



**FME® Desktop KML Pathway Tutorial**  
**FME Desktop 2014 SP2 Edition**



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City of Vancouver

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Others

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Digital Elevation Model: GeoBase®

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### Document Information

## FME Desktop KML Pathway Tutorial

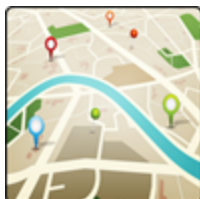


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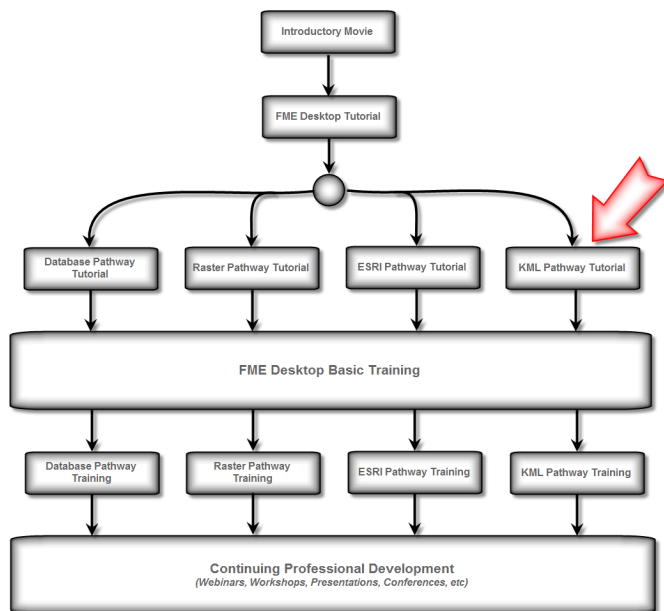
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## Introduction



***Welcome to the FME Desktop KML Pathway Tutorial.***



## KML Pathway

This tutorial is an introduction to using KML data with FME. It is the first part of the FME Training KML Pathway.

It is assumed that you will already be familiar with the concepts and techniques described in the FME Desktop Tutorial.

NB: You can find the FME Desktop Tutorial either online or on the FME Desktop installation DVD. It includes both PDF documents and a set of movies which cover each chapter of the tutorial.

## FME Version

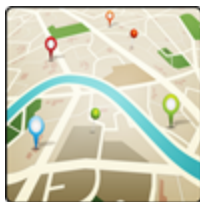
This tutorial specifically covers the use of FME Desktop® 2012 edition. Older versions of FME may not have some of the functionality described in this tutorial.

## Sample Data

The sample data required to carry out the examples in this document can be obtained from:

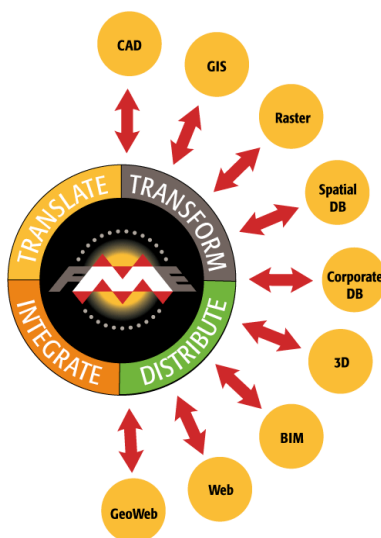
<http://www.safe.com/fmedata>

## Introduction to FME



*Here's a quick one-page reminder on what FME is.*

### What is FME?

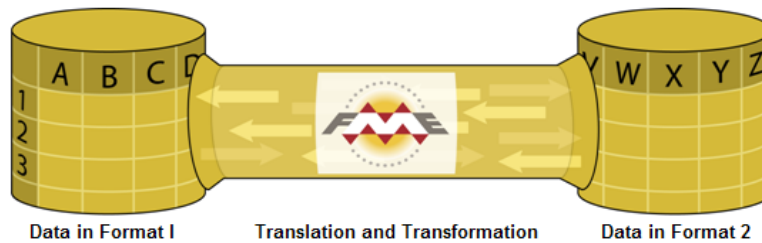


FME is a spatial data transformation platform that helps organizations more easily overcome a range of spatial data interoperability challenges. It is available in both desktop and server solutions.

FME is classified as a [Spatial ETL](#) (Extract-Transform-Load) tool, designed to help users master more spatial data transformation challenges than any other technology.

- Extract is the ability to read any format of spatial data.
- Transform is the ability to manipulate data during the translation process.
- Load is the ability to write the data in any other format.

With Data Transformation, the output from an FME process can be tailored to match a required structure, and can even be greater than the sum of the inputs.



The key FME Desktop application is FME Workbench, an intuitive point and click interface for graphically defining translations and transformations as a flow of data.

FME Quick Translator is an application for carrying out basic, non-customized translations.

FME Universal Viewer is an application for visually inspecting spatial data.

## KML Basics



***If you are new to KML data, then here are some basic facts and information.***

### What is KML?

KML stands for Keyhole Markup Language. It is an XML-based format (or language if you prefer) intended to store data for use within the Google Earth™ and Google Maps™ applications.

The name “Keyhole” comes from the name of the original developers of the KML format and Google Earth product.

KMZ is an alternate form for a KML format dataset. A KMZ dataset is simply a KML dataset compressed by a ZIP type program and renamed with a new file extension. KMZ is most frequently used as a means to store a set of raster images; the KMZ (zip) folder stores the raster files (as JPEG or GeoTIFF) plus a KML file that references them.

### KML and FME

As with any FME supported format it is important to be aware of how the format’s structure relates to FME, and how FME defines that structure as a schema.

### ***Feature Types and Datasets***

KML is a file-based dataset, meaning each KML file is counted as an FME dataset. Each file can contain “Folder id” sections representing FME feature types.

For example, if the FME dataset name is planning and the feature type name is ROADS, then the output would be a KML file called planning.kml containing a section beginning:

```
<Folder id="kml_ft_ROADS">
```

### ***KML and Coordinate Systems***

KML stores coordinates as latitude and longitude values based on the WGS84 datum. This is the only coordinate system that KML supports.

The FME equivalent coordinate systems are LL84 and EPSG:4326

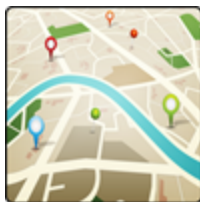
Data sent to the KML writer must be tagged with a coordinate system – either from within the source data or using a CoordinateSystemSetter transformer. Then FME will automatically convert the data to LL84.



When the data is untagged, and FME is unable to ascertain the source coordinate system, the translation will be terminated.

```
FATAL |KML: Feature does not have a coordinate system specified
FATAL |+++++
FATAL |Feature Type: 'Safe_Software_HQ'
FATAL |Attribute(string)      : '__wb_out_feat_type__' has value 'Safe_Software_HQ'
FATAL |Attribute(32 bit integer): '_creation_instance' has value '0'
FATAL |Attribute(encoded: utf-8): 'a' has value 'Safe Software HQ'
FATAL |Attribute(encoded: utf-8): 'b' has value 'Safe Software's HQ in Surrey, Canada'
FATAL |Attribute(encoded: utf-8): 'c' has value ''
FATAL |Attribute(string)      : 'fme_geometry' has value 'fme_point'
FATAL |Attribute(string)      : 'fme_type' has value 'fme_point'
FATAL |Attribute(string)      : 'kml_icon' has value 'C2'
FATAL |Attribute(string)      : 'kml_iconstyle_scale' has value '0.8'
FATAL |Attribute(encoded: utf-8): 'kml_id' has value 'kml_1'
FATAL |Attribute(string)      : 'kml_labelstyle_scale' has value '1.0'
FATAL |Attribute(string)      : 'kml_linestyle_width' has value '1.0'
FATAL |Attribute(string)      : 'kml_parent' has value 'kml_ft_Safe_Software_HQ'
FATAL |Attribute(string)      : 'kml_type' has value 'kml_point'
FATAL |Coordinate System: ''
FATAL |Geometry Type: IFMEPoint
FATAL |Coordinate Dimension: 2
FATAL |(-132,45)
FATAL |=====
ERROR |KML: Error finishing writing dataset
```

## Reading KML Data



***FME's support for KML includes the ability to read KML datasets and to convert them into other GIS data formats.***

FME's ability to read KML datasets includes all of the spatial components, but also items like document properties, folders, and timestamp attributes.

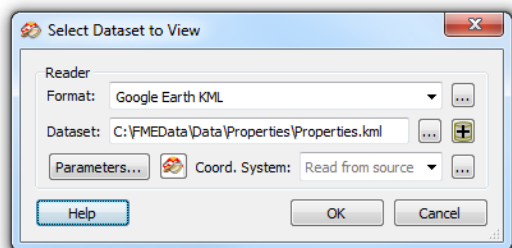
### Exercise 1: Read KML Data

Follow these steps to open a KML dataset for inspection.

- 1)** Start FME Universal Viewer. Select Start > All Programs > FME Desktop 2012 > FME Universal Viewer from the Windows Start menu.
- 2)** Select File > Open Dataset from the menu bar to open the dataset selection dialog.

Fill in these fields:

**Reader Format:** Google Earth KML  
**Reader Dataset:** C:\FMEData\Data\Properties\Properties.kml



- 3)** Click OK to accept the selection and open the dataset:



Now that there is some data open in the FME Universal Viewer, it can be queried.

**4)** Click the Select Features tool to make it active (denoted by a small “i” character on the cursor). Click on any parcel in the dataset to query it.



The feature is queried and the information window of the FME Universal Viewer shows the results of the query:

Feature: 1 of 1	
Feature Type: LandParcels	
Coord Sys: LL84	
Attribute Name	Attribute Value
City	INTEROPOLIS
fme_fill_color	0.000000,1.000000,1.000000
fme_fill_opacity	0.647059
fme_geometry	fme_polygon
fme_type	fme_area
kml_description	<center> <table> <tr> <th colspan='2' ...
kml_document_href	
kml_document_path	C:\FMEData\Data\Properties\Properti...
kml_generated_id	
kml_iconstyle_scale	0.8
kml_id	kml_7
kml_labelstyle_scale	1.0
kml_linestyle_width	1.0
kml_name	kml_7
kml_parent	kml_ft_LandParcels
kml_parent_type	Folder
kml_polystyle_color	a5ffff00
kml_schema_data[0].name	Number
kml_schema_data[0].value	8046
kml_schema_data[1].name	StreetName
kml_schema_data[1].value	EXCHANGE
kml_schema_data[2].name	StreetType
kml_schema_data[2].value	DR
kml_schema_data[3].name	City
kml_schema_data[3].value	INTEROPOLIS
kml_schema_data[4].name	Zipcode
kml_schema_data[4].value	78754
kml_schema_url	#LandParcels
kml_snippet	
kml_type	kml_area
Number	8046
StreetName	EXCHANGE
StreetType	DR
xml_type	xml_area
Zipcode	78754

Notice how the window shows:

- The data type/folder (LandParcels)
- The coordinate system of the data (LL84)
- KML information such as scale and style
- Attributes like Street Name and Type

Use the other tools in this part of the toolbar to measure distances, pan, and zoom.



## Exercise 2: Translate KML with FME Workbench

Follow these steps to set up a conversion from KML format data to a different format. In this example the chosen output format is MapInfo TAB.

**1)** Start FME Workbench. In the Start tab, choose the option to Generate workspace.

**2)** When the New Workspace dialog opens, fill in these fields:

### Reader

**Format:** Google Earth KML

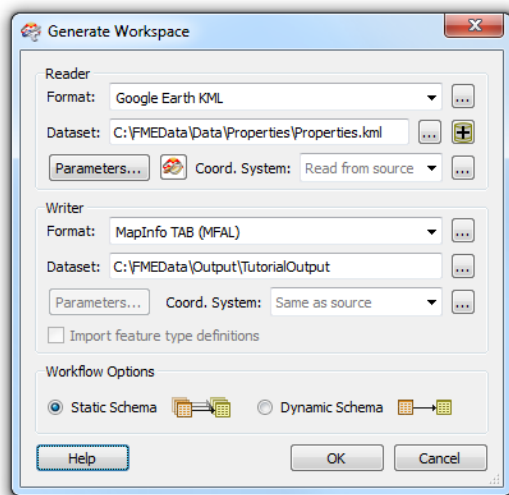
**Dataset:** C:\FMEData\Data\Properties\Properties.kml

### Writer

**Format:** MapInfo TAB (MFAL)

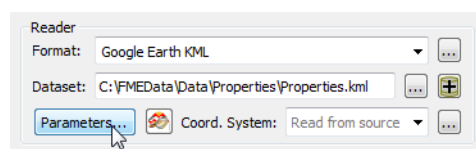
**Dataset:** C:\FMEData\Output\TutorialOutput

Do not click OK yet.

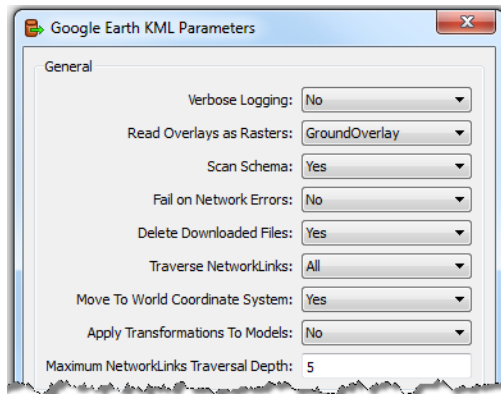


NB: for MapInfo TAB, the writer dataset requires a folder to be selected, not a file or filename.

**3)** Click the Parameters button in the Reader section.



A new dialog will open displaying all of the parameters that can be used to control reading of the KML data.

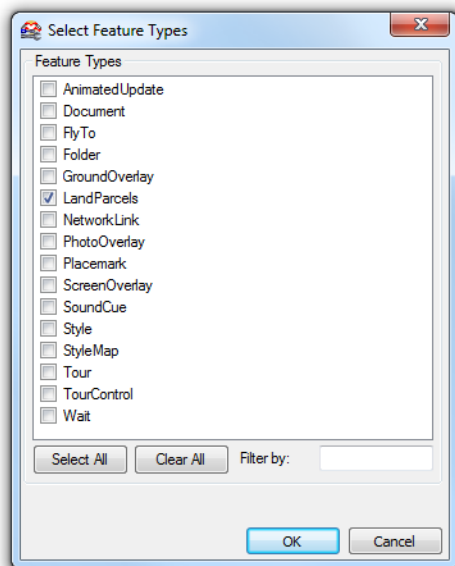


Notice how there are parameters to control aspects such as the reading of raster data, the traversal of network links, and the transformation of KML models (3D objects stored in an associated Collada file).

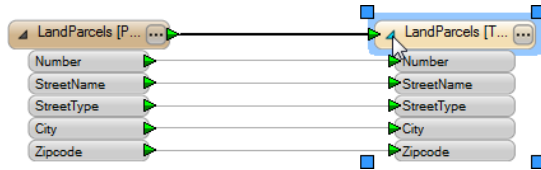
Now click OK to close the dialog and again to accept the selection.

**4)** The Select Feature Types dialog appears.

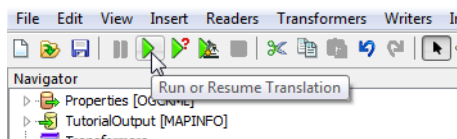
Press the Clear All button to deselect all types. Place a check mark next to the LandParcels feature type in order to select it for translation. Click OK.



**5)** A workspace will now be created. Click the expand icon on each feature type object, in order to reveal the attributes being translated. The workspace will now look like this:



**6)** Run the translation. Click the green play button to start the translation.



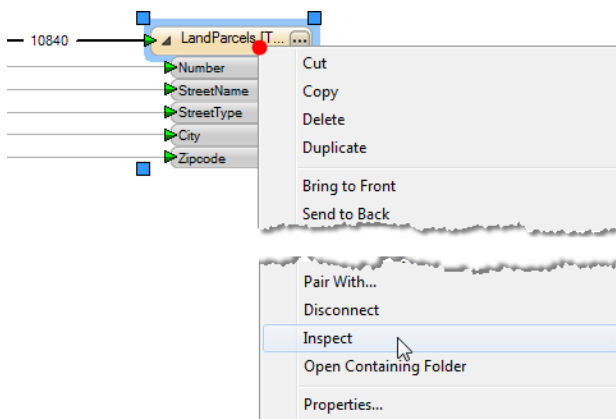
The translation will now run. It may take one or two minutes to complete. A dialog and log message may warn of "Unexpected Input", but it is not really unexpected, since we turned off several feature types in step 4. Therefore the warning can be ignored.

```

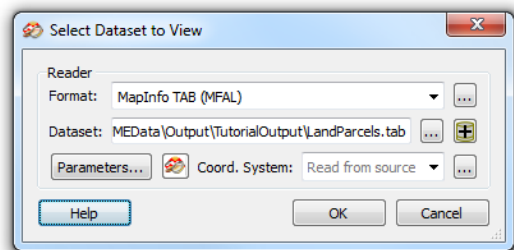
=====
|
|               Features Written Summary
|
|-----
|LandParcels (LandParcels)                                10840
|-----
|Total Features Written                                10840
|-----
|Translation was SUCCESSFUL with 1 warning(s) (10840 feature(s) output)

```

**7)** To inspect the output, right-click on the writer feature type and choose the option Inspect.



The FME Universal Viewer will start up, and a pre-filled dialog will be displayed:



Click OK. The newly created MapInfo dataset will be opened and can be inspected to prove the translation functioned correctly.



## Writing KML Data



***FME allows users to translate other spatial datasets into the KML format widely used in today's society.***

Writing a basic KML dataset, with no concern about complex node types or feature styling, is as simple as choosing KML as the output format and running the translation. Where there is styling (symbology) present on the source data, FME will attempt to preserve it when writing KML output.

### KML Writing Requirements

For the most part if there are any peculiarities about the KML format, FME takes care of them automatically.

- KML requires all features to be three-dimensional; if necessary FME will force compliance to this rule by setting a Z value (third dimension) of zero on all two-dimensional features.
- All nodes must have a unique ID. By default FME uses the format attribute `kml_id`, but if this is unset then FME will automatically create an id number in order to comply with this rule.
- As noted, KML requires all features to be held in the LL84 coordinate system.

FME will automatically convert your data to LL84 provided that it knows the source coordinate system used. If it cannot deduce this information, and you do not provide it in the dataset parameters, then the translation will be stopped with an error.

### Exercise 3: Translate to KML with FME Workbench

Follow these steps to set up a conversion of GIS data to KML format. In this example the source data format is again MapInfo TAB.

**1)** Start FME Workbench. In the Start tab choose the option to Generate workspace.

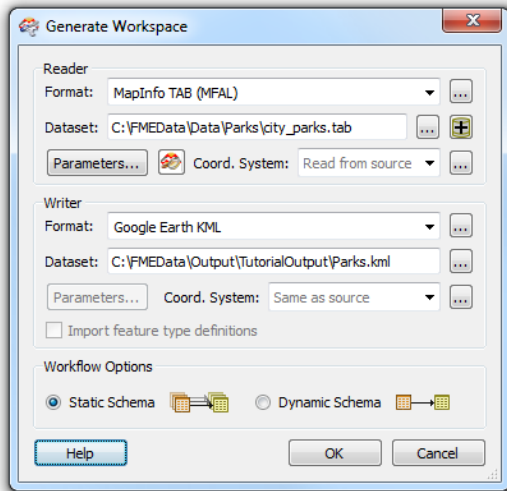
**2)** When the New Workspace dialog opens, fill in these fields:

#### Reader

**Format:** MapInfo TAB (MFAL)  
**Dataset:** C:\FMEData\Data\Parks\city\_parks.tab

#### Writer

**Format:** Google Earth KML  
**Dataset:** C:\FMEData\Output\TutorialOutput\Parks.kml



There are no available parameters for the KML writer at this point, so go ahead and click OK.

**3)** Run the translation. Click the green play button to start the translation.

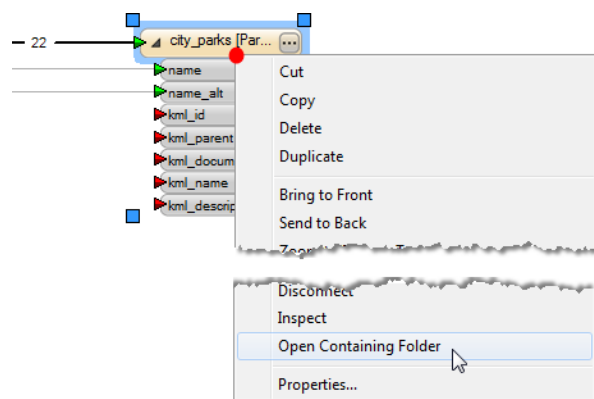
The translation will now run and will be completed in a few seconds.

```

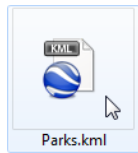
=====
|
|               Features Written Summary
|=====
|city_parks                                           22
|=====
|Total Features Written                               22
|=====
|Translation was SUCCESSFUL with 1 warning(s) (22 feature(s) output)

```

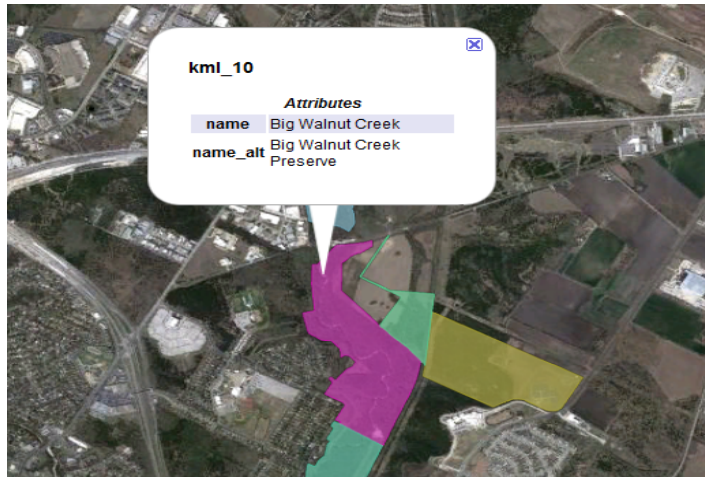
**4)** Inspect the output. To locate the output folder, right-click on the writer feature type. Choose the option Open Containing Folder.



**5)** Windows Explorer will now open and display the correct location for the output dataset.



Right-click the file Parks.kml and choose Open with > Google Earth.



Notice how the parks data retains the same color as it did in the source data (you can open the source MapInfo in the FME Universal Viewer to check) and that querying a feature returns a list of attribute values.

## KML Data Transformation



***Much of the KML-specific transformation in FME is related to feature symbology and styling***

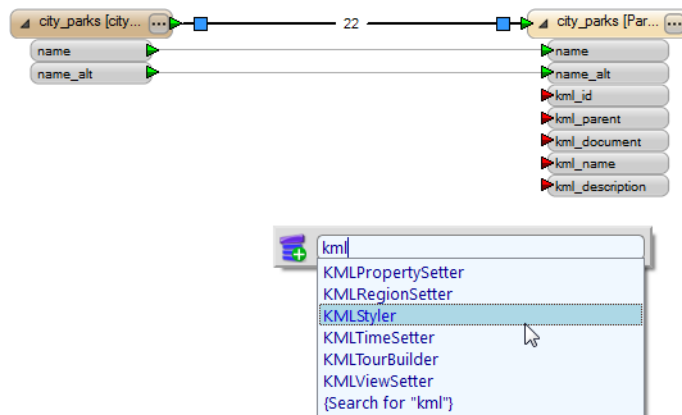
KML format supports tags that define the style and symbology of the features within a dataset.

In FME these tags can be set using a series of writer parameters and KML-specific transformers.

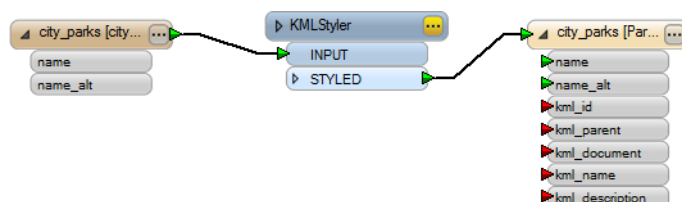
### Exercise 4: Style KML Data with FME Workbench

Follow these steps to transform and style data as it is converted to KML.

- 1) Start FME Workbench. Open, or re-create, the workspace from the previous exercise.
- 2) Place the KMLStyler transformer. Click on the connection between the reader and writer feature types. Type the characters KML. A list of KML-related transformers will appear.



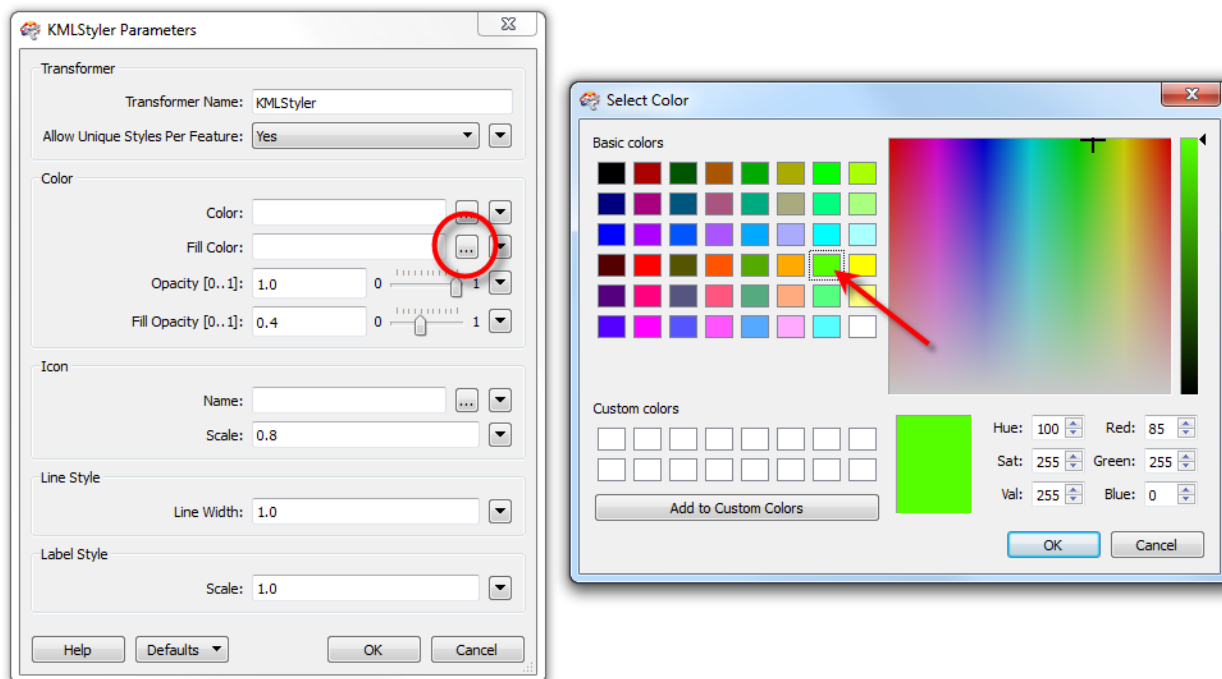
Select KMLStyler from the list. A KMLStyler transformer will be added between the reader and writer.



**3)** Click on the yellow parameters button on the KMLStyler to open up the parameters dialog for this transformer.

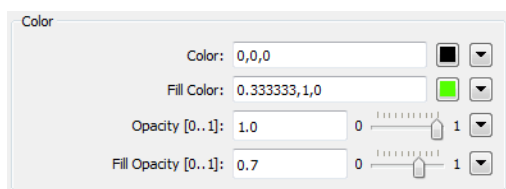
To set a fill color for the parks, click on the browse button to the right of the Fill Color field:

In the color-picker dialog, choose a shade of green and click OK.



**4)** Back in the KMLStyler parameters dialog, click on the browse button to the right of the Color field, and set the Color value for the polygon outline to black or to the same green as the fill color.

Set the value for Fill Opacity to 0.7

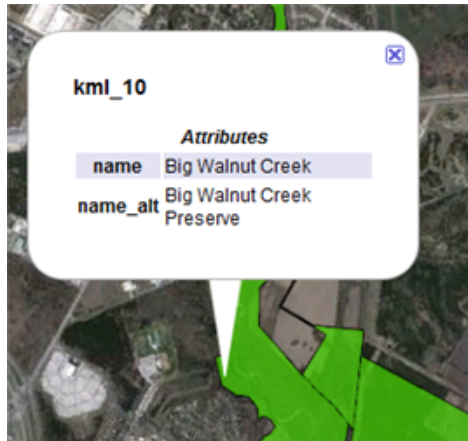


Click OK.

**5)** Run the translation and inspect the output.

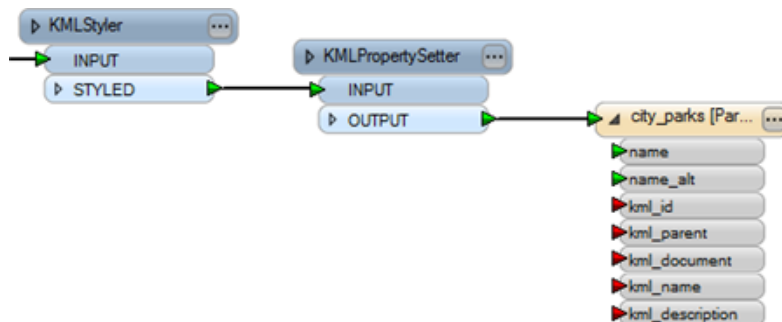
**6)** Back in Google Earth, choose the File > Revert menu item (or right-click the object in the “Places” window and choose Revert) to reload the data.

The park features will now all be the same shade of semi-transparent green, with a common border color.



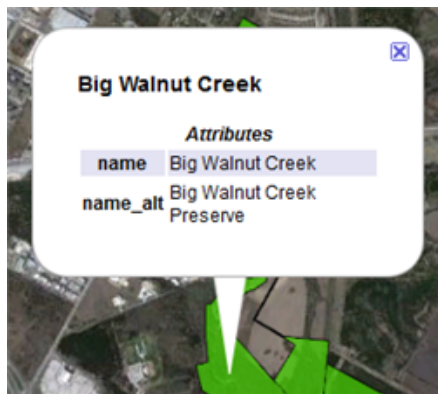
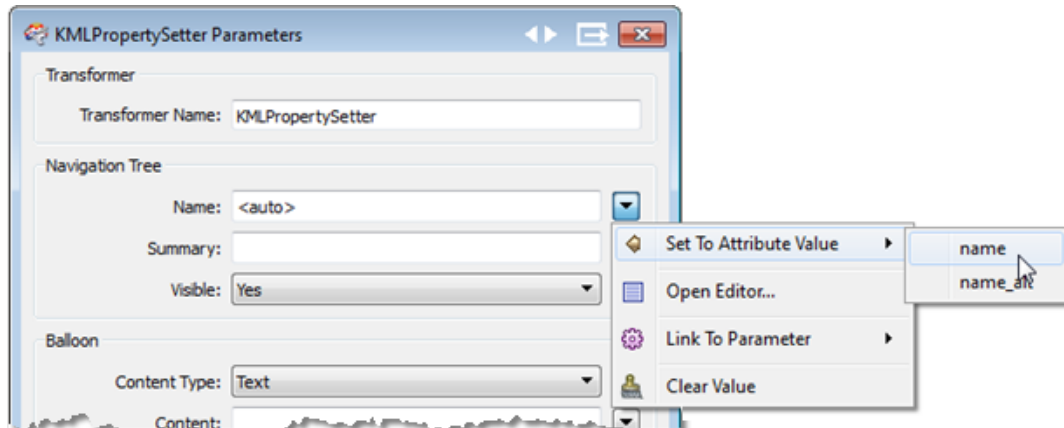
Notice that, in Google Earth, features are given a default name, such as kml\_10

**7)** To use the park name as the name for the feature, click on the connection between KMLStyler and writer feature type, then type KMLPropertySetter to place this transformer.



**8)** Open the parameters dialog for the KMLPropertySetter. Fill in these fields:

Name: click the button to select Set To Attribute Value > name  
Summary: A park in the city of Interopolis



9) Run the translation and back in Google Earth use the File > Revert menu item to reload the data.

Now querying a feature will show the feature name, and the Places dialog will show both the name and the description of the feature.

### Exercise 5: Add a Point Dataset

Point features are points of interest that have a location but no size, such as mountain peaks or historical markers. Point features in KML are assigned an icon as a map symbol. FME includes a set of built-in icons specifically designed for KML format translations and viewing. The KMLStyler transformer is used to set point feature parameters including icon type, color, size and opacity.

1) In FME Workbench, open or continue with the workspace from the previous exercise.

2) Click Readers > Add Reader on the menu bar. When the Add Reader dialog opens, fill in these fields:

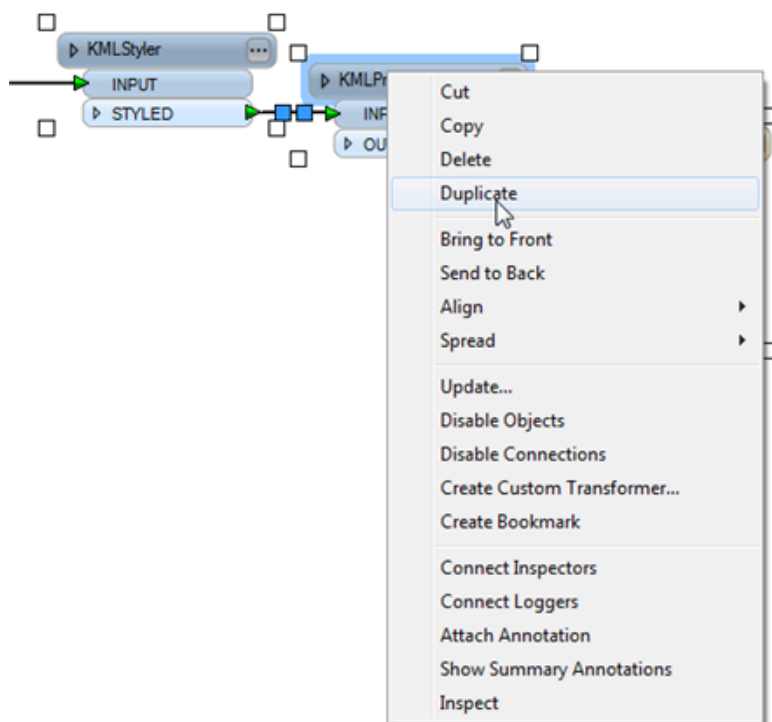
**Reader****Format:** MapInfo MIF/MID**Dataset:** C:\FMEData\Data\BirdSociety\BirdNestPoints.mif

Click OK to add the new reader.

**3)** Select the previously placed KMLStyler and KMLPropertySetter transformers.

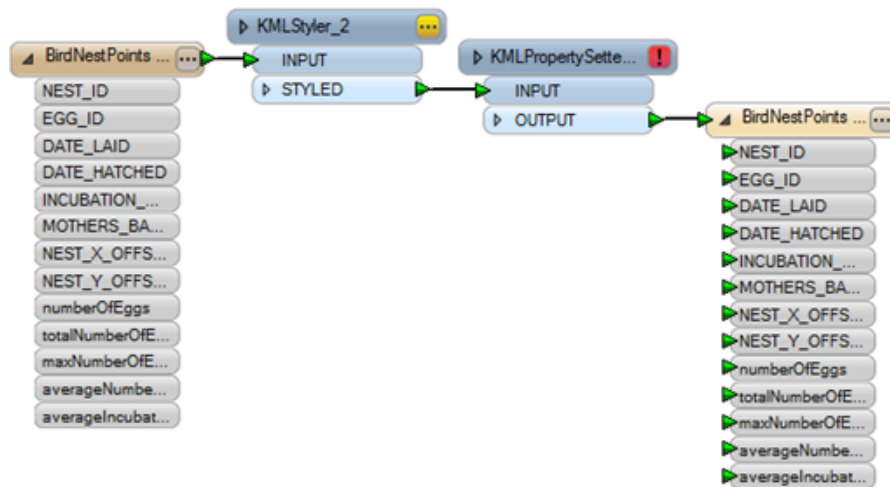
Right-click and choose the Duplicate option.

Connect the BirdNestPoints feature type to the new transformers.



**4)** Right-click the BirdNestPoints reader feature type, and choose Duplicate (On Writer). Delete the connection that will automatically be created, and connect the KMLPropertySetter transformer to the new writer feature type.





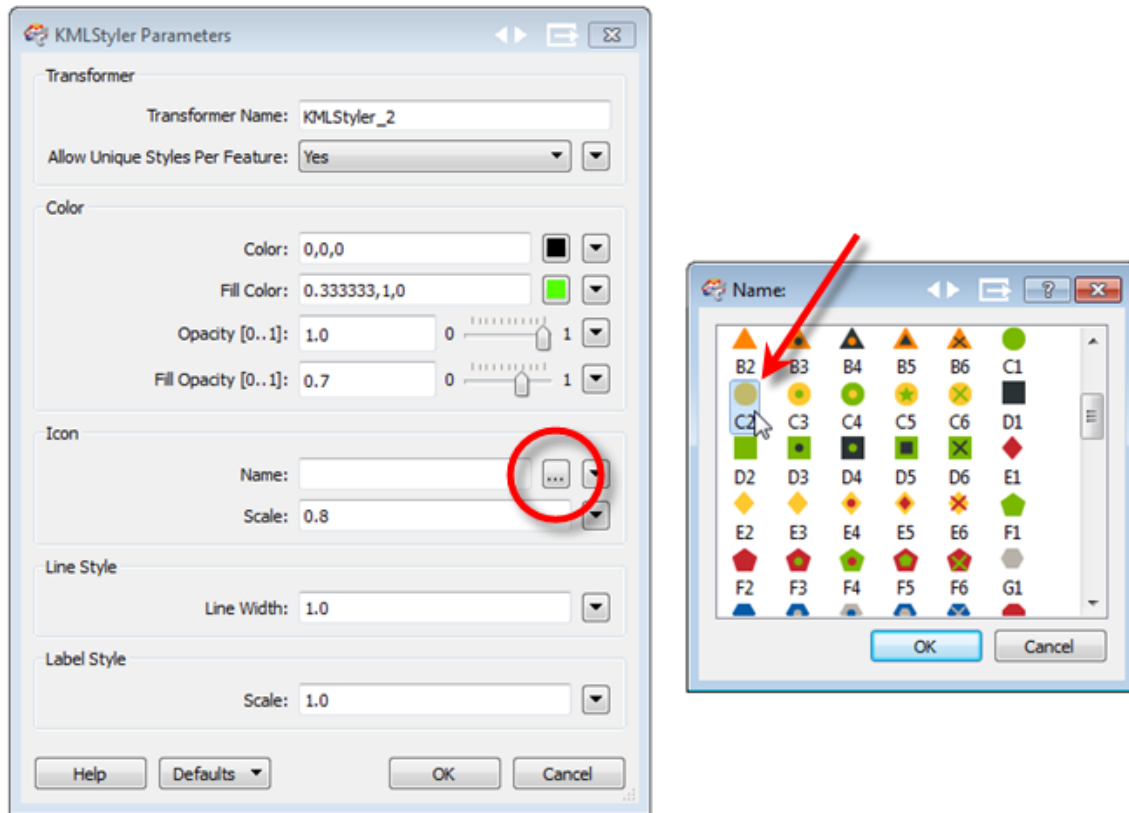
**5)** Click on the yellow parameters button on KMLStyler to open up the parameters dialog.

To set an icon for the bird nests, click on the browse button to the right of the Name field. In the icon-picker dialog, choose icon C2 and click OK.

Set icon scale to 0.4

Click OK again to close the KMLStyler parameters dialog.

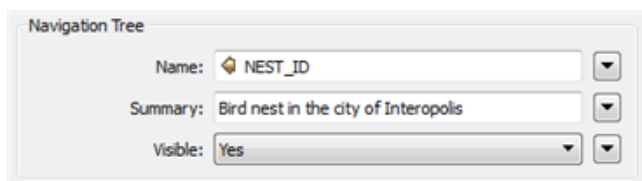
NB: An image URL can be entered into the name field instead of picking an FME icon. For example, try <http://fme.ly/nest> with an icon scale of 1.0



**6)** Set the properties for these bird nest features. Click on the red parameters button on the KMLPropertySetter to open up its parameters dialog. Fill in these fields:

Name: set to the attribute value NEST\_ID

Summary: Bird nest in the city of Interopolis

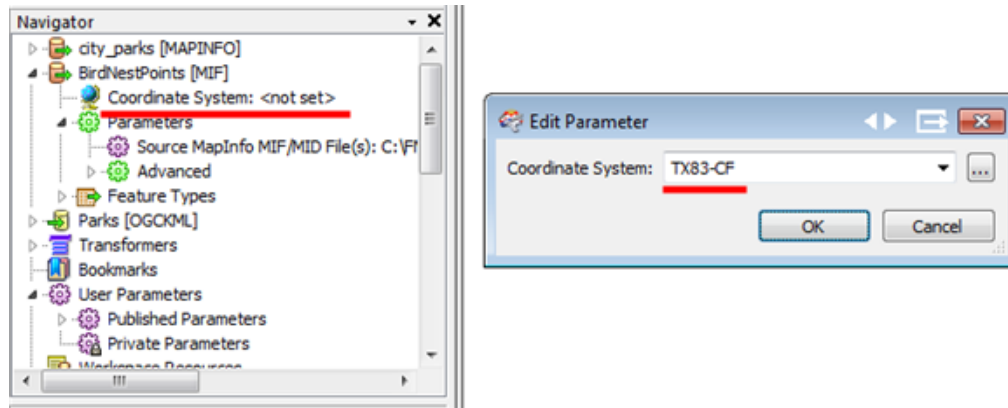


**7)** Run the translation.

Back in Google Earth, reload the data.

**8)** Problem! Google opens the data in the center of the Atlantic Ocean. There must be a problem with the bird nest coordinate system.

In the Navigator windows, locate the Coordinate System parameter for the BirdNestPoints reader. Double-click the parameter. When prompted enter a coordinate system of TX83-CF and click OK.



## 9) Re-run the translation



Back in Google Earth, reload the data.

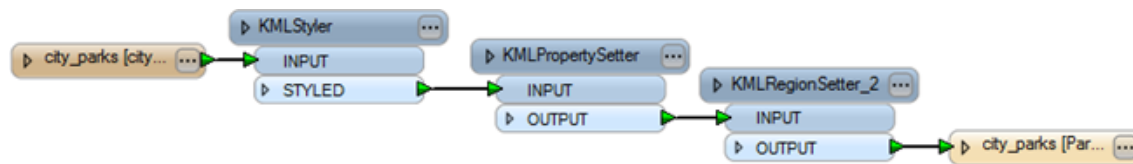
You will now see the bird nests represented by icons.

## Exercise 6: Regionate KML Data with FME Workbench

Follow these steps to create regions that set Level Of Detail bounds within KML.

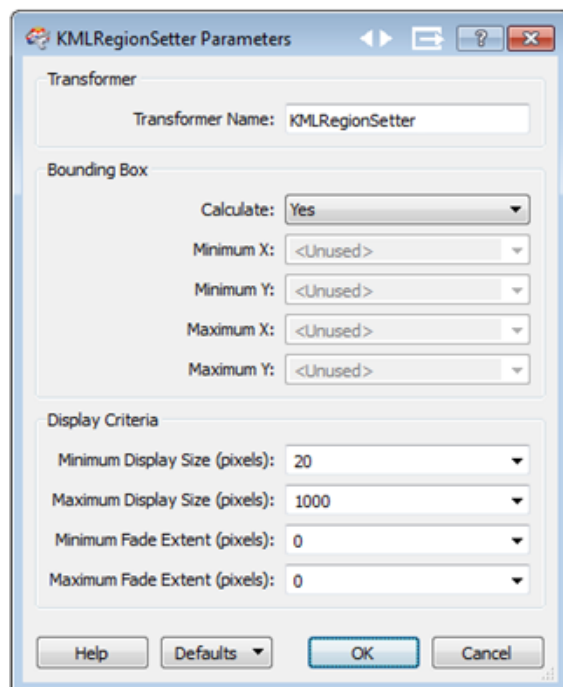
- 1) Start FME Workbench. Open or recreate the workspace from the previous exercise.
- 2) Place a KMLRegionSetter transformer. Click on the connection between the KMLPropertySetter transformer and the writer feature type.

Type the characters KML. Select KMLRegionSetter from the list.



3) Click on the red parameters button on the KMLRegionSetter. Fill in these fields:

<b>Bounding BoxCalculate:</b>	Yes
<b>Display CriteriaMinimum Display Size:</b>	20
<b>Display CriteriaMaximum Display Size:</b>	1000



4) Run the translation.

Back in Google Earth, reload the data.

You will now see that city parks appear and disappear as you zoom in and out.

5) Place a second KMLRegionSetter transformer in the connection between the KMLPropertySetter transformer and the birds nests writer feature type.

Bounding BoxCalculate:No

Minimum X:-97.7

Minimum Y:30.2

Maximum X:-97.5

Maximum Y:30.4

Display Criteria Minimum Display Size:5000

Maximum Display Size:-1

NB: It's better to set an explicit bounding box for point features and not use the option to calculate it. That's because point features produce an infinitely small bounding box and would never show in the output. The numbers above cover a good area of the data.

**6) Run the translation and reload Google Earth.**

You will now see that bird nests also appear as you zoom in and out, but because Maximum Display Size = -1, will never disappear because you have zoomed in too close.

**Exercise 7: Create 3D KML Data with FME Workbench**

Follow these steps to create 3D building features within KML.

**1) Start FME Workbench.** In the Start tab choose the option to Generate workspace.

**2) When the New Workspace dialog opens, fill in these fields:**

**Reader**

**Format:** Esri Geodatabase (File Geodatabase API)

**Dataset:** C:\FMEData\Data\Properties\Buildings.gdb

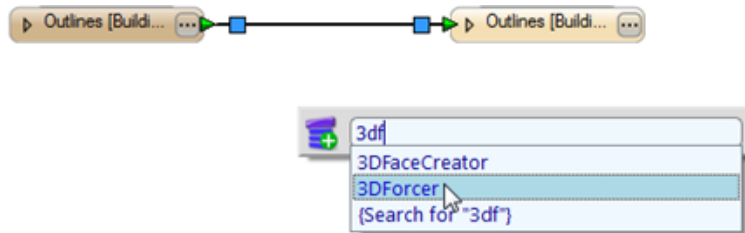
**Writer**

**Format:** Google Earth KML

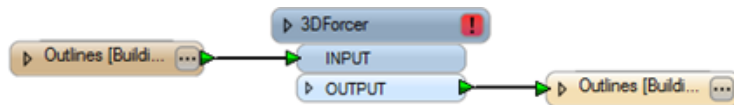
**Dataset:** C:\FMEData\Output\TutorialOutput\Buildings.kml

**Click OK to  
create the  
workspace.**

**3) Click on the connection between the reader and writer feature types.** Type the characters 3DF. Select 3DForcer from the list of transformers.

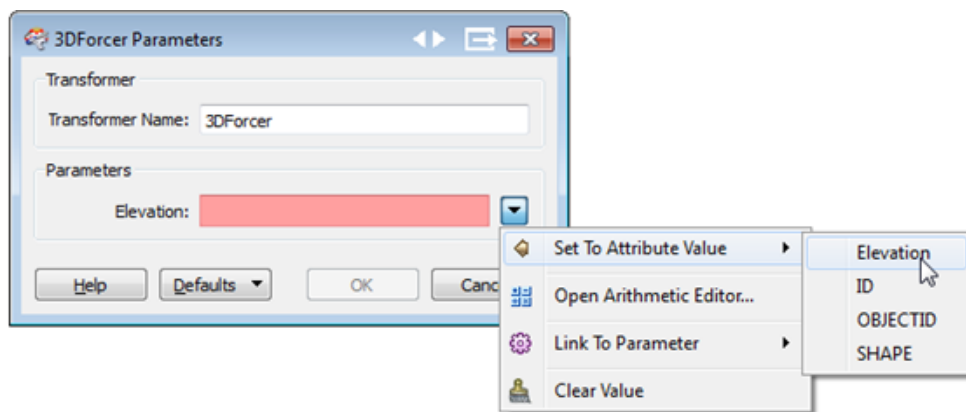


A 3DForcer transformer will be added between the reader and writer.

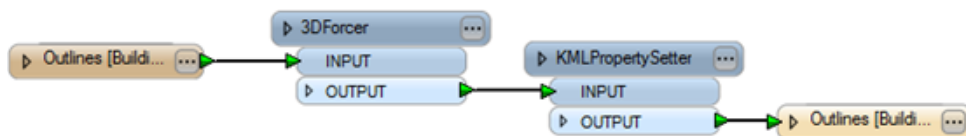


**4)** Open up the parameters dialog for the 3DForcer transformer. This transformer gives a Z value to the coordinates of 2D features.

Select the attribute Elevation as the source for the Z values. This attribute contains a building height for each feature.



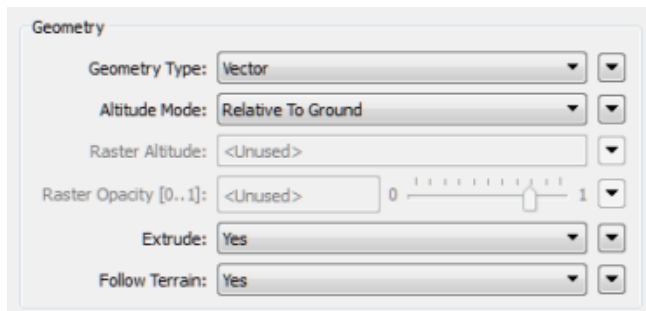
**5)** Place a KMLPropertySetter transformer between the 3DForcer and the writer feature type.



Open the properties dialog. Fill in these fields:

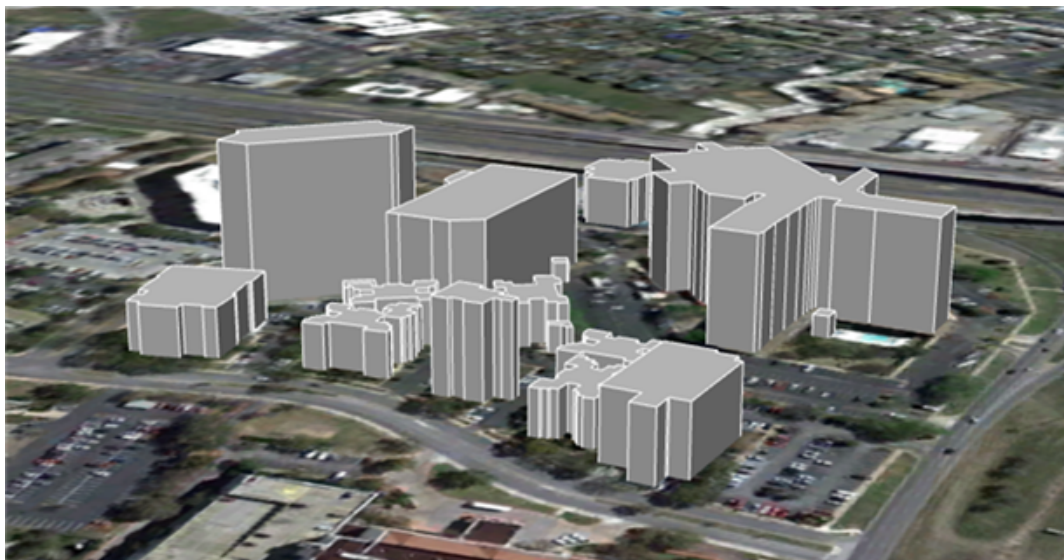
Altitude Mode:Relative to Ground

Extrude:Yes

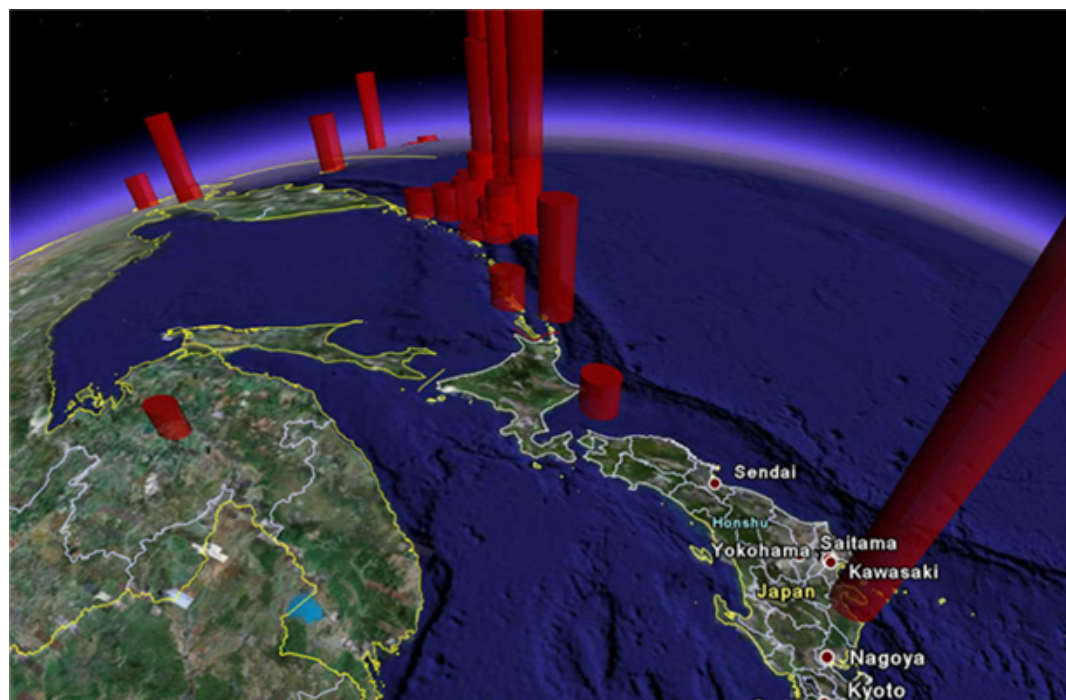


**6)** Run the translation and inspect the output.

Change the view aspect and you will now see three-dimensional building features.

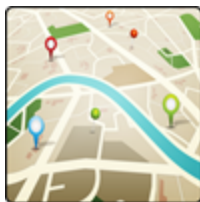


NB: This 3D forcing technique can be used in many scenarios, even for thematic mapping data such as earthquake intensity:



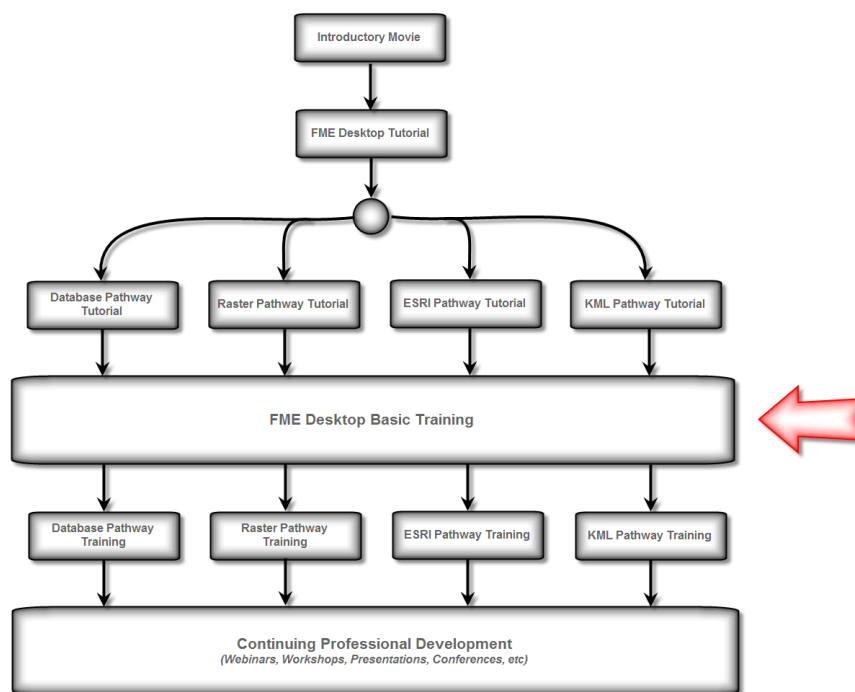


## What's Next?



***This document is a basic introduction to using KML data with FME.***

### Next Step



The next step in the FME KML Pathway is to take a basic FME Desktop training course, in preparation for the full FME KML Training Course.

Further information on all training options is available on the Safe Software web site at [www.safe.com/training](http://www.safe.com/training)

Many other resources for FME Desktop technical information can be located through the FMEpedia knowledgebase at <http://fmepedia.safe.com>