScriptDir + "/eqs1day_canv.kml"; class FILEPATH kmlPath(kmlName\$); KML file information
use query to copy epicenters from global earthquake vector to temporary California-Nevada epicenter vector object err = VectorCopyElements(GlobalQuakes, CaNv_Quakes,	class KML kml; kml.SetPath(kmlPath); kml.SetLayout(layout); kml.SetResolution(450); target resolution 450 m
"RemExRecords", ptQry); printf("VectorCopyElements returned %d/n/n", err);	kml.Write();
GlobalQuakes.Close(); Close the global earthquake vector object	CaNv_Quakes.Close(); tempfile.Close(); Close temporary objects