FME® Desktop Tutorial

FME Desktop 2014 Edition

Document and Copyright Information

Safe Software Inc. makes no warranty either expressed or implied, including, but not limited to, any implied warranties of merchantability or fitness for a particular purpose regarding these materials, and makes such materials available solely on an "as-is" basis.

In no event shall Safe Software Inc. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of purchase or use of these materials. The sole and exclusive liability of Safe Software Inc., regardless of the form or action, shall not exceed the purchase price of the materials described herein.

This manual describes the functionality and use of the software at the time of publication. The software described herein, and the descriptions themselves, are subject to change without notice.

Data Sources

City of Vancouver

Unless otherwise stated, the data used here originates from open data made available by the City of Vancouver, British Columbia (data.vancouver.ca). It contains information licensed under the Open Government License - Vancouver.

Others

Forward Sortation Areas: Statistics Canada, 2011 Census Digital Boundary Files, 2013. Reproduced and distributed on an "as is" basis with the permission of Statistics Canada. © This data includes information copied with permission from Canada Post Corporation.

Digital Elevation Model: GeoBase®

Fire Hall Data: Some attribute data adapted from content © 2013 by Wikipedia

(http://en.wikipedia.org/wiki/Vancouver_Fire_and_Rescue_Services), used under a Creative Commons Attribution-ShareAlike license

Stanley Park GPS Trail: Used with kind permission of VancouverTrails.com. See http://www.vancouvertrails.com/trails/stanley-park/.

Copyright

Revisions

Every effort has been made to ensure the accuracy of this document. Safe Software Inc. regrets any errors and omissions that may occur and would appreciate being informed of any errors found. Safe Software Inc. will correct any such errors and omissions in a subsequent version, as feasible. Please contact us at:

Safe Software Inc.

Phone: 604-501-9985

Fax: 604-501-9965

Email: services@safe.com

Web: www.safe.com

Safe Software Inc. assumes no responsibility for any errors in this document or their consequences, and reserves the right to make improvements and changes to this document without notice.

Trademarks

Document Information

Document Name:	FME Desktop Tutorial 2014 v10.0
Version:	FME Desktop 2014
Updated:	January 2014

Contents

Introduction

This tutorial is a recommended part of all the FME Training Pathways

Training Pathway

This tutorial is a basic introduction to using FME and is part of the FME Training Pathway system.

No prior knowledge of FME Desktop is required to follow its instructions.

FME Version

This tutorial specifically covers the use of FME Desktop® 2014 edition. Older versions of FME may not have some of the functionality described in this tutorial.

Contents

This tutorial consists of five individual chapters. Each chapter has its own topic and exercises.

The FME Desktop installation DVD includes a set of movies which cover each chapter of this tutorial. They can be accessed on the disk by browsing to the folder "Tutorial".

Installation and Licensing

This chapter explains how to install and license FME, from the point of view of a trial user.

It includes information on where to download FME from, and how to get a trial license. It also covers what sample data is required for the FME Desktop Tutorial, and where to download it from.

Format Translation

The first task for most new FME users is translation of spatial data from one format to another. This chapter shows how to quickly translate data between different formats, using both the FME Quick Translator, and FME Workbench.

Data Restructuring

Format translations are much more effective when they can be customized to produce output data in a particular structure. This chapter explains how to use FME Workbench to go beyond quick translation, and produce data in a structure that can be used seamlessly by the end user.

Content Transformation

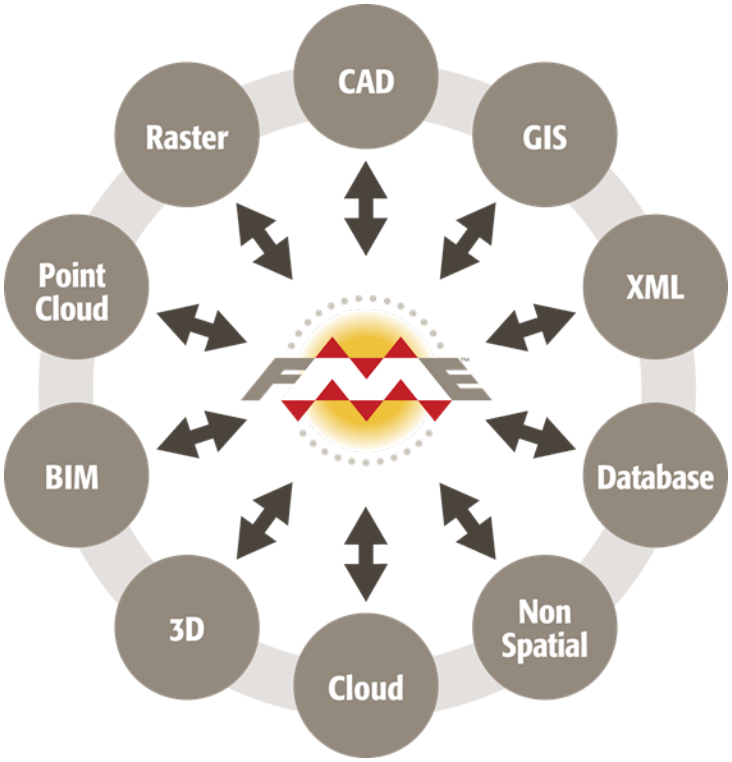
Data Transformation in FME can go further than simple restructuring, and include manipulating the actual content of data during a format translation. This chapter covers using FME Workbench to transform spatial and attribute components, demonstrating FME's ability to add significant value to translated data. It also covers how to translate more than one format of data simultaneously.

Data Reprojection

In order to be able to share spatial data it's often necessary to reproject that data into a more suitable coordinate system. This chapter shows how to reproject data within FME Workbench, and also demonstrates how to handle multiple source files using a Dynamic schema.

Introduction to 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.



What is FME?

FME enables both Translation and Transformation of spatial data to overcome the twin barriers to interoperability:

- Data Type (CAD, GIS, BIM, etc)
- Data Format

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.

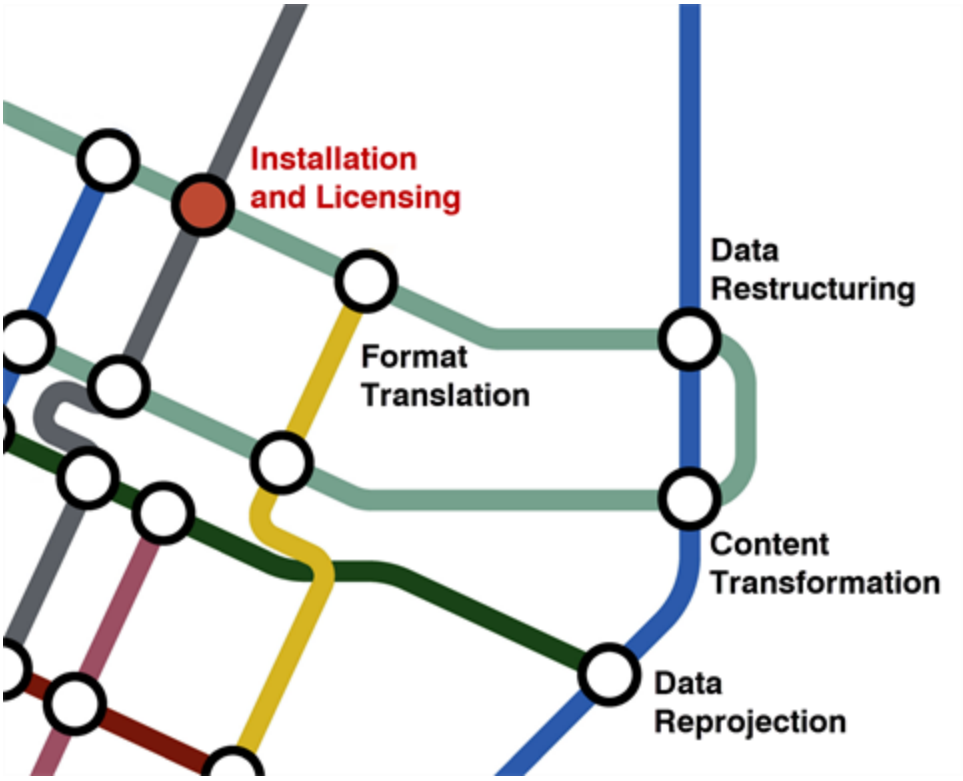
The key FME Desktop application is **FME Workbench**, an intuitive point and click interface for graphically defining translations and transformations as a flow of data.

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

FME Data Inspector is an application for visually inspecting spatial data.

What's the First Step?

Now that you have an idea about what FME can do, your first step in the FME learning program is to review the next chapter: Installation and Licensing.



Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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

Chapter 1 - Installation and Licensing

This chapter covers all steps from downloading FME Desktop to actually starting and using an FME application

In this chapter

- Downloading FME
- Installing FME
- Starting an FME application
- Getting Help

Linux/Mac Users: Be sure to check the notes particular to your operating system at the end of this chapter.

The FME installer comes in two versions, one of which is specifically for trial users of FME. This trial version is fully operational with no functional restrictions other than a time-limited license.

The usual trial period is 14 days.

FME licensing methods depend on the type of license used (fixed or floating). Again, there is a specific license type solely for trial use.

If you have already purchased a permanent FME license, you can download and install the full version of FME. The installer file will be the same regardless of edition.

For more information, please refer to the FME Installation and Licensing Manual.

This chapter covers installation and licensing using the simplified trial version.

Downloading FME

A trial version of FME can be downloaded from the Safe Software web site.

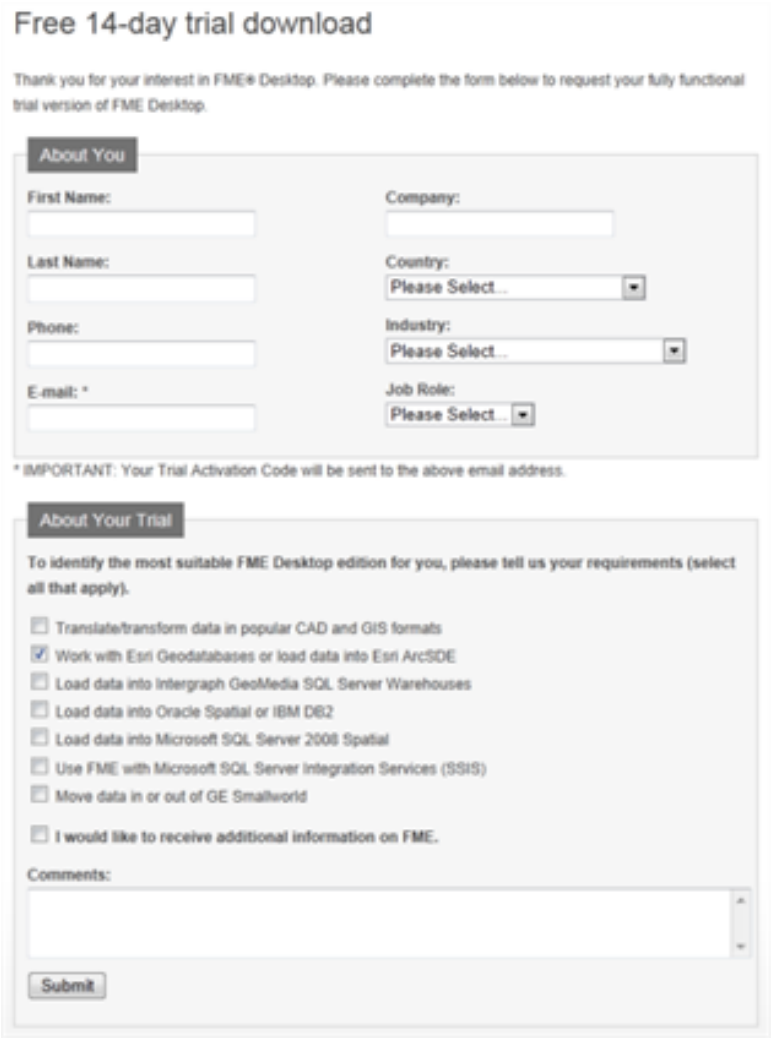
Follow these steps to download a trial version of FME.

1) Open a web browser and visit: http://www.safe.com/trial.

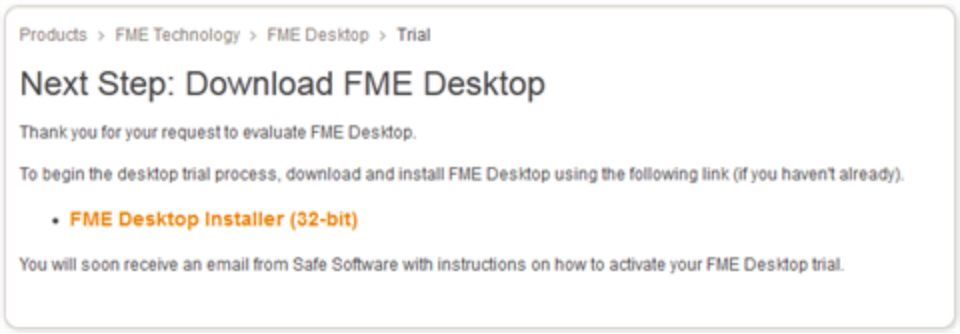
2) Fill in the Trial Request Form. Below About Your Trial, select the edition of FME that most closely matches your intended application.

If you are unsure, selecting "Work with Esri Geodatabases or load data into Esri ArcSDE" will provide an FME edition that is suitable for use with the sample data set to be installed later in this chapter.

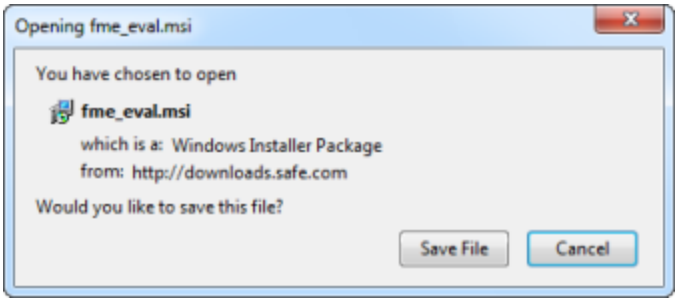
3) Click on the Submit button.



4) The Download page appears. Click the FME Desktop Installer (32-bit) link.



5) The download of the installation file will begin. Depending on your browser and security settings, you may be offered the choice to either run the file directly, or save it first.



FME's executable is digitally signed, so running the installer directly should produce a dialog reporting Safe Software Inc as the publisher. Depending on your system setup the digital signature might not be visible, in which case you may have to save the installer file before running it.

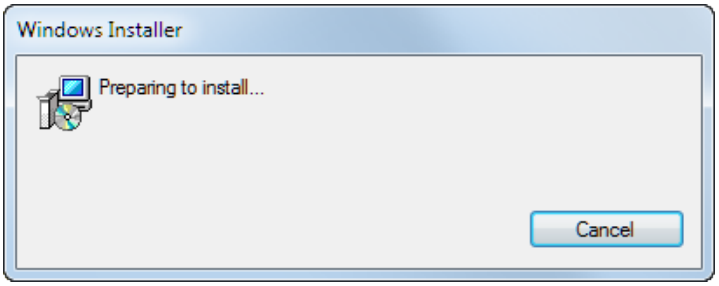
Installing FME

The user account installing FME is required to have administrative privileges. You may therefore require assistance from your system administrator to install FME, if you do not have these privileges.

Follow these steps to install FME Desktop.

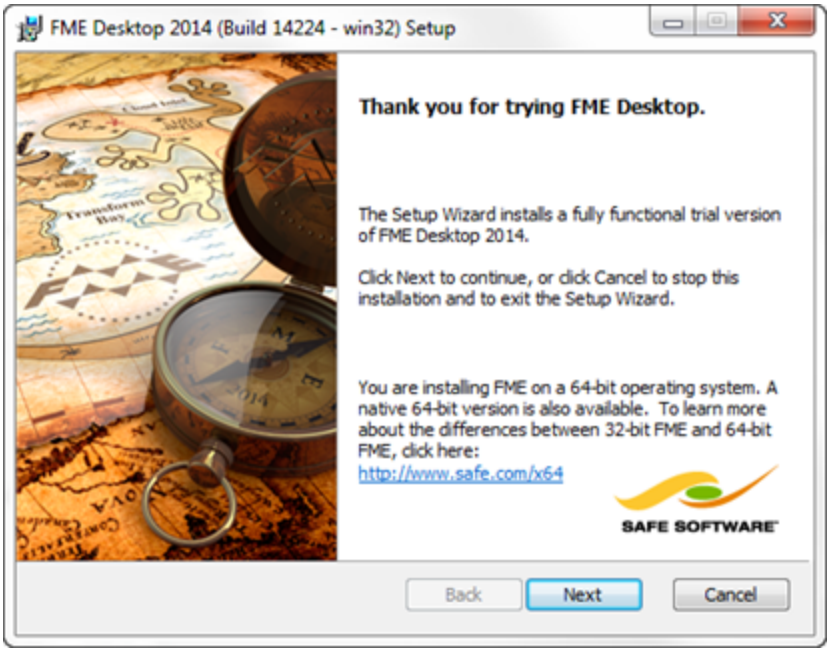
1) Run the FME installer. Once the installer file is downloaded you can do this by right-clicking the file in Windows Explorer and choosing Install.

Once initiated, the installer will show a "Preparing to install…" message.



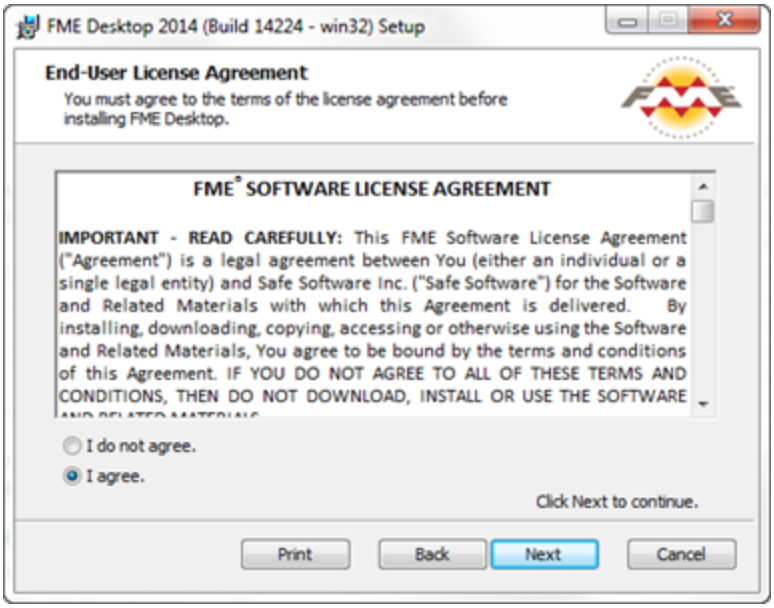
Build numbers in the title bar will vary depending whether you install from the download as described here, or from the DVD installer.

2) You may also see an intermediate dialog momentarily, as the FME installer calculates the required disk space. No user action is required here.

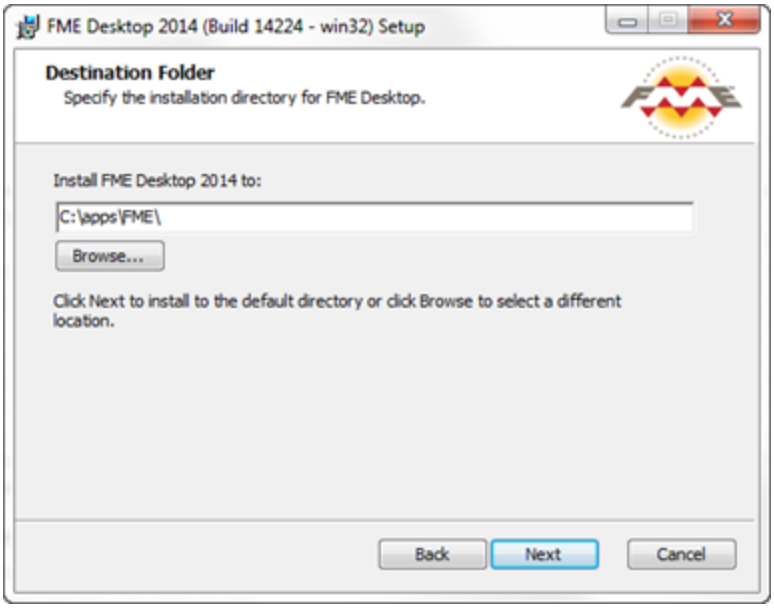


Next, a welcome dialog box appears. Click Next to continue.

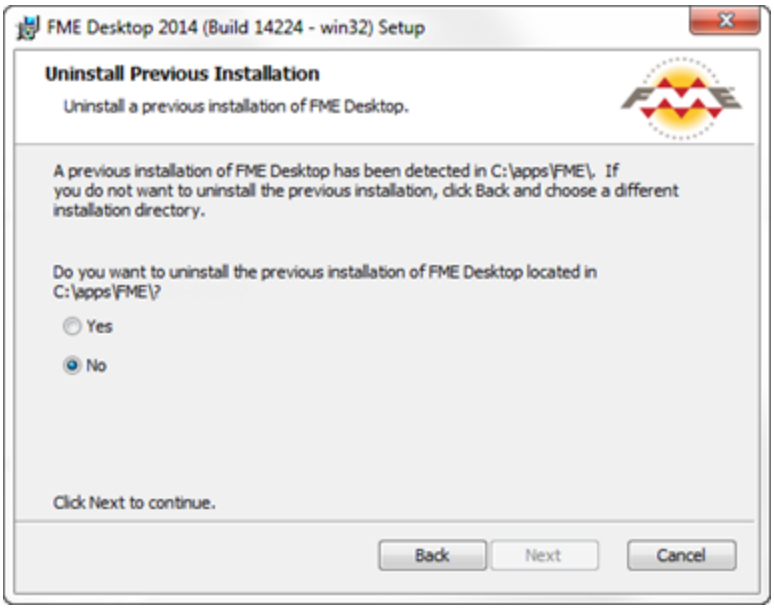
3) Select the "I agree" button to accept the FME End-User License Agreement.



4) FME may be installed in any folder desired. The usual location is in the *Program Files* or *Apps* folder.

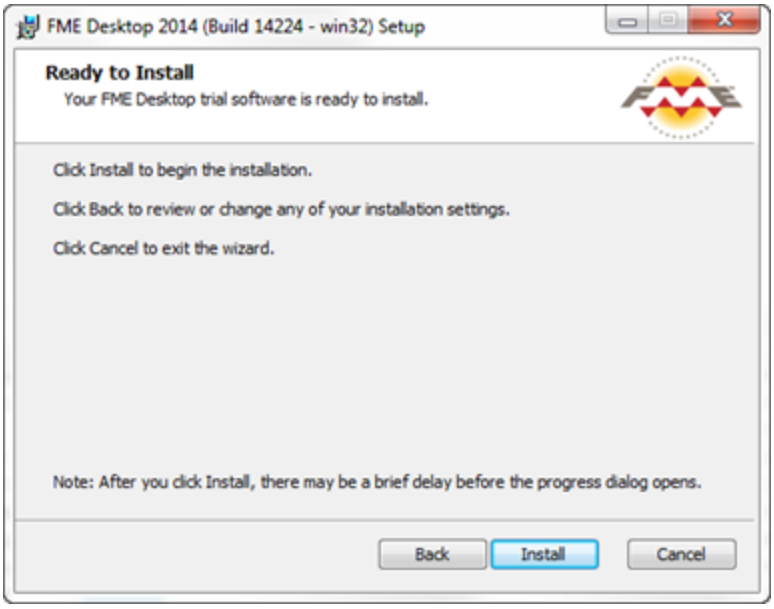


5) If the chosen folder already holds a copy of FME, then the installer prompts to uninstall it. FME cannot be installed into the same folder unless the older version is uninstalled first.

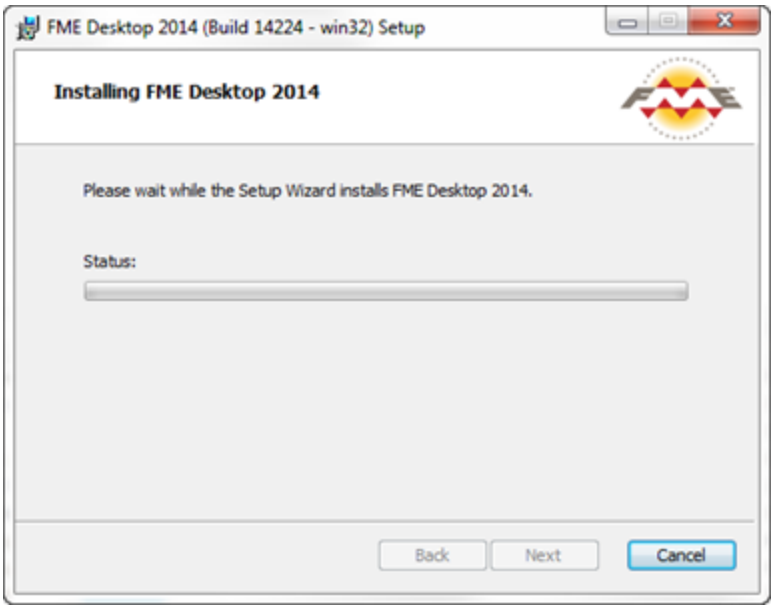


Before the installation starts, a dialog box opens to review the current settings.

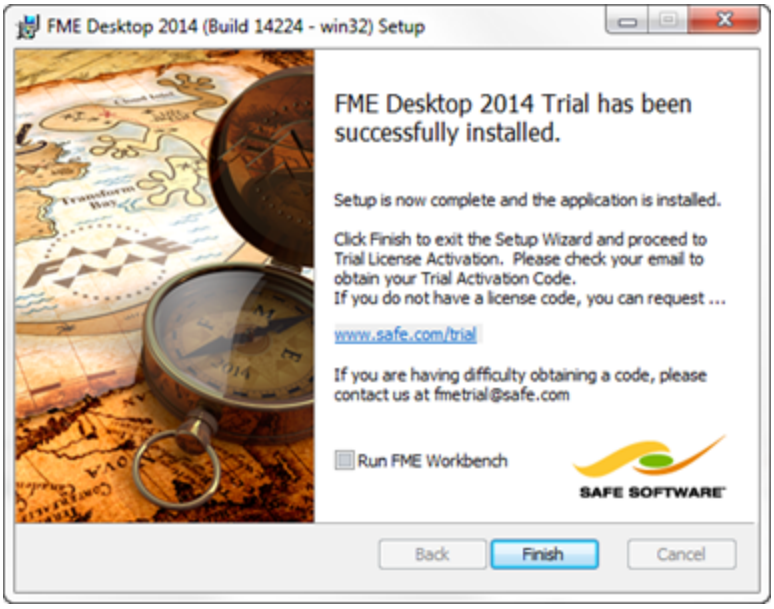
6) Click Install to commence the installation process.



7) If a previous version of FME was already installed, the installation process will first uninstall it.



8) Once the installation is complete, a final dialog box appears. Click Finish to proceed to the licensing stage.

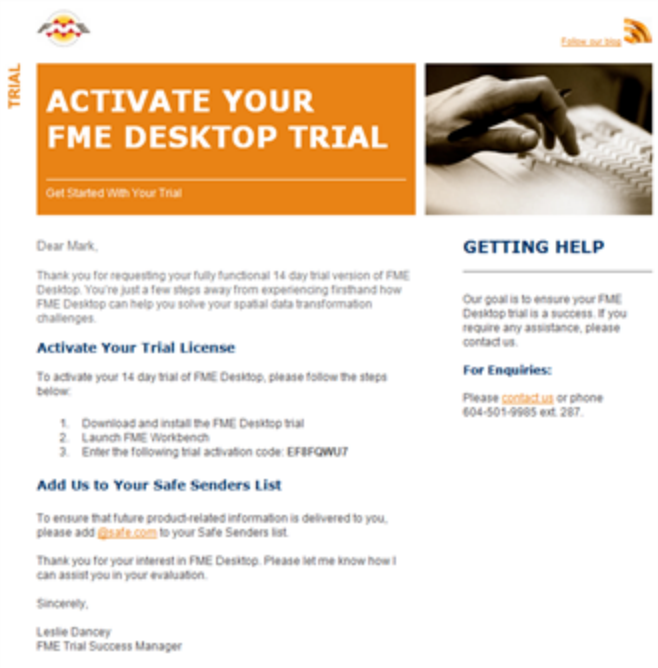

FME Desktop 2014 (Build 14224 - win32) Setup
FME Desktop 2014 Trial has been successfully installed.
Setup is now complete and the application is installed.
Click Finish to exit the Setup Wizard and proceed to Trial License Activation. Please check your email to obtain your Trial Activation Code.
If you do not have a license code, you can request ...
www.safe.com/trial
If you are having difficulty obtaining a code, please contact us at fmetrial@safe.com
Run FME Workbench
SAFE SOFTWARE
Back
Finish
Cancel

Licensing FME

This document covers trial licensing, which is generally a single fixed license.

Follow these steps to license FME Desktop with an Activation Code.

1) By filling in the Trial Request Form on the web site, you will receive an e-mail containing an FME activation code.


TRIAL

ACTIVATE YOUR FME DESKTOP TRIAL

Get Started With Your Trial

Dear Mark,

Thank you for requesting your fully functional 14 day trial version of FME Desktop. You're just a few steps away from experiencing firsthand how FME Desktop can help you solve your spatial data transformation challenges.

Activate Your Trial License

To activate your 14 day trial of FME Desktop, please follow the steps below:

1. Download and install the FME Desktop trial
2. Launch FME Workbench
3. Enter the following trial activation code: EF8FQWU7

Add Us to Your Safe Senders List

To ensure that future product-related information is delivered to you, please add @safe.com to your Safe Senders list.

Thank you for your interest in FME Desktop. Please let me know how I can assist you in your evaluation.

Sincerely,

Leslie Dancey
FME Trial Success Manager

GETTING HELP

Our goal is to ensure your FME Desktop trial is a success. If you require any assistance, please contact us.

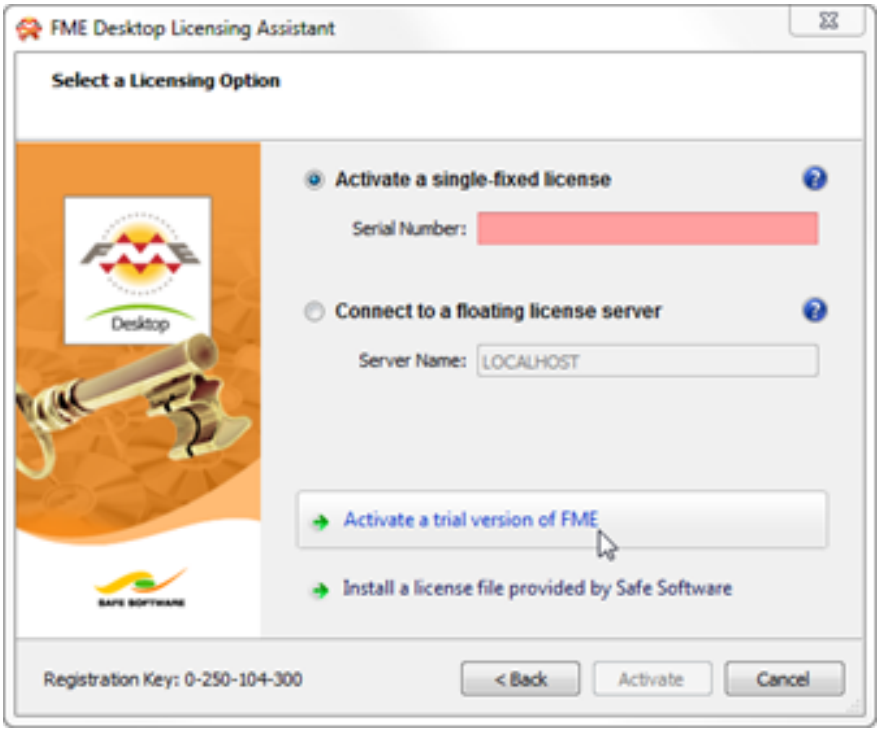
For Enquiries:

Please contact us or phone 604-501-9985 ext. 287.

2) Licensing FME involves the FME Licensing Assistant tool.

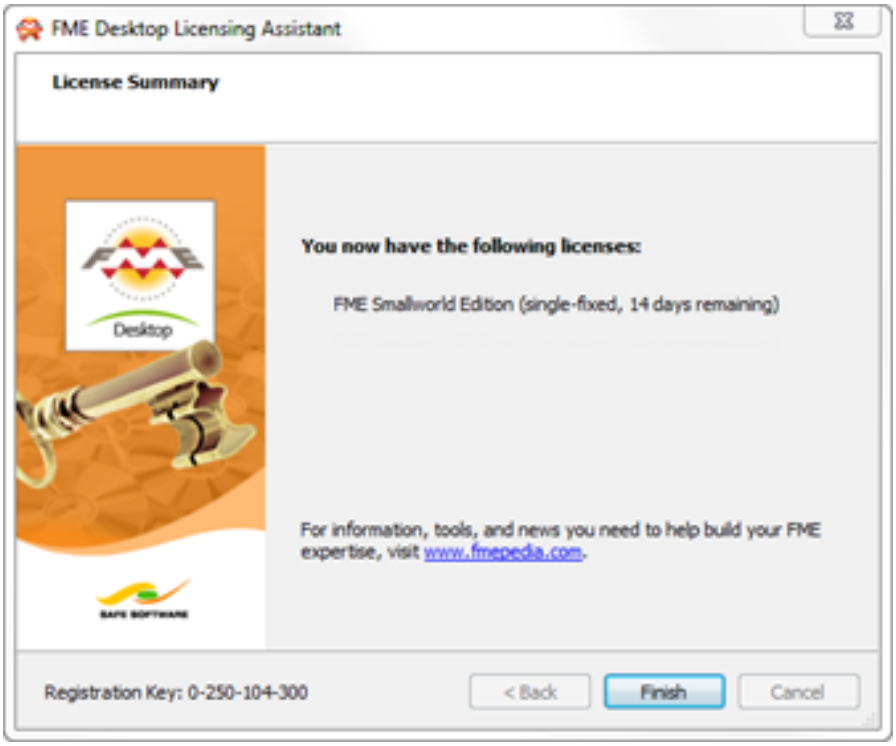
The FME Licensing Assistant can be launched at any time by selecting **Start > All Programs > FME Desktop 2014> Utilities > FME Licensing Assistant**.

Choose the option to "Activate a trial version of FME."



3) Enter your license code into the field provided and click the Activate button.

4) Correctly entering the code will complete the licensing process. The type of license will depend on the information provided in the Evaluation Request Form.


FME Desktop Licensing Assistant
License Summary
You now have the following licenses:
FME Smallworld Edition (single-fixed, 14 days remaining)
Desktop
For information, tools, and news you need to help build your FME expertise, visit www.fmepedia.com.
Registration Key: 0-250-104-300
< Back
Finish
Cancel

Installing the FME Sample Dataset

Carrying out the exercises in this tutorial requires a set of sample data available from either the Safe Software web site or the installation DVD.

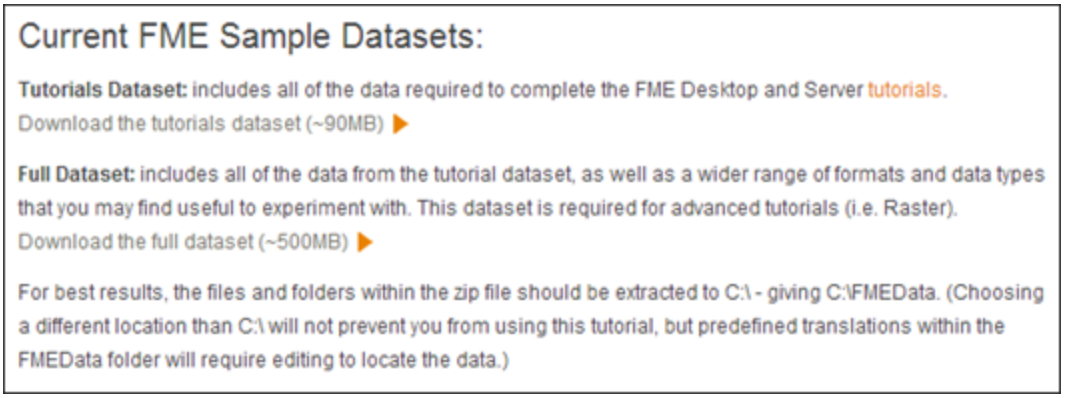
Follow these steps to download and install the FME sample dataset from the Safe Software web site.

1) Open a web browser and visit: http://www.safe.com/fmedata.

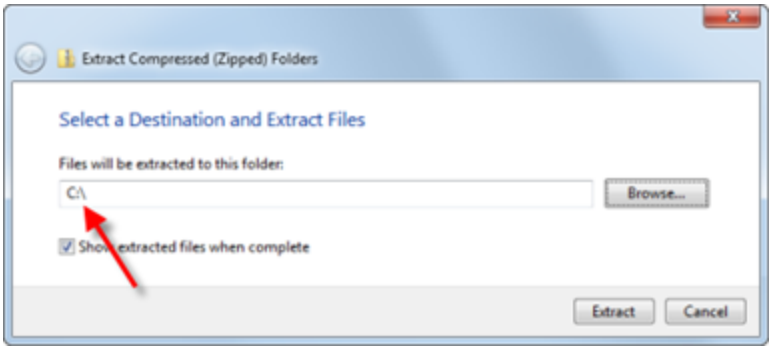
2) There are two datasets available. One is a full dataset with nearly 500mb of example data. The other is a 100mb subset specifically for the FME Desktop and Server tutorials.

The Tutorials dataset is all you need to complete the exercises in this document; however the Full dataset has a wider range of formats and data types that you may find useful to experiment with.

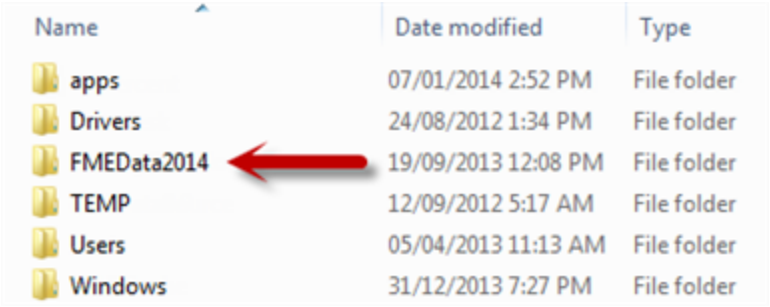
Click the correct link to download your chosen set of FME sample data.



3) Download the file and extract its contents. Where possible, choose the root folder of the C:\ drive to extract the data.



The data will be automatically extracted into a folder called FMEData2014.



Choosing a different location than C:\ will not prevent you from using this tutorial, but predefined translations within the FMEData folder will require editing to locate the data.

Congratulations! You have now:

- *Downloaded and installed FME Desktop*
- *Licensed FME Desktop*
- *Installed the FMEData demo dataset*

Exercise 1.a: Starting an FME Application

Now that FME is installed and licensed, its applications may be launched.

Exercise 1.a: Starting an FME Application	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Parks (MapInfo TAB format) Parcel Boundaries (AutoCAD DWG format) Interopolis Orthophoto Images (GeoTIFF format)
Overall Goal	View city parks and parcel data overlaid onto a raster image and inspect the data
Demonstrates	Startup and use of the FME Data Inspector

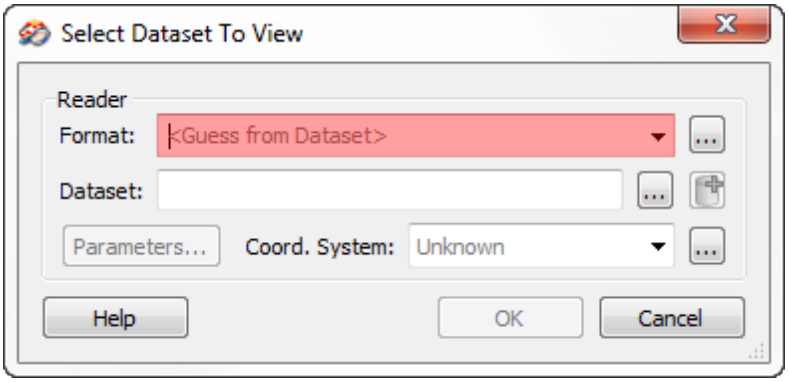
The FME Data Inspector

The FME Data Inspector is a tool for visually inspecting spatial data, regardless of type or format. This application is a good introduction to the functionality of FME.

Follow these steps to start the FME Data Inspector and view some spatial data.

1) From the Windows start menu, select **Start > All Programs > FME Desktop 2014 > FME Data Inspector**. The exact start path may vary according to the operating system being used.

2) On the FME Data Inspector menubar, click **File > Open Dataset** to open the Select Dataset to View dialog box. Fields with a red background are mandatory fields.



3) To specify the source data format, click in the Format field and start typing "**mapi**"

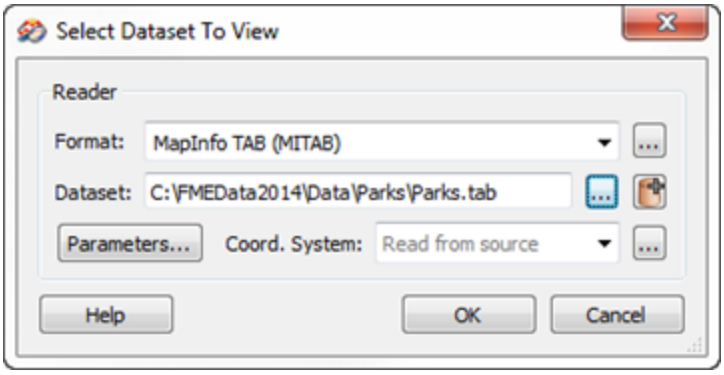
A filtered list of formats appears.

When MapInfo TAB (MITAB) appears in the list, press Enter or click to select it.

Alternatively, the source format can be defined by clicking on the Browse button at the right of the Format field, and using the Reader Gallery dialog box.

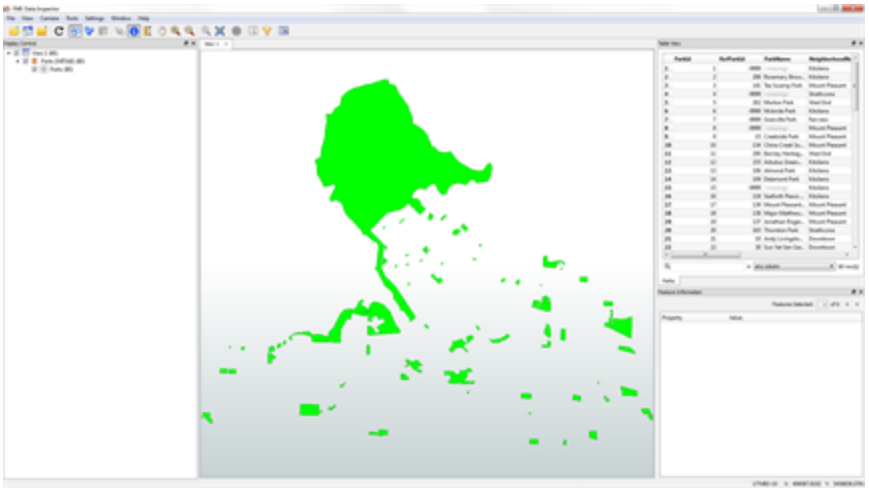
4) To select the TAB data to view, click the Browse tool (the [...] icon for the Dataset field).

In the file browser, navigate to, navigate to *C:\FMEData2014\Data\Parks* and select the *Parks.tab file*.



5) Click OK to open the TAB file in the FME Data Inspector's display window..

The MapInfo TAB dataset is now open in the FME Data Inspector.



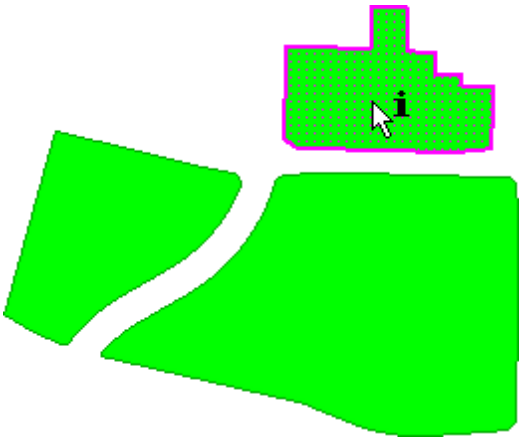
Inspecting Attributes

Follow these steps to inspect a spatial feature, and to view attribute and other information.

1) You can verify that this tool is activated in one of the following ways:

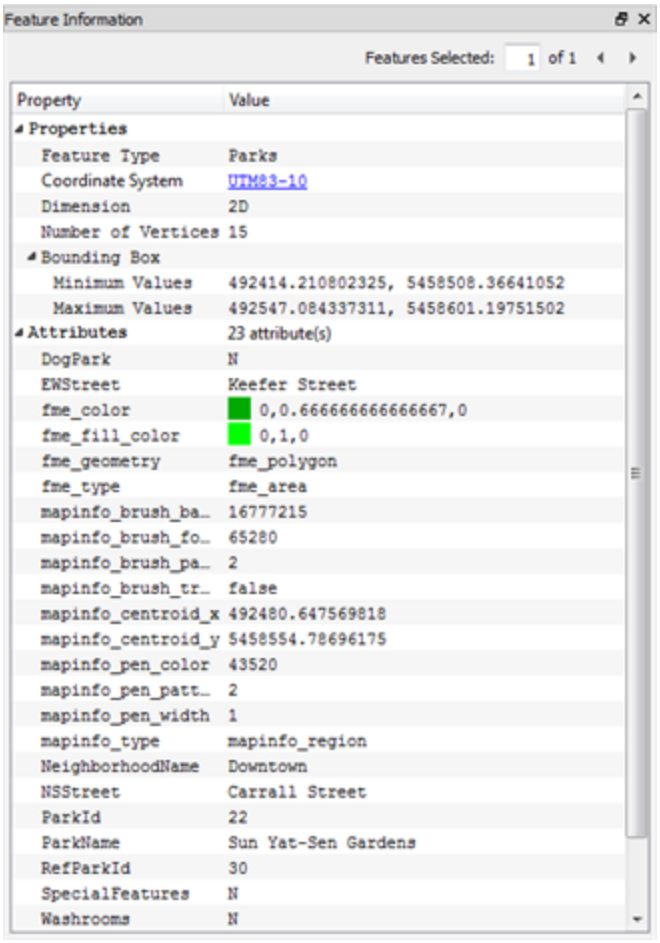
- Click the Select Features tool button if it is not already activated.
- The  icon has an "engaged" appearance on the toolbar.
- Place your cursor on the View window. When the letter "**i**" appears to the right of the cursor, the tool is active.

2) Click one of the spatial features in the display window.

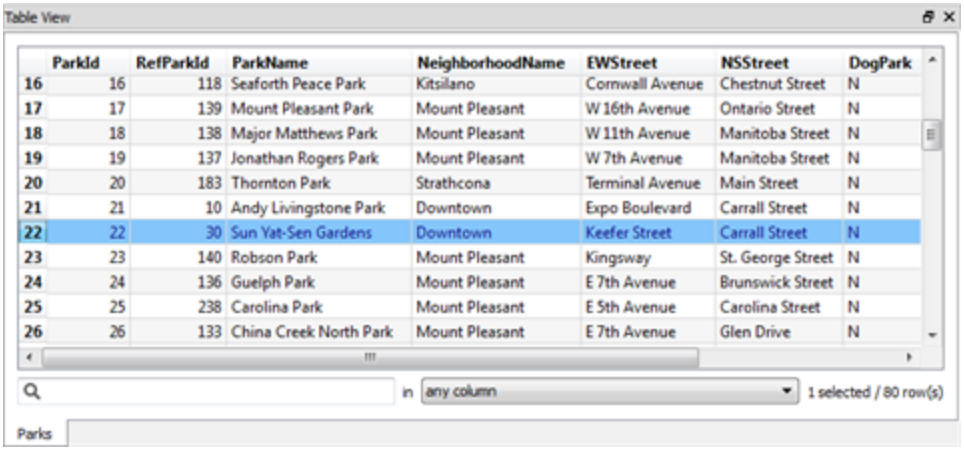


Details about the feature are displayed in the Information window, on the right hand side of the Data Inspector.

Notice that the Feature Information window displays: user attributes and FME "format attributes," as well as details about the feature's coordinate system, plus other information:



Also notice that the Table View window is a layout of the user attributes for all features in the Parks layer, with the selected Park feature highlighted:



Exercise 1.b: Overlaying Data in the FME Data Inspector

A useful feature of FME Data Inspector is its ability to overlay multiple datasets in different formats within a single window.

Follow these steps to add a second dataset to the view, and to set the display window order.

1) To add a dataset, on the Inspector toolbar click the Add (not Open) Dataset icon ( ).

The equivalent menubar tool is found under **File > Add Dataset**.

The Select Dataset to Add dialog box appears.

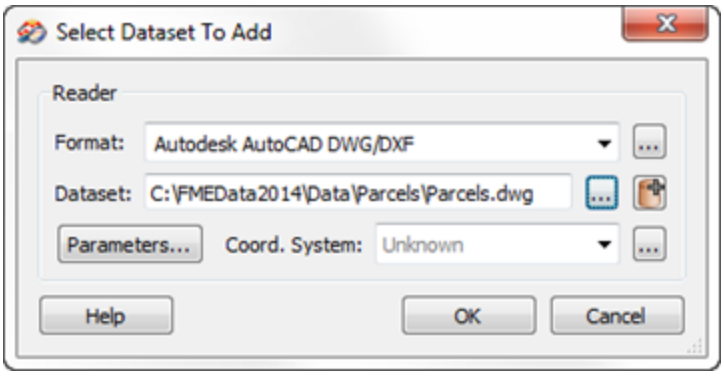
2) This time, click on the format Browse button – besides the Format field – to select the Autodesk AutoCAD DWG/DXF format.

3) In the Dataset field, click the dataset Browse button and navigate to *C:\FMEData2014\Data\Parcels*.

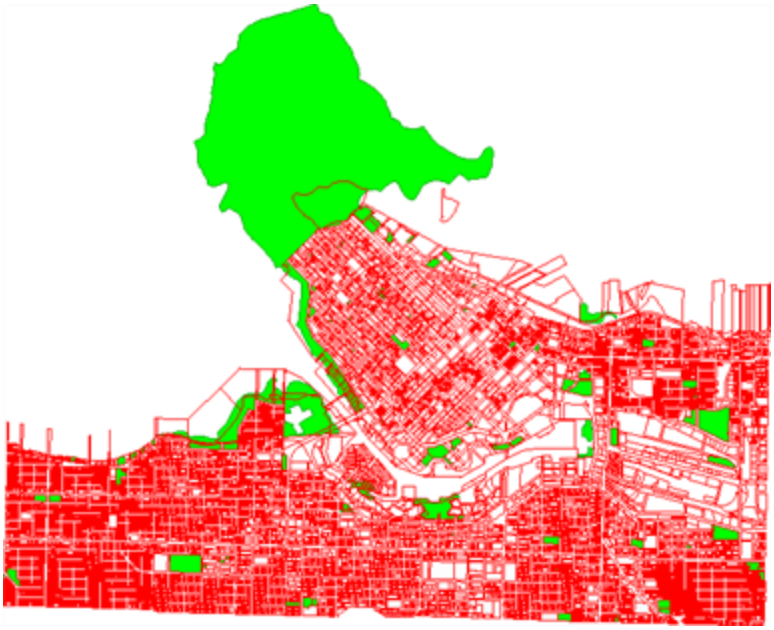
4) Select the DWG file *Parcels.dwg* and click OK to accept the selection.

By selecting the format before the dataset, you can browse only those datasets that correspond to the requested format. This narrows your search and makes it quicker to find what you need.

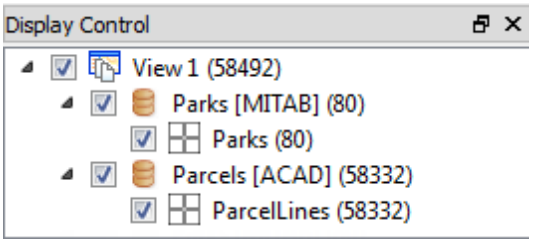
5) Click OK to add the dataset to the display window.



The newly-added data appears above the original MapInfo Parks dataset.



6) In the Display Control Window (left side of Inspector), dragging the dataset icon beside the MITAB (city_parks) dataset can be used to move it above or below the properties datasets in the display window.



Notice that the park features now appear above - and therefore obscure - the AutoCAD parcel data.

The FME Data Inspector can also add background maps to the display. Follow these steps to add a background map.

7) Click **Tools > FME Options** on the menubar.

8) In the field for Background Format notice all of the different online mapping services that can be used to provide background information. To use local data - as we will in this example - select Other FME Format.

9) Set Format to GeoTIFF (Geo-referenced Tagged Image File Format). Browse to the folder *C:\FMEData2014\Data\Orthophotos* and select all of the TIF files in there.

Now use the Open Dataset tool to open the parks dataset again. When you do so, background data - in this case raster - will be displayed.

Congratulations! You have now:

- *Started the FME Data Inspector*
- *Opened a dataset for inspection*
- *Queried a feature*
- *Added a second dataset to the view*
- *Changed the display order of datasets*
- *Added Background Data*

Getting Help

FME products include extensive, context-sensitive help. For assistance with a tool or format, click the item and then press F1 to open the help system.

A host of useful technical information is also available online through http://fmepedia.safe.com/.

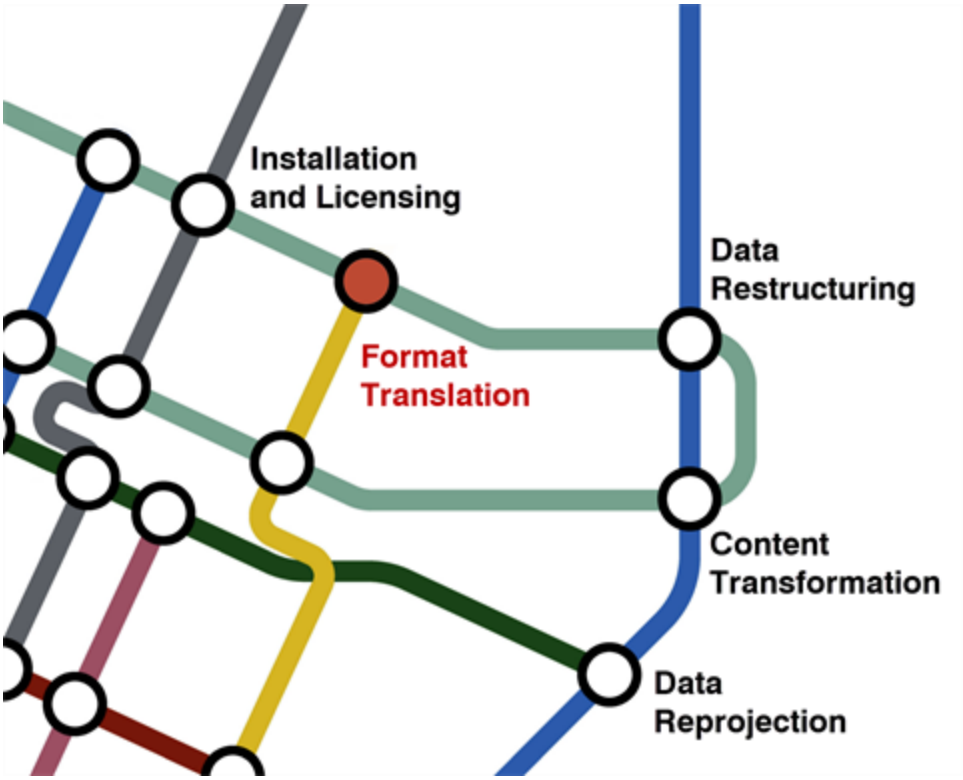
If you have any questions about licensing or installation, please contact the FME support team through the contact form on their web site at: www.safe.com/support.

For general information, or for sales enquiries, please contact your Safe Software Account Manager or email sales@safe.com.

Conclusion

Next Step

Now that you have completed this chapter, your next step in the FME learning program is to continue to the next chapter: Format Translation.



Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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

Chapter 2 - Format Translation

This chapter covers basic methods for translating spatial data from one format to another

In this chapter

- What is Data Translation?
- Using the FME Quick Translator
- FME Workbench
- Quick translations in FME Workbench

What is Data Translation?

Data Translation entails the changing of data format to facilitate the interoperability of spatial data.

Quick Translation involves the translation of data format, without any customization; i.e. translation without transformation.

Exercise 2.a: Using the FME Quick Translator

The simplest method of data translation is to use the FME Quick Translator application.

Exercise 2.a: Using the FME Quick Translator	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Mapping Grid (GML format)
Overall Goal	Translate the Interopolis mapping grid dataset from GML to Esri Shape format.
Demonstrates	Quick translation with the FME Quick Translator

The FME Quick Translator

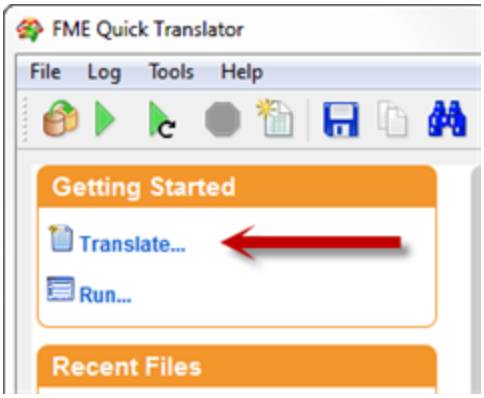
The FME Quick Translator is used mainly for carrying out one-off translations of data formats. It is not intended to be used for transforming data or creating repeatable processes.

Follow these steps to carry out a simple Quick Translation using the FME Quick Translator.

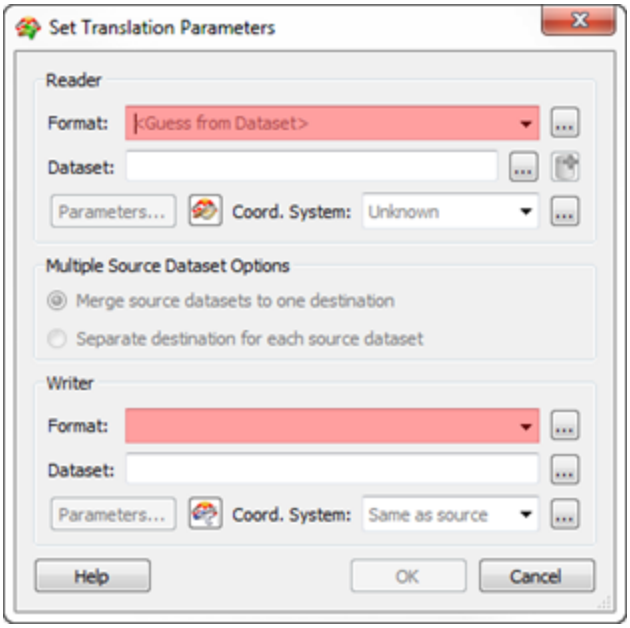
1) Select **Start > All Programs > FME Desktop 2014> Utilities > FME Quick Translator** from the Windows start menu.

The FME Quick Translator will launch.

2) Select Translate from the Getting Started dialog.



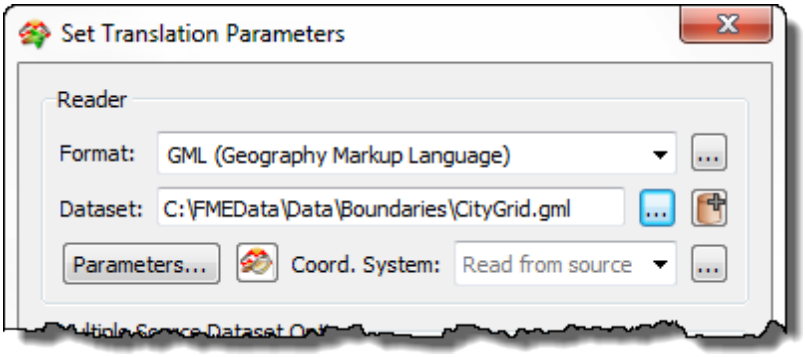
The Set Translation Parameters dialog box appears.



3) In the Reader Format field set the reader format as GML (Geography Markup Language).

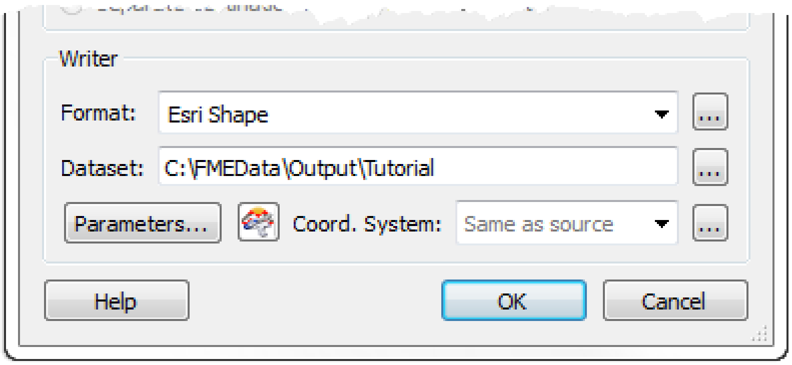
4) Click the Browse button adjacent to the Reader Dataset field, and navigate to *C:\FMEData2014\Data\Boundaries*.

5) Select the file *CityGrid.gml*. Click on Open to accept the file.



6) In the Writer Format field, select Esri Shape from the Writer Gallery.

7) Click the Browse button adjacent to the Writer Dataset field, and navigate to *C:\FMEData2014\Output\Tutorial*.



Click on Select Folder to accept this output location.

8) Click OK. The translation will start and be complete in approximately two seconds.

```
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
                            Features Read Summary
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
Grid                                                                       117
==============================================================================
Total Features Read                                                        117
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
                           GML to SHAPE Statistics
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
                         Input Features Transformed
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
Grid+xml_type+xml_area+gml_parent_id+%gml_parent_id+gml_id+%gml_id+Gr      117
==============================================================================
Total Input Features Transformed                                           117
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
                        Transformed Features Output
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
Grid_area+gml_parent+%gml_parent_id+gml_id+%gml_id+GridId+%GridId+Fac      117
==============================================================================
Total Transformed Features Output                                          117
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
                          Features Written Summary
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
Grid_area (Grid_area)                                                      117
==============================================================================
Total Features Written                                                     117
=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
Translation was SUCCESSFUL with 3 warning(s) (117 feature(s) output)
FME Session Duration: 1.4 seconds. (CPU: 0.7s user, 0.6s system)
```

9) Why not open the newly created Shape dataset in the FME Data Inspector to prove that the translation has worked as expected and contains a grid of rectangular polygons?

Congratulations! You have now:

- *Started the FME Quick Translator*
- *Translated data from one format to another using the Quick Translator*

FME Workbench

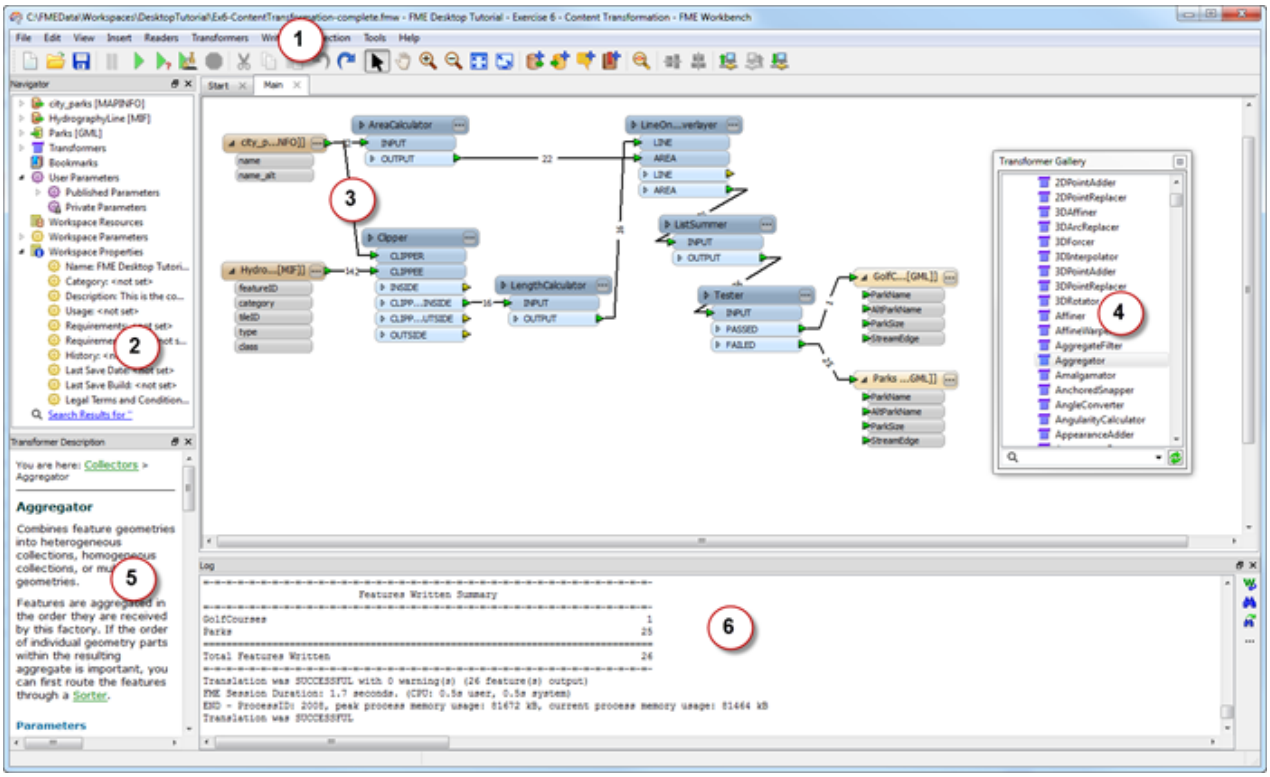
FME Workbench has two immediate advantages over the Quick Translator:

- It allows a translation to be saved and re-used
- It allows user-customization of a translation

Before attempting to use Workbench, it will be useful to read this introductory information about the application.

Workbench interface

The FME Workbench user interface looks like this:



1. Menu bar and Toolbar
2. Navigator Window
3. Canvas
4. Transformer Gallery
5. Help Window
6. Log Window

Be aware that windows can be moved and docked in different locations; therefore not every installation of FME will have exactly the same layout.

Menu Bar and Toolbar

The menu bar at the top of the Workbench window contains menus with commands that affect the entire canvas.

The toolbar is located under the menu bar and provides tooltips for each icon shown.

Commonly-Used Tools

- **File** tools let you create, open and save workspaces.

- **File** tools also let you run a translation (in one of three different modes), pause it, and stop it.

- **Edit** tools let you cut, copy, and paste objects, as well as undo and redo changes.

- **View** tools let you explore the Workbench canvas. They include select, pan, zoom in, zoom out, zoom to extents, and full screen.

- **Insert** tools let you add new objects to a workspace.

- The **Launch Inspection Application** tool launches the FME Data Inspector.

- **Align** tools let you arrange a set of selected objects into horizontal or vertical groups.

- **Publish** tools let you publish to and download workspaces from FME Server.

Many objects in Workbench have a context-sensitive menu with shortcuts to toolbar tools, and can be opened by right-clicking the object.

Exercise 2.b: Quick Translations in FME Workbench

Although FME Workbench enables customization of a translation, it can also be used for a quick translation from one format to another without data transformation.

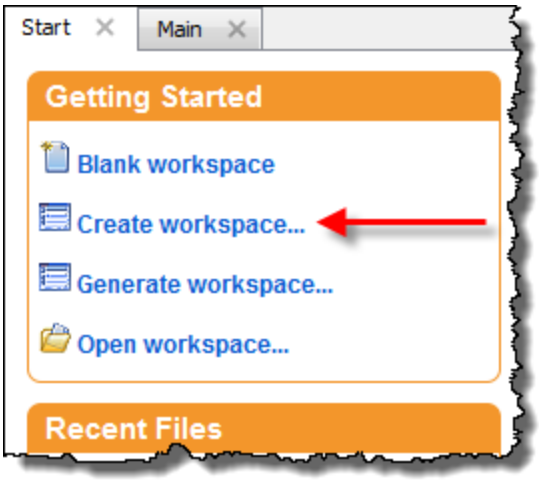
Exercise 2.b: Quick Translations in FME Workbench	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Parks (MapInfo TAB format)
Overall Goal	Translate the City Parks dataset from MapInfo TAB to GML. *This is the first step in a larger project to create data suitable for analysis by a Grounds Maintenance team.*
Demonstrates	Quick translation with FME Workbench

Follow these steps to carry out a Quick Translation exercise using FME Workbench.

1) From the Windows start menu, select **Start > All Programs > FME Desktop 2014> FME Workbench**.

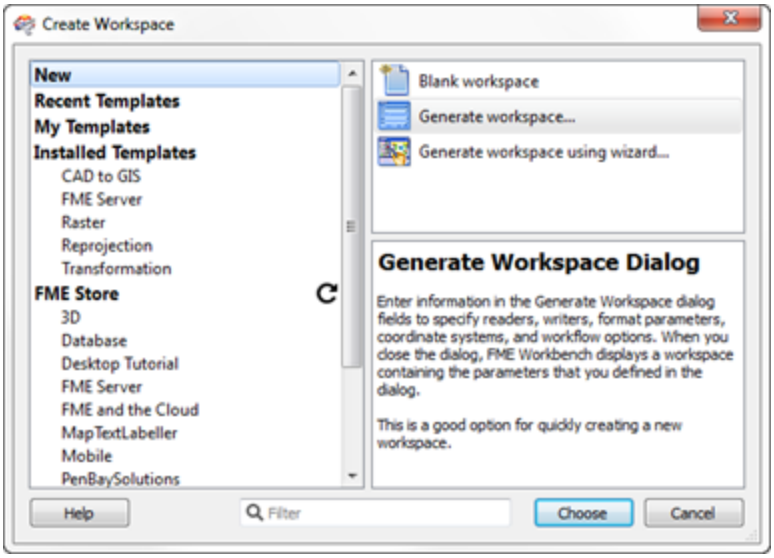
FME Workbench will launch, and the FME Workbench start tab appears.

2) In the Getting Started box, click the link Create workspace…



The equivalent menubar tool is **File > New**.

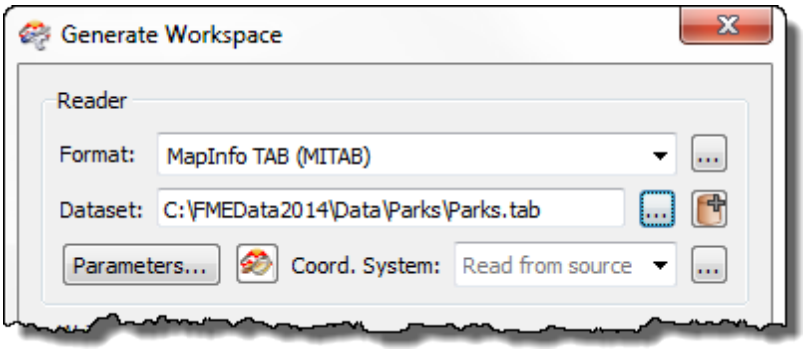
3) The Create Workspace dialog opens. Choose the option to "Generate Workspace."



4) When the Generate Workspace dialog box opens, fill in the Reader fields as follows:

Format MapInfo TAB (MITAB)
Dataset *C:\FMEData2014\Data\Parks\Parks.tab*

This defines what data is to be read, and its format.

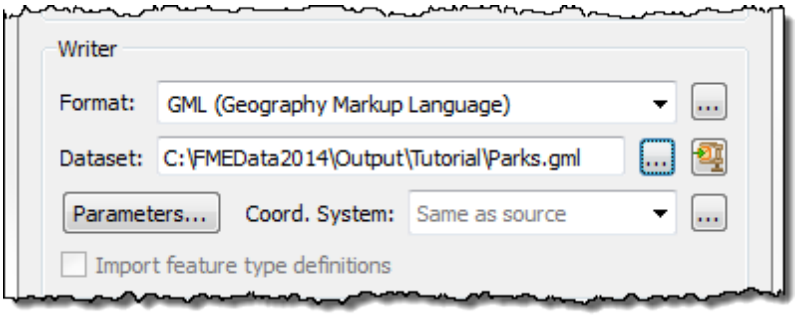


5) Now, fill in the Writer fields as follows:

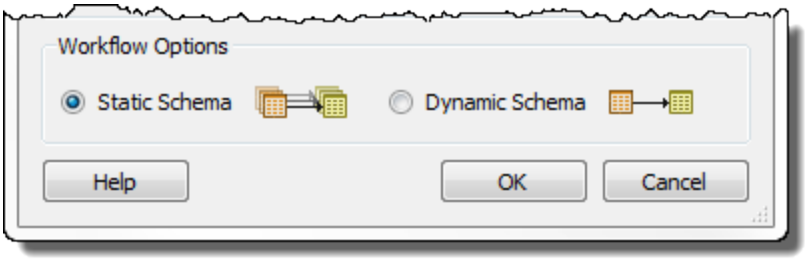
Format GML (Geography Markup Language)
Dataset *C:\FMEData2014\Output\Tutorial\Parks.gml*

To name the output click the Browse button and navigate to *C:\FMEData2014\Output\TutorialOutput*.

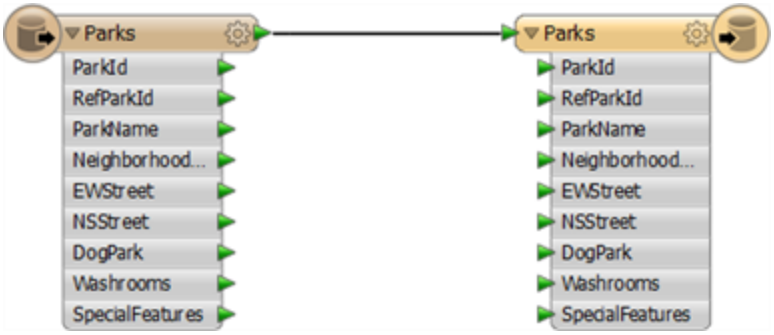
In the File Name field of the Select File dialog, type the file name as **Parks.gml** and then click Save.



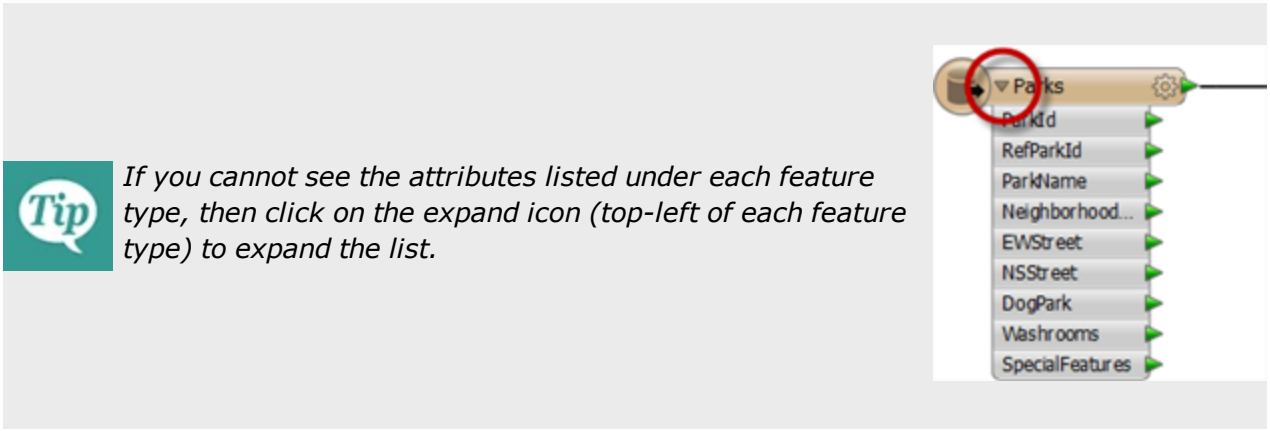
Ensure that the Static Schema default option is selected, and then click OK.



The new workspace is now created. Workspace is the FME term for a translation created and edited in FME Workbench.



The objects in the workspace represent what is known as Schema in FME.



If you cannot see the attributes listed under each feature type, then click on the expand icon (top-left of each feature type) to expand the list.

The object on the left-hand side represents a layer to be read by the Reader (in this case a MapInfo data table).

The object on the right-hand side represents a layer to be written by the Writer (in this case to a GML layer).

As part of FME terminology, these objects are called Feature Types.

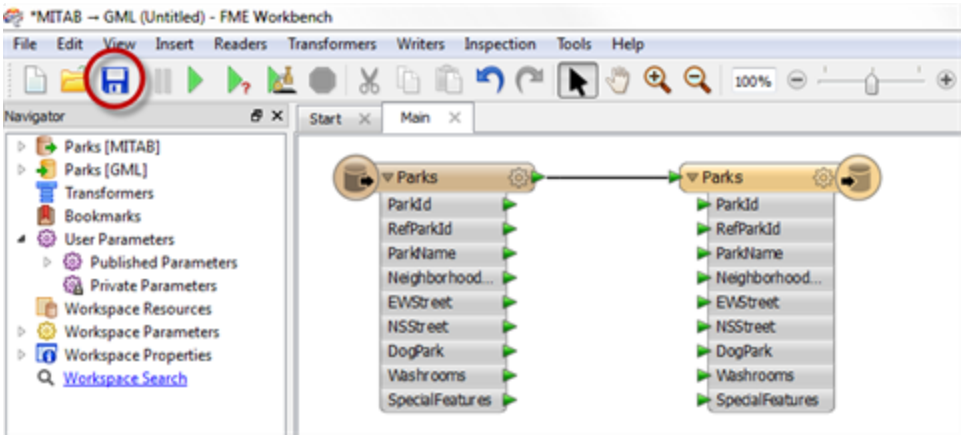
Multiple layers in the input or output would be represented by multiple feature type objects in the workspace.

By default FME sets up the translation to replicate the source. As a result, the writer feature type – and its attributes – have identical names to that of the Reader.

The lines between the reader and writer feature types are called Connections. They represent the flow of data within the workspace.

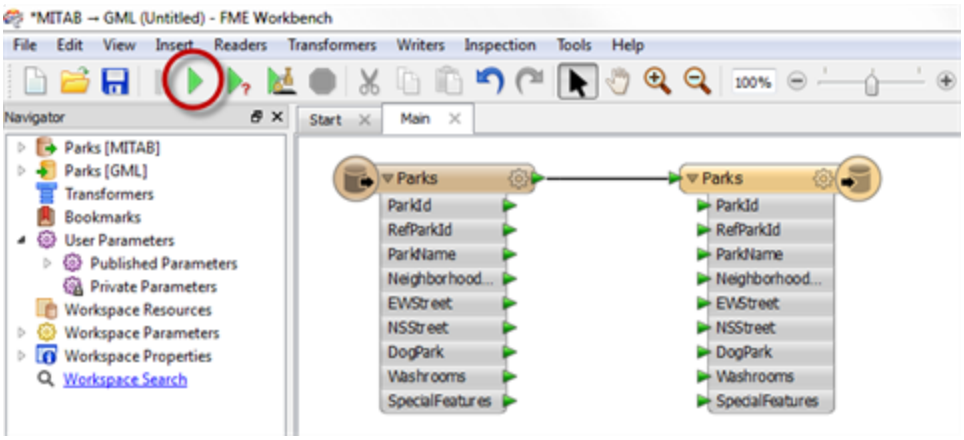
- The thin-line connections represent the matching of attributes.
- The green arrows at the end of each connection are called Ports.
- Ports on the right of an object are called *Output Ports*; on the left side, *Input Ports*.

6) To save the translation, click the Save button on the Workbench menu bar.



When prompted, save the workspace to *<Documents>\My FME Workspaces\CityParks.fmw*.

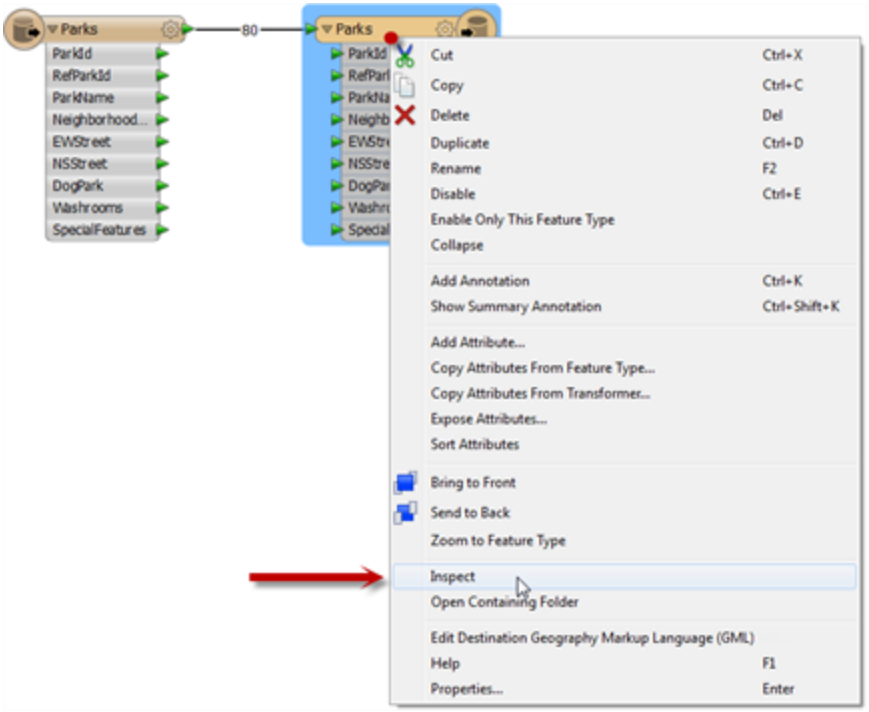
7) To initiate the translation, press the green Run button.



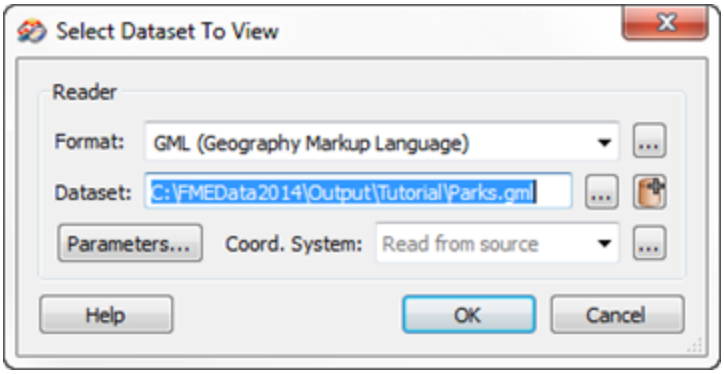
The translation runs successfully.

```
------------------------------------------------------------------------
                        Features Read Summary
------------------------------------------------------------------------
Parks                                                                 80
========================================================================
Total Features Read                                                   80
------------------------------------------------------------------------
------------------------------------------------------------------------
                        Features Written Summary
------------------------------------------------------------------------
Parks                                                                 80
========================================================================
Total Features Written                                                80
------------------------------------------------------------------------
Closing native MapInfo reader
Translation was SUCCESSFUL with 0 warning(s) (80 feature(s) output)
```

8) To inspect the translation output, right-click the writer feature type (**GML:city_parks**) and choose the option Inspect.



The FME Data Inspector starts up and the Select Dataset to View dialog opens. Click OK.



This will open up the data for viewing within the FME Data Inspector.

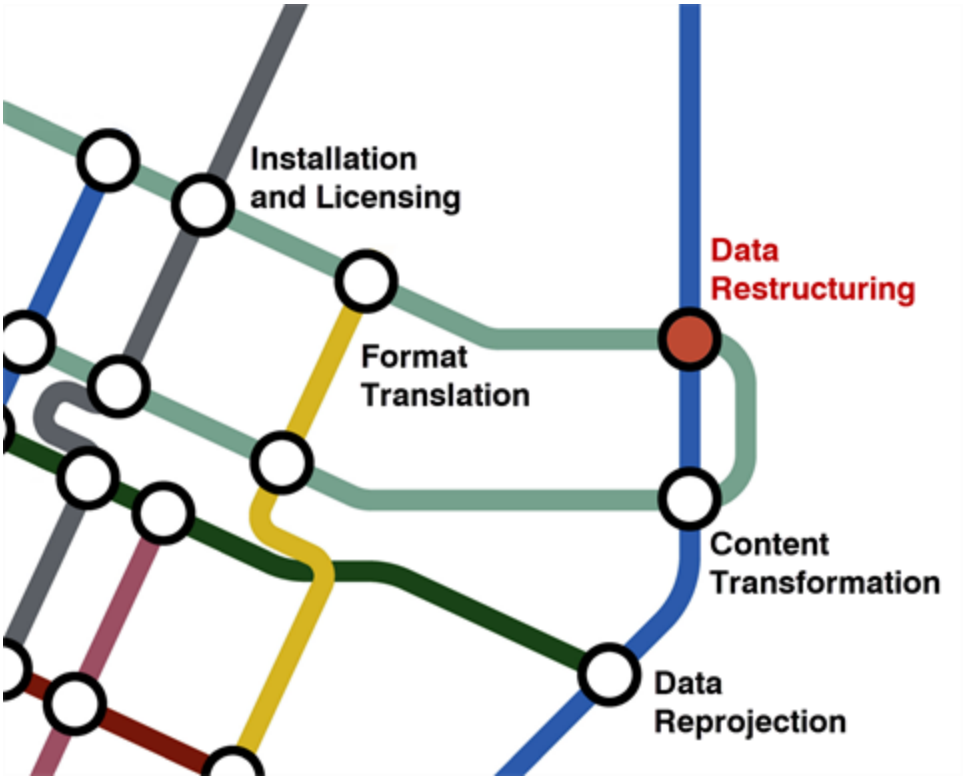
Congratulations! You have now:

- *Started FME Workbench*
- *Created a quick translation*
- *Saved and run the translation*
- *Inspected the output*

Conclusion

Next Step

Now that you have completed this chapter, your next step in the FME learning program is to continue to the next chapter: Data Restructuring.



Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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

Chapter 3 - Data Restructuring

This chapter covers the basics of how to restructure data as it is translated from one format to another. This is a form of data transformation.

In this chapter

- What is Data Transformation?
- Structural Transformation
- Exercise: Structural Transformation with FME Workbench
- Transformers
- Exercise: Structural Transformation with Workbench Transformers

What is Data Transformation?

Data Transformation is the ability to manipulate data during format translation.

Such manipulation can take the form of creation, deletion, or modification of information. Transformation can take place on either spatial or non-spatial (attribute) information.

Transformation can be carried out on the structure of the data (i.e. the data is being restructured) or the content of the data. This chapter covers the transformation of data structures.

Structural Transformation

Transformation of data structure in FME is vital to produce data in a form that can be used seamlessly by the end user, a key requirement for transparent data interoperability.

Examples of structural transformation are:

- Adding and/or removing attributes
- Editing attribute names and/or data types
- Merging and/or dividing different data layers

Exercise 3.a: Structural Transformation with FME Workbench

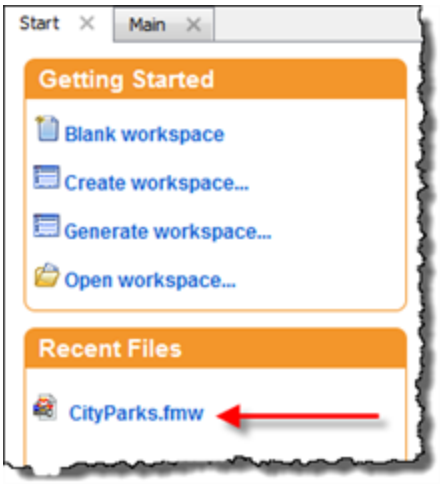
Translations in FME Workbench can be easily modified to restructure data, by simply editing the writer feature type and/or adjusting its related connections.

Exercise 3.a: Structural Transformation in FME Workbench	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Parks (MapInfo TAB format)
Overall Goal	Restructure data during a translation from MapInfo TAB to GML.
Demonstrates	Restructuring (Schema Editing and Schema Mapping) with FME Workbench

Follow these steps to carry out a simple Data Transformation exercise using FME Workbench.

This exercise continues on from the exercise "Quick Translations in FME Workbench" from the previous chapter. You may skip the first two steps if you have that workspace already open.

1) Select **Start > All Programs > FME Desktop 2014 > FME Workbench** from the Windows start menu.



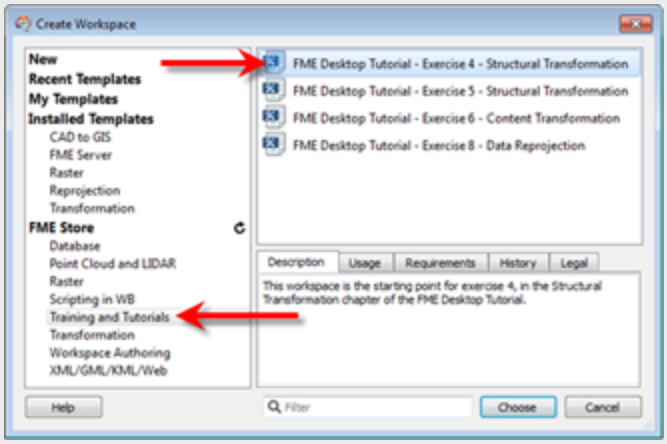
FME Workbench will launch, and the FME Workbench start tab appears.

CityParks.fmw will appear in the Recent Files part of the Start tab.

2) Click on the link to open the workspace.

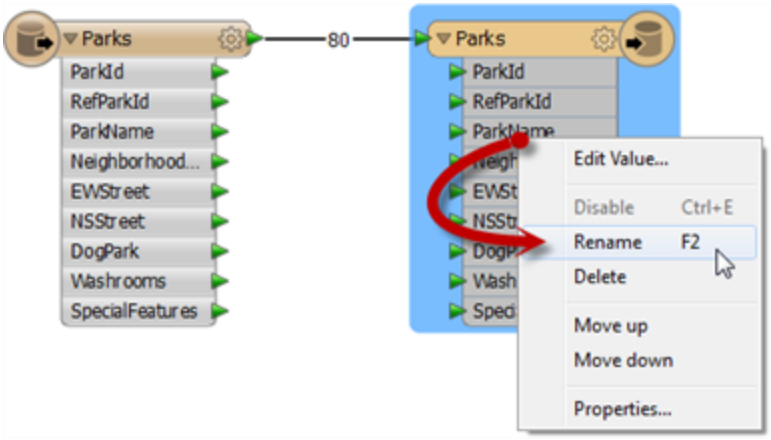
There are two alternatives to using the workspace from Chapter 2:

- *Use **File > Open** on the menu bar to select a predefined workspace C:\FMEData2014\Workspaces\DesktopTutorial\Exercise3a-Begin.fmw*
- *Open the Create Workspace dialog and download the workspace as a template from **FME Store > Training and Tutorials***

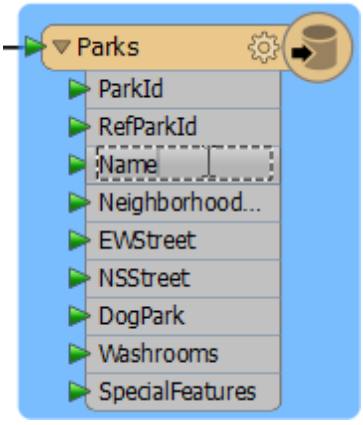


3) Click on the expand icons on both the reader and writer feature types to expand the list of user attributes on these types.

The first task is to rename the destination attributes. Right-click on the writer attribute called ParkName and choose the Rename option.



4) Enter Name as the new attribute name, and then press Enter.



Because FME is case sensitive, be sure to enter attribute and feature type names exactly as they appear throughout this tutorial.

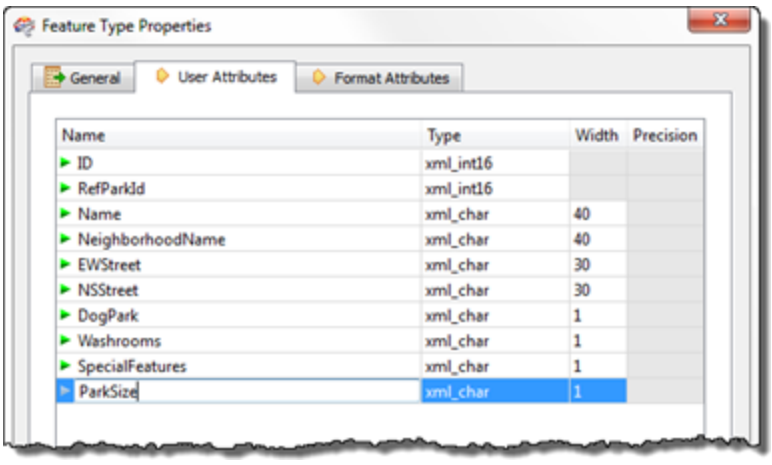
5) Repeat the process to rename a second attribute from ParkId to simply ID.

This overall process is called *Schema Editing.*

6) Another schema editing task is to add new attributes to a writer schema.

Click on the […] button on the right-hand side of the writer feature type (GML:Parks). The Feature Type Properties dialog box opens.

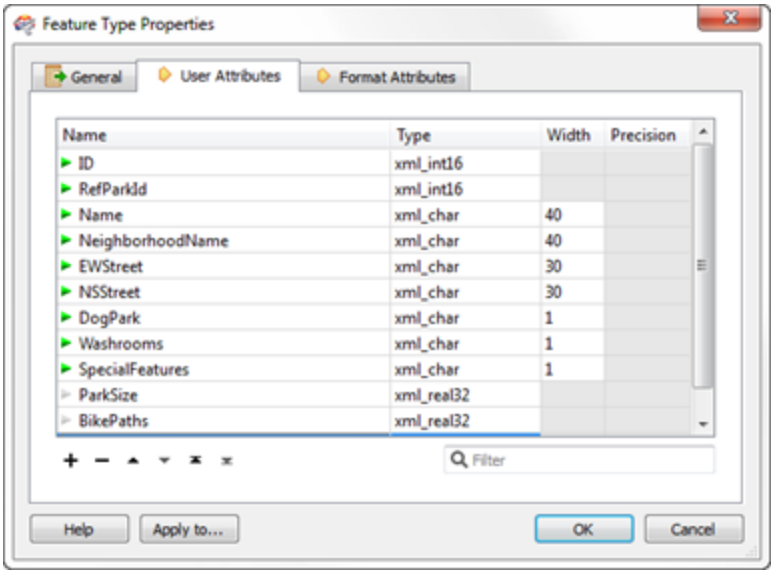
Click on the User Attributes tab to get a list of user attributes:

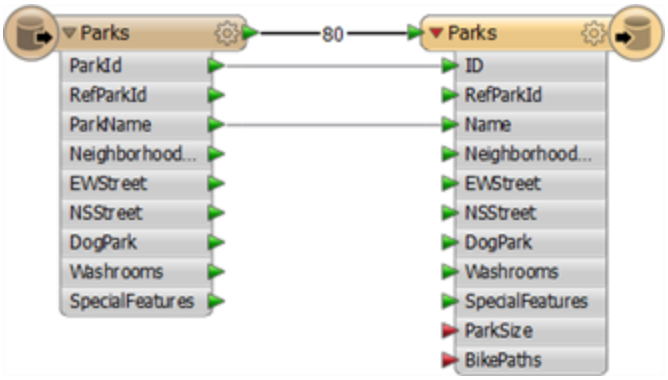


Click in the empty space under SpecialFeatures (or click on the + button at the foot of the dialog) and type in **"ParkSize"** to create a new attribute name.

Set the data type of ParkSize to *xml_real32*, by clicking on the Type field down arrow and selecting that data type.

7) Repeat this process to create an attribute called **"BikePaths"**, also of type xml_real32. Then click OK.





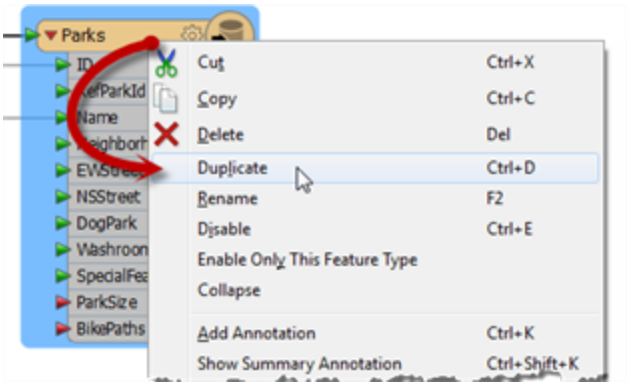
When arrows are red it means the port has no input.

However, a red input arrow is not considered an error because sometimes you may not actually want any input to a particular port.

In this case, it is not a concern because the setup process is not yet complete.

The next task is to create a separate output layer for parks with off-leash dog areas, since in this example such parks require extra maintenance and must be treated as a special case.

8) Right-click on the GML:Parks Writer feature type and choose the Duplicate option.



9) Drag the created duplicate of the first feature type underneath the original feature type.

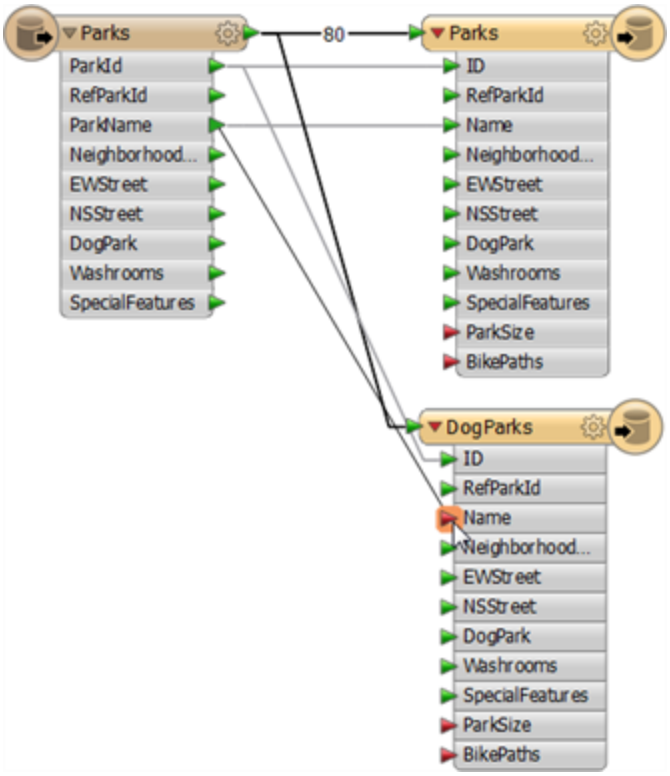
When the workspace is run there will now be two layers in the output GML dataset; although, no action has yet been taken to actually separate the data.

10) To differentiate the output layers, rename the feature types as follows:

Click on the duplicate writer feature type (GML:Parks00). Then press the F2 key and change the name to DogParks.

11) Click on the green arrow emerging from the MAPINFO:Parks Reader feature type, and then drag a connection to the red arrow on the GML:DogParks Writer feature type.

12) Repeat the previous step, this time connecting the attributes ParkName to Name and ParkId to ID.



This overall process is called *Schema Mapping*.

13) Save your workspace.

To view the resulting changes, you may now run the workspace and inspect the output. Again note that we've done nothing yet to actually separate the dog park data, nor fill in values for the ParkSize and BikePath attributes.

Congratulations! You have now:

- *Renamed attributes in the destination schema*
- *Added new attributes to the destination schema*
- *Created a new layer (feature type) in the destination schema*
- *Renamed feature types*
- *Mapped Reader features and attributes to a Writer*

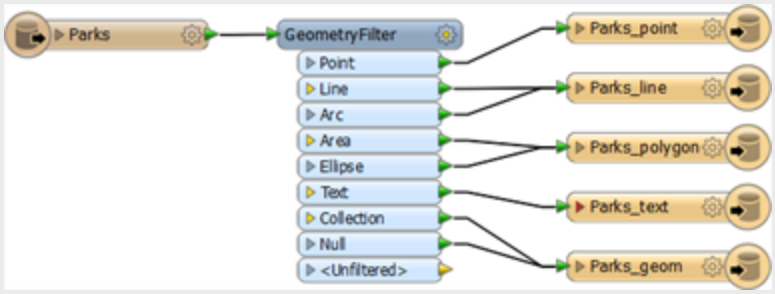
Transformers

Besides schema editing and schema mapping, transformation can also be carried out using blue-colored objects in FME Workbench called Transformers.

Transformation occurs as the data is passed from reader to writer through a series of these transformers.

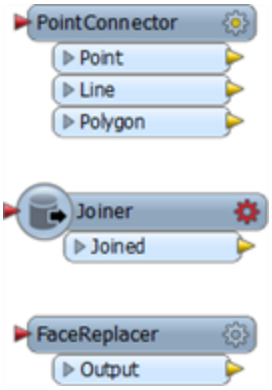
There are approximately 500 different transformers available within Workbench and the FME Store.

You may already have seen a transformer in a prior workspace, since FME sometimes inserts a GeometryFilter transformer automatically in a new workspace. This allows FME to perform the restructuring necessary for translation to a specific format.



Transformer Info

A parameters button is located on the top right of a transformer. This button appears as a cog wheel whose color defines its status.



Many transformers have mandatory parameters that must be set. Luckily the majority contain default values that will be acceptable. A yellow parameters button indicates the transformer is using default values for any mandatory fields.

The workspace will run, but it is recommended that you confirm the default values are correct for your needs before starting the translation.

When the parameters button is red it means that one or more mandatory fields do not have defaults. In this case, a value must be set before the translation can be run.

A parameters button whose color matches the transformer (usually light blue) indicates that all parameter values have already been checked and accepted.

Some transformers (like this Joiner) have extra decoration. This is to indicate transformers that are fetching data into the workspace or sending data out of it.

Exercise 3.b: Structural Transformation with Workbench Transformers

Translations in FME Workbench can easily be modified to restructure data by simply editing the writer feature type, and/or adjusting the related connections.

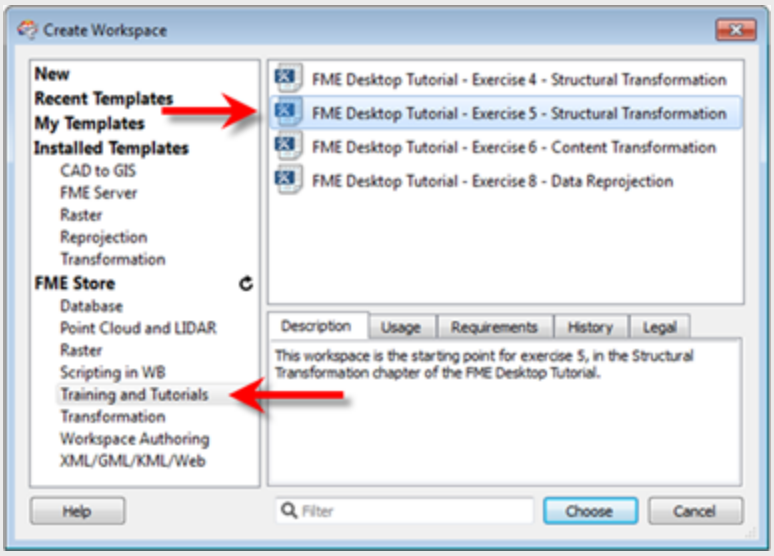
Exercise 3.b: Structural Transformation with Workbench Transformers	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Parks (MapInfo TAB format)
Overall Goal	Restructure data during a translation from MapInfo TAB to GML. *This is another step in the larger project to create data suitable for analysis by a Grounds Maintenance team.*
Demonstrates	Restructuring with FME Workbench transformers

Follow these steps to carry out an example of Data Transformation using transformers in FME Workbench.

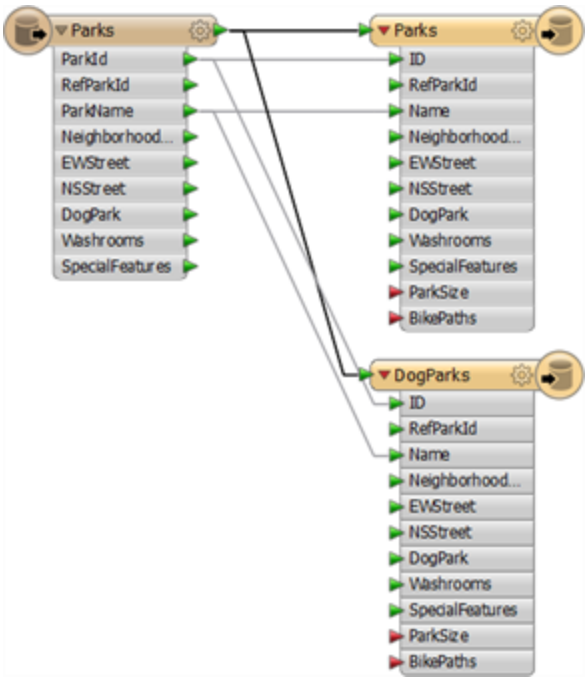
This exercise continues on from the previous exercise (3a) and assumes you will have the prior workspace already open.

If you don't have the previous workspace you can:

- *Use **File > Open** on the menu bar to select a predefined version from C:\FMEData2014\Workspaces\DesktopTutorial\Exercise 3b-Begin.fmw*
- *Open the Create Workspace dialog and download the workspace as a template from **FME Store > Training and Tutorials***

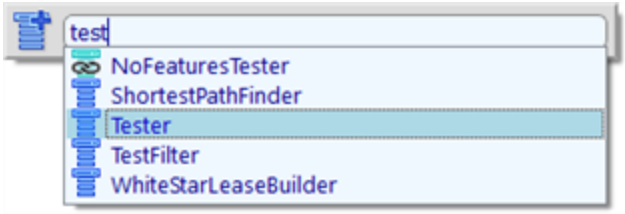


At the moment, the workspace is duplicating data due to the connections from the Reader to two different Writer feature types.

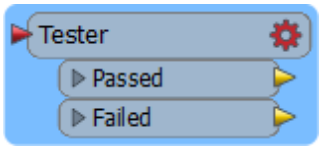


Therefore, the first task involves filtering out data into one feature type or another. This can be done using a Tester transformer.

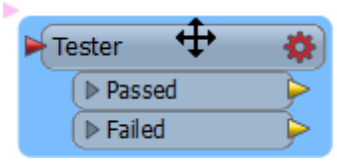
1) Click in a blank space on the Workbench canvas. Start typing the characters "test." A list of matching transformers will appear.



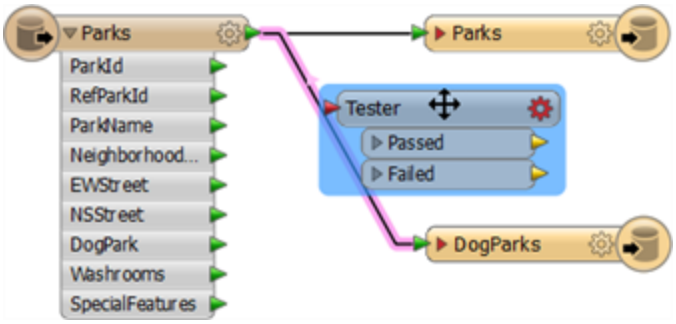
2) Select the transformer named Tester. The transformer is dropped onto the Workbench canvas window.



3) Now the transformer must be set into the correct position. Click on the transformer and start to drag it. A pink marker will appear in the top-left corner of the transformer.

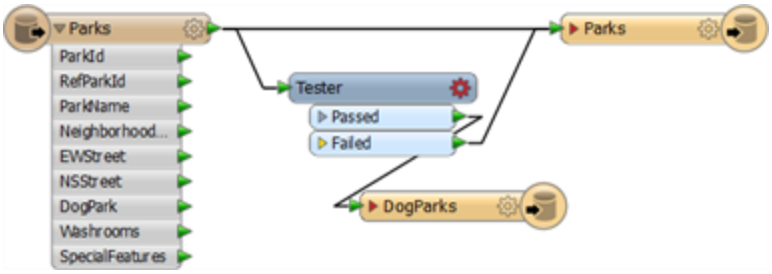


4) Drag the transformer so the pink marker is on top of the connection between the MAPINFO:Parks Reader feature type and GML:DogParks Writer feature type as shown (here with the attribute list collapsed).

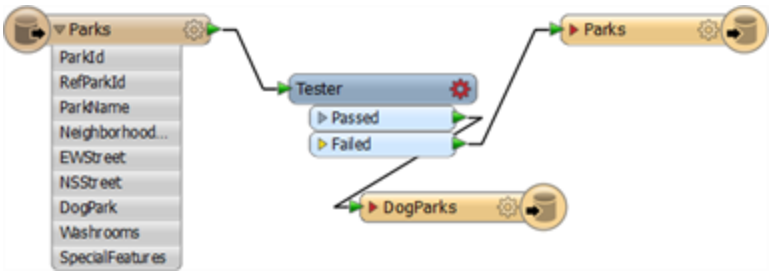


The connection will become highlighted to confirm that the transformer is in the correct position.

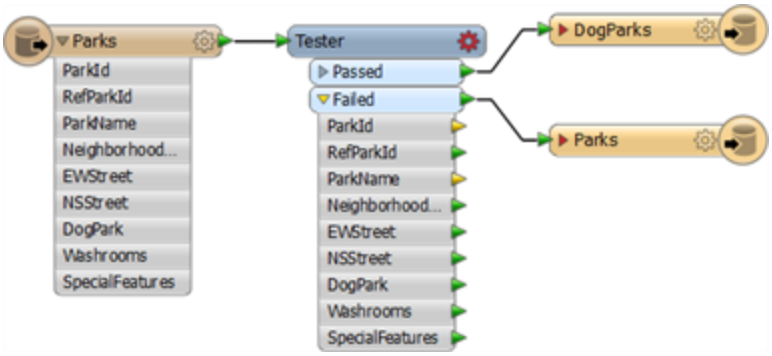
5) Drag a new connection between the Tester:Failed port and the GML:Parks Writer feature type.



6) Click on the existing connection between MAPINFO:Parks and GML:Parks.Then press the Delete key to remove it.



Because overlapping connections are frowned upon in a workspace, re-arrange the workspace objects to avoid this (as shown). In effect, the two Writer feature types swap positions.

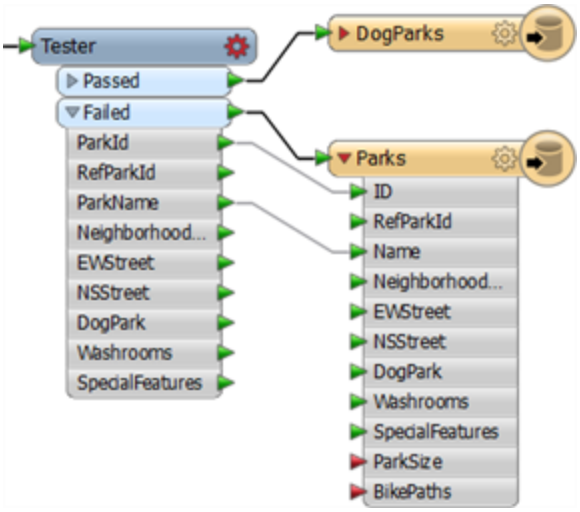


Notice that the attribute ports belonging to the FAILED features are yellow. This is because FME cannot identify an automatic connection. When arrows are yellow like this, the values will be dropped when the workspace is run.

Drag connections as follows to reconnect the attribute Schema Mapping:

Tester:FAILED:ParkName > GML:Parks:Name

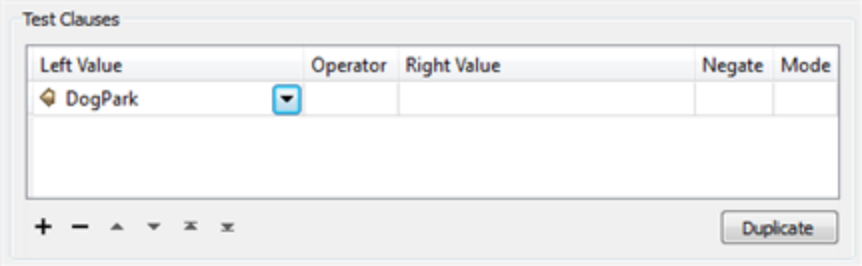
Tester:FAILED:ParkId > GML:Parks:ID



The next task consists in setting up the test to be carried out by the Tester. The test will check if the DogPark field is set to "Y" (meaning "Yes").

7) Click on the parameters button for the Tester (it should be red). A Tester Parameters dialog box will open.

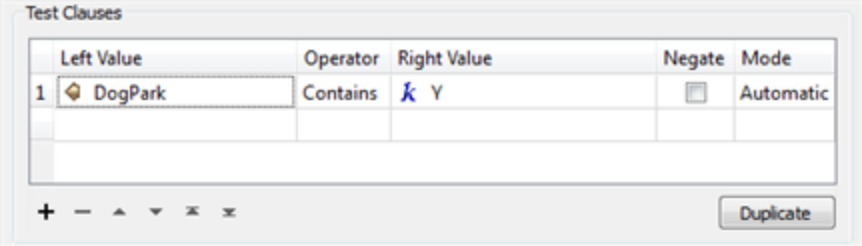
8) In the Test Clauses section, double-click the Left Value field, click the drop-down arrow, choose "Attribute Value" and select the attribute DogPark.



9) Double-click on the Operator field and select "Contains" as the operator.

Then double-click in the Right Value field and type the letter"**Y**." By using "Contains" the test will work whether the data is set to "Y" or "Yes", plus it will be case-insensitive, where an equals (=) operator would not be.

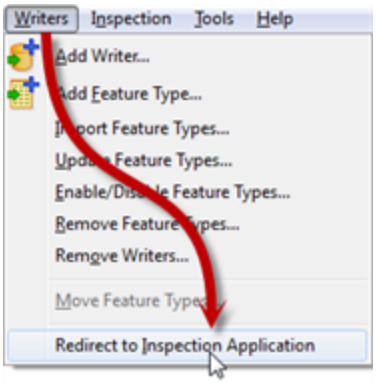
Click OK to accept the test.



10) Save the workspace, so it can be reused later on, but don't run it yet.

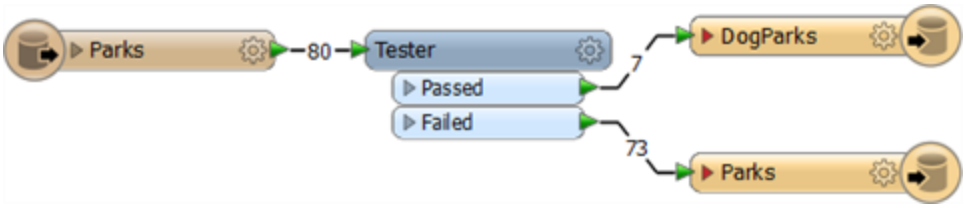
Output from a workspace can be inspected, without actually writing a new dataset, by using a redirect option.

11) Click the menu bar option **Writers > Redirect to Inspection Application**.



12) Run the workspace. The data will be divided into two output layers and sent to the FME Data Inspector as a preview.

If the Tester is set up correctly, then the feature counts in the completed workspace will show that 80 features were read from the Parks dataset, of which only seven (7) had off-leash dog areas and the remaining 73 did not.



13) Select the same menu bar tool again to turn off the redirect option. Run the workspace again to create the correct output.

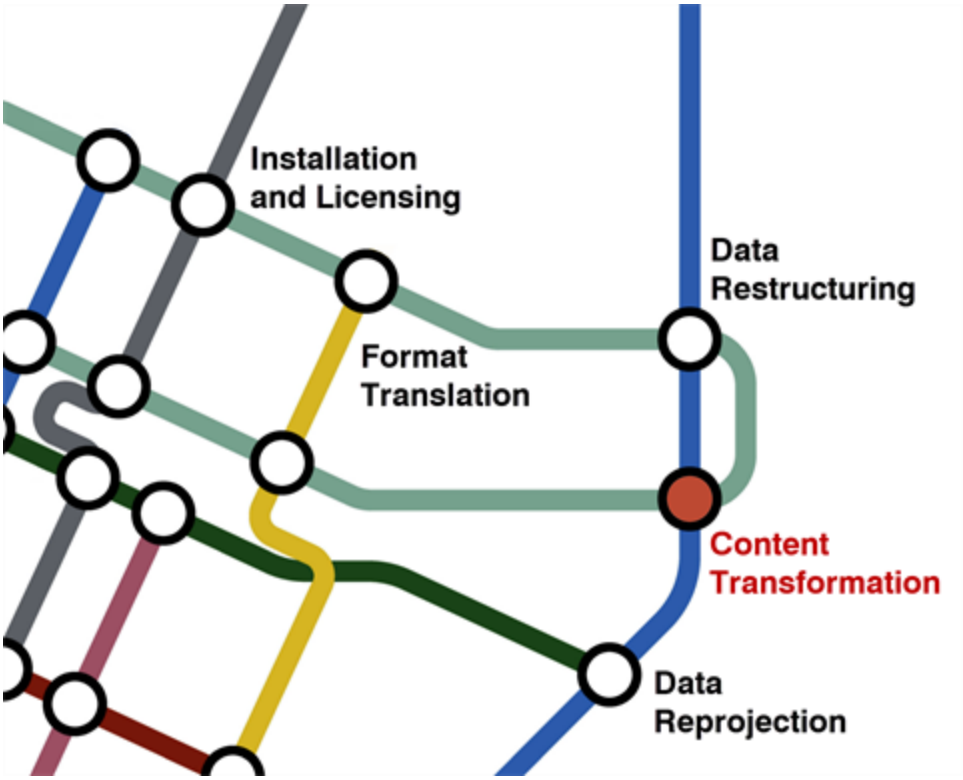
Congratulations! You have now:

- *Located a Workbench transformer using Quick Add*
- *Placed a transformer using Drag-and-Insert*
- *Restructured data with a transformer and correctly schema mapped it*
- *Set up a transformer's parameters*
- *Used Redirect to Inspection Application to preview the results of a translation*

Conclusion

Next Step

Now that you have completed this chapter, your next step in the FME learning program is to continue to the next chapter: Content Transformation.



Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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

Chapter 4 - Content Transformation

This chapter covers the basics of how to transform data content as it is translated from one format to another.

In this chapter

- Content Transformation
- Exercise: Content Transformation with FME Workbench

Content Transformation

Transformation of data content occurs when the spatial or attribute components of a dataset are manipulated.

Examples of content transformation are:

- Concatenating or splitting attribute values
- Calculating new attribute values
- Clipping spatial data to a predefined boundary
- Snapping vertices to close gaps in features

Exercise 4.a: Content Transformation with FME Workbench

Besides restructuring data, Workbench transformers can be used to transform the content of data.

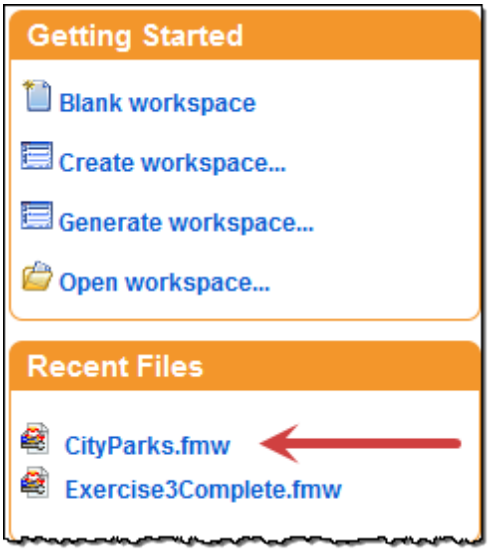
Exercise 4.a: Content Transformation with FME Workbench	
Scenario	FME user; City of Interopolis, Planning Department
Data	City Parks (MapInfo TAB format)
Overall Goal	Measure the area of each city park, and the total length of bike path that runs through each one. *This is the final step in a project to create data suitable for analysis by a Grounds Maintenance team.*
Demonstrates	Using transformers to transform data content

Follow these steps to carry out a Content Transformation exercise using FME Workbench.

This exercise continues on from the exercise "Structural Transformations with Workbench Transformers" from the previous chapter. You may skip the first two steps if you have that workspace already open.

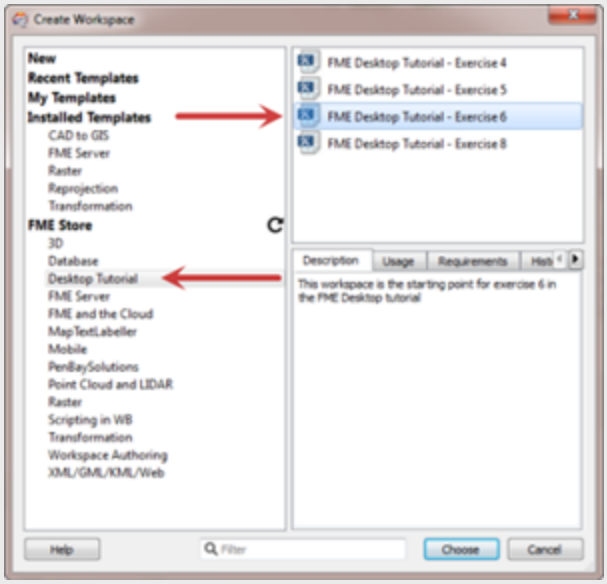
1) Select **Start > All Programs > FME Desktop 2014> FME Workbench** from the Windows start menu.

2) *CityParks.fmw* will appear in the Recent Files part of the Start tab. Click on the link to open the workspace.



There are two alternatives to using the workspace from Chapter 3:

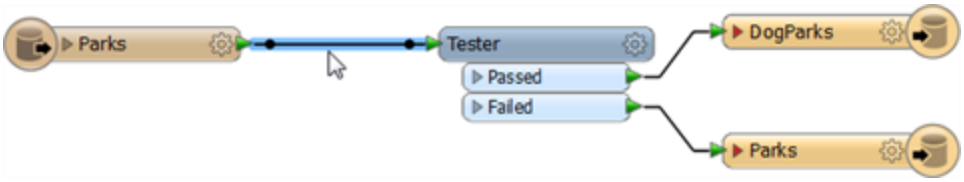
- *Use **File > Open** on the menu bar to select a predefined workspace C:\FMEData2014\Workspaces\DesktopTutorial\Exercise4a-Begin.fmw*
- *Open the Create Workspace dialog and download the workspace as a template from **FME Store > Desktop Tutorial***



To measure the area of each park feature, an AreaCalculator transformer must be used.

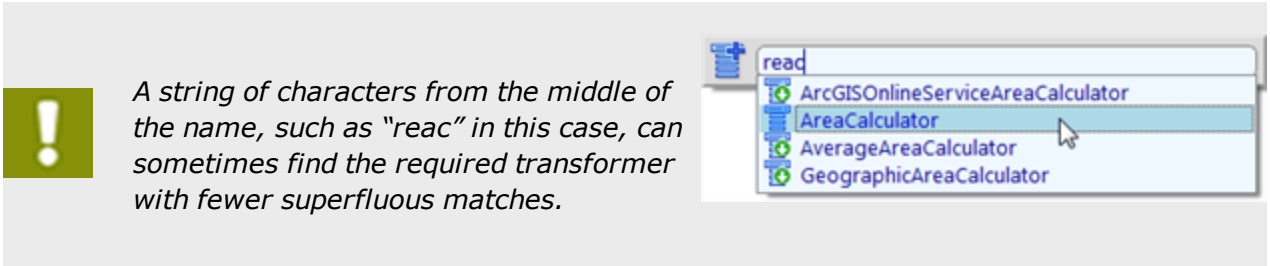
Calculator is the term used for transformers that compute new attribute values.

3) In the Workbench canvas, click on the connection between MAPINFO:Parks and the Tester.



4) Start matching the name of the AreaCalculator transformer by typing "**Area**".

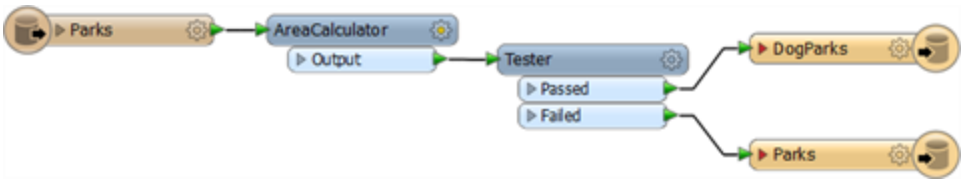
The Quick Add list of matching transformers will appear beneath.



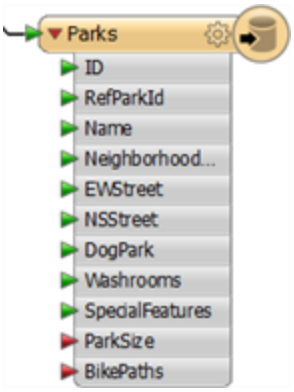
A string of characters from the middle of the name, such as "reac" in this case, can sometimes find the required transformer with fewer superfluous matches.

5) Select the AreaCalculator transformer. The transformer is dropped automatically into place.

Re-arrange the workplace objects to avoid overlapping connections:



Notice that even though the area of each park is being calculated, the ParkSize attribute is not receiving that information.



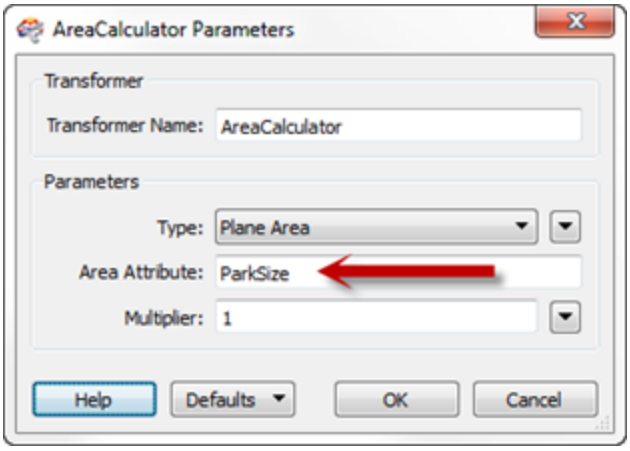
That's because the AreaCalculator records its information in a default attribute called _area.

The new attribute (_area) can be manually mapped to ParkSize, but there is a better way.

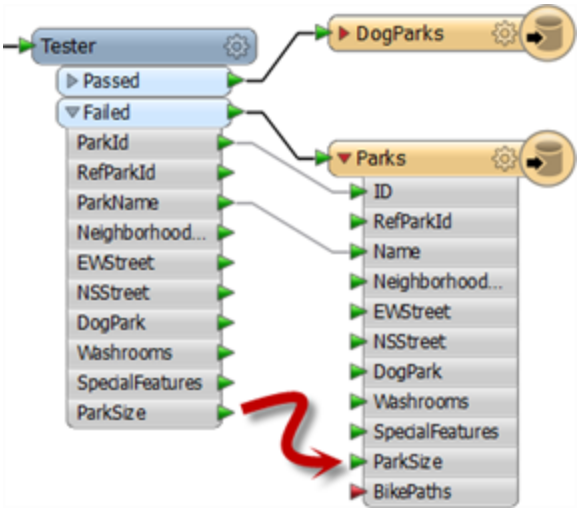
6) Click the yellow-colored parameters button on the AreaCalculator transformer to open up the parameters dialog box.

The Area Attribute parameter defines the attribute to receive the calculated area.

Click in the Area Attribute field, and rename the attribute as ParkSize to match the name of the writer feature type definition. Then click OK.

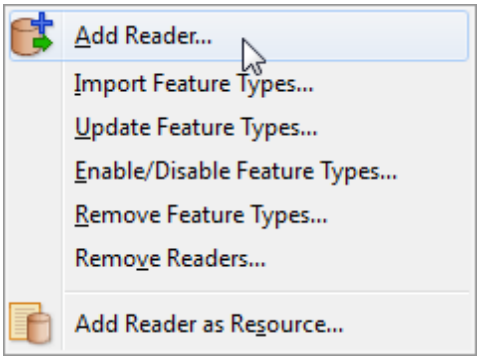


Now FME can automatically map the measured area to the correct schema attribute.



The next transformation requires bike path information to calculate the length of bike path per park. Because this information is held in a separate dataset, it is necessary to add a new Reader to the workspace.

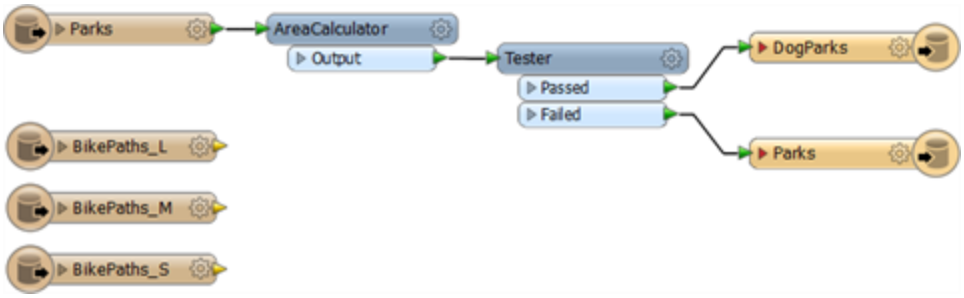
7) Select **Readers > Add Reader** from the menu bar.



8) When the Add Reader dialog box opens, fill in the format field as follows and then select the three specified Shape files:

Format	Esri Shape
	C:\FMEData2014\Data\Transportation\Cycling\BikePaths_L.shp
	C:\FMEData2014\Data\Transportation\Cycling\BikePaths_M.shp
Datasets	*C:\FMEData2014\Data\Transportation\Cycling\BikePaths_S.shp*

Click OK to add the new Reader to the workspace.

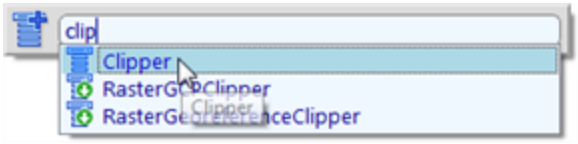


Calculating the length of bike path that runs through each park requires that the bike path features are clipped to the park extents. This can be done with a Clipper transformer.

9) Click on a blank area of the Workbench canvas and start typing letters to match the Clipper transformer name (e.g. "clip")

The Quick Add list of matching transformers appears beneath.

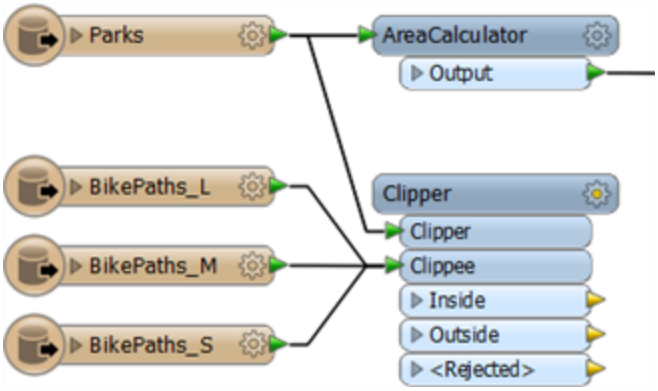
Select the Clipper transformer.



10) Drag connections between the SHAPE:BikePaths Reader feature types and the Clipper:Clippee port.

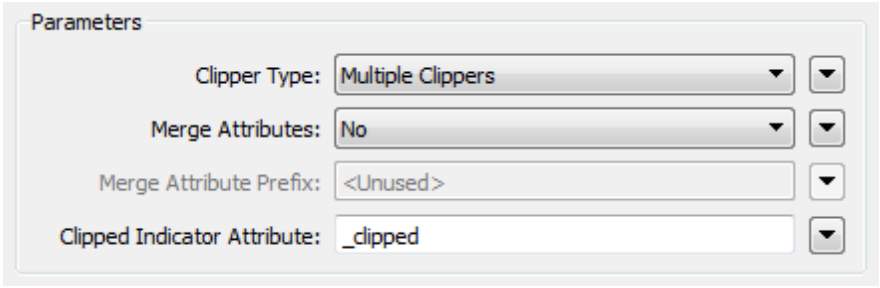
11) Drag a second connection from the MAPINFO:Parks Reader feature type, onto the Clipper:Clipper port.

The first section of workspace will now resemble this layout:



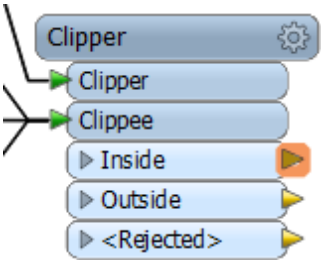
12) Click on the Clipper transformer parameters button to open the Clipper Parameters dialog box.

Set the Clipper Type parameter to Multiple Clippers (or ensure it is already set) and click OK.



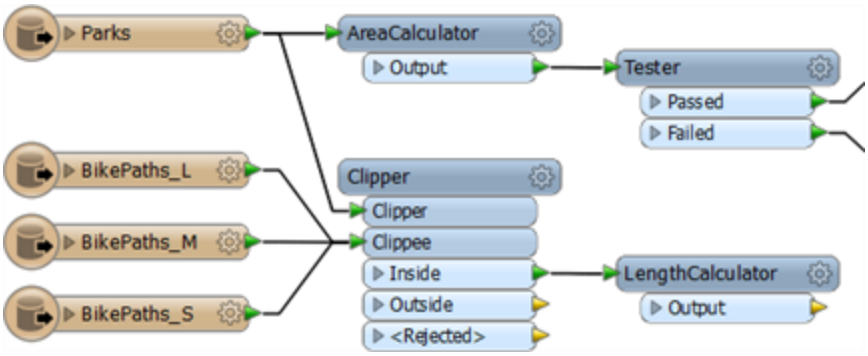
The next task involves measuring the length of the remaining streams.

13) Click on the yellow arrow of the Clipper:Inside output port. It will be highlighted in orange to confirm its selection.



14) Start typing a match for the LengthCalculator transformer. "**Length**" or "**thcal**" would both work. The Quick Add list of matching transformers appears beneath.

15) Select the LengthCalculator transformer. The transformer will be added to the workspace and connected to the correct Clipper port. The parameters for this transformer can be checked, but the defaults shouldn't need changing.

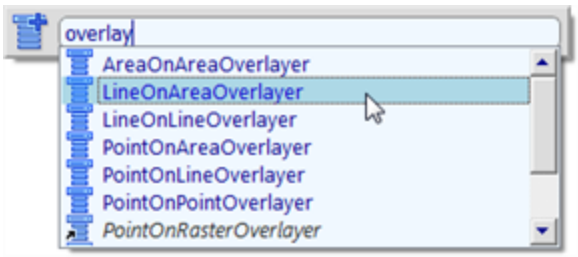


Now that the length of each path is being calculated, it needs to be added to the park features using an "overlayer" transformer. An overlayer transformer carries out a form of spatial join upon the data.

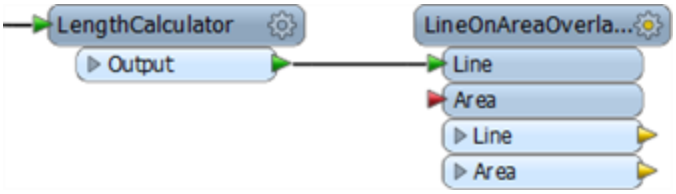
Since bike path features are lines, and park features, areas, the LineOnAreaOverlayer is the transformer to use.

16) Click on a blank area of the Workbench canvas and start typing the letters "overlay." The Quick Add list of matching transformers appears beneath.

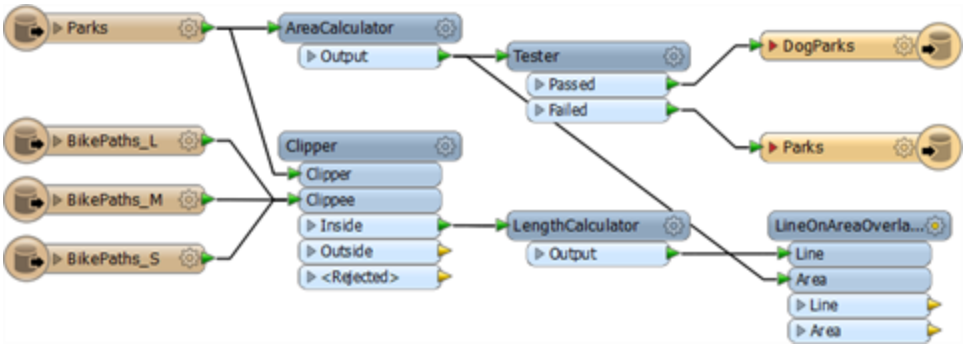
Select the LineOnAreaOverlayer transformer.



17) Drag a connection from the LengthCalculator:Output port to the LineOnAreaOverlayer:Line input port.



18) Drag a connection from the AreaCalculator:Output port to the LineOnAreaOverlayer:Area input port. Don't worry if the connection lines overlap a little.

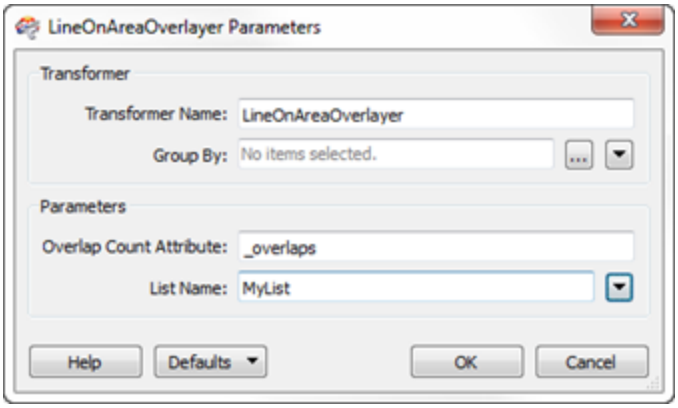


19) Open the LineOnAreaOverlayer Parameters dialog box.

Since often there is more than one bike path passing through a park, a list must be set.

A list is a special FME data structure that allows multiple values per attribute.

20) One of the parameters is called List Name. Click in the List Name parameter and type **"MyList."** Then click OK.

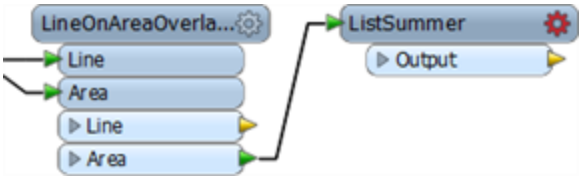


The path lengths in the list need to be summed up, to use as a single result. This can be done with a ListSummer transformer.

21) Click on the LineOnAreaOverlayer:Area output port. It will be highlighted in orange to confirm its selection.

Start typing the letters "**sum**." The Quick Add list of matching transformers will appear beneath.

Select the ListSummer transformer. The transformer will be added to the workspace and connected to the LineOnAreaOverlayer:Area port.



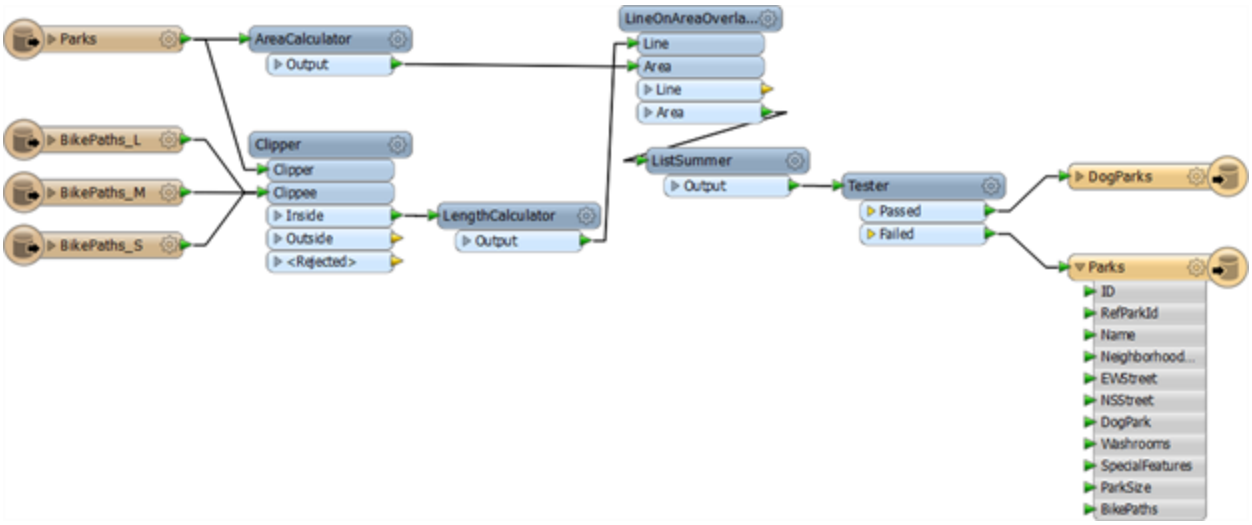
22) Open the ListSummer Parameters dialog box. Select the MyList{}._length as source list attribute. To match the destination feature type schema, rename the Sum Attribute name to BikePaths.

Click OK.

23) Drag a connection from the ListSummer:Output port to the Tester:Input port.

Notice that the BikePaths attributes on the Writer feature types now have a green input arrow, indicating they are properly connected and receiving data.

24) Delete the existing connection between the AreaCalculator and the Tester transformer and rearrange the transfomers to straighten out connections and ensure as few connections overlap as possible.



25) Check and reconnect any attributes whose schema mapping has been lost (there shouldn't be any, but you should check). Then save the workspace, run it, and inspect the output dataset.

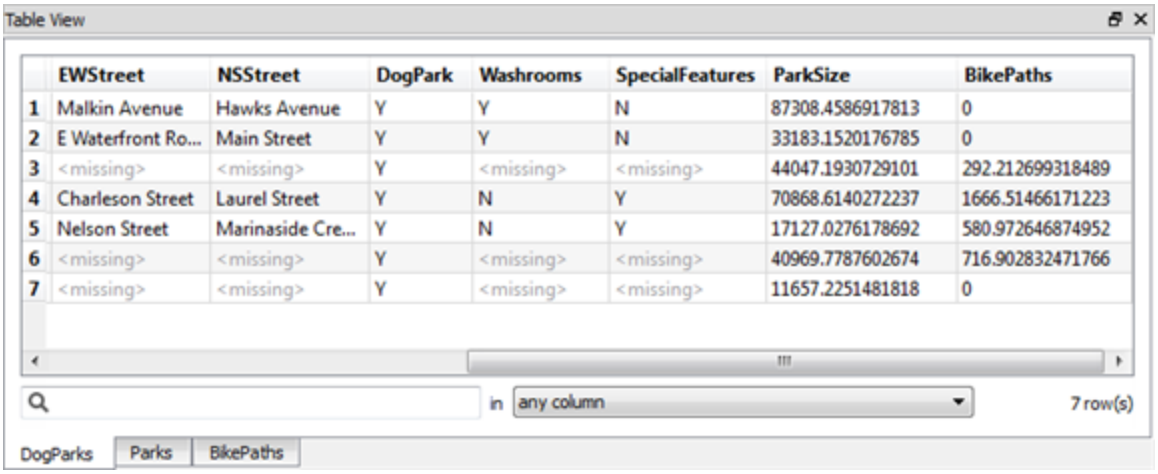


Table View

	EWStreet	NSStreet	DogPark	Washrooms	SpecialFeatures	ParkSize	BikePaths
1	Malkin Avenue	Hawks Avenue	Y	Y	N	87308.4586917813	0
2	E Waterfront Ro...	Main Street	Y	Y	N	33183.1520176785	0
3	<missing>	<missing>	Y	<missing>	<missing>	44047.1930729101	292.212699318489
4	Charleson Street	Laurel Street	Y	N	Y	70868.6140272237	1666.51466171223
5	Nelson Street	Marinaside Cre...	Y	N	Y	17127.0276178692	580.972646874952
6	<missing>	<missing>	Y	<missing>	<missing>	40969.7787602674	716.902832471766
7	<missing>	<missing>	Y	<missing>	<missing>	11657.2251481818	0

in any column 7 row(s)

DogParks Parks BikePaths

All features will now have a value for ParkSize and BikePaths, and will be divided into Parks and Dog Parks.

This information will let the planning department calculate grounds maintenance costs for the coming year.

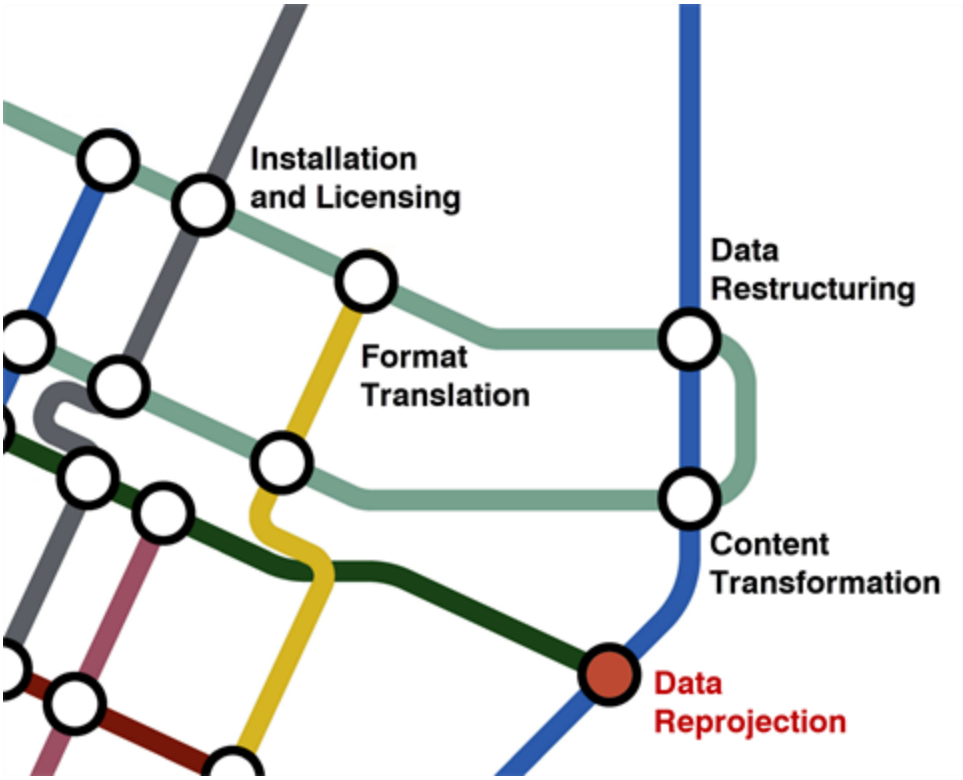
Congratulations! You have now:

- *Used transformers to calculate new attribute values from spatial measurements*
- *Added a new reader to a workspace*
- *Clipped one set of features using features from another set as a clip boundary*
- *Used a spatial overlay (spatial join) to transfer attributes from one set of features to another*
- *Used FME lists to store multiple values for a single attribute*

Conclusion

Next Step

Now that you have completed this chapter, your next step in the FME learning program is to continue to the next chapter: Data Reprojection.



Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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

Chapter 5 - Data Reprojection

This chapter covers the basics of how to reproject data from one coordinate system to another.

In this chapter

- Coordinate Systems
- Data Reprojection
- Dynamic Workspaces

Coordinate Systems

Usually coordinate systems are associated with the term map projection; however, they also involve:

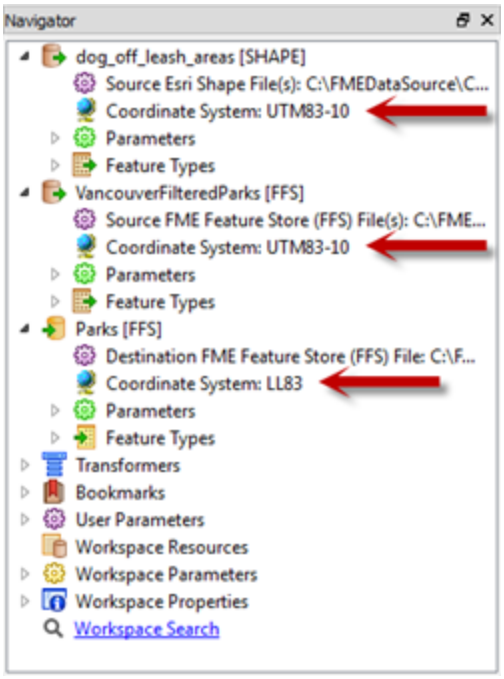
- Datum
- Units
- Spheroid
- Ellipsoid
- Origins and Offsets
- Scale Factor

Data Reprojection

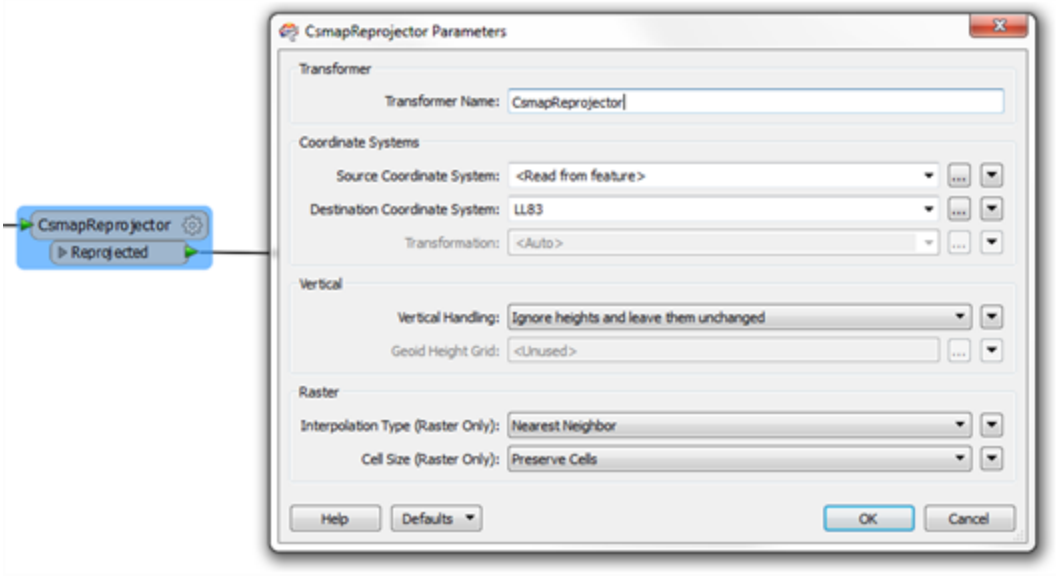
Reprojection can be considered a form of Data Transformation, but one which is unique enough to deserve its own section.

Reprojection occurs naturally in FME whenever a destination coordinate system is specified that is different to the source coordinate system.

Coordinate systems are specified in the Workbench Navigator window. The destination coordinate system is specified by the user, whereas the source coordinate system can be specified either by the user or within the dataset itself.



Another method of reprojection is to use a transformer. The CsmapReprojector transformer is preferred because it includes more parameters for greater control over how the reprojection is carried out.



Exercise 5.a: Coordinate Reprojection with FME Workbench

Coordinate reprojection is a very common task with FME Workbench.

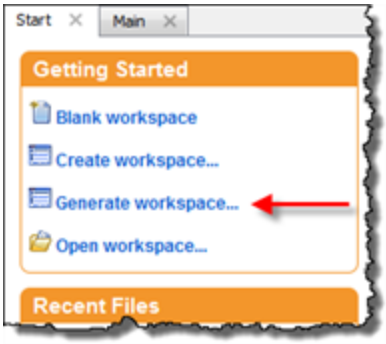
Exercise 5.a: Coordinate Reprojection with FME Workbench	
Scenario	FME user; City of Interopolis, Planning Department
Data	Bicycle Paths (Esri Shape format)
Overall Goal	Create a workspace to reproject a series of Esri Shape files.
Demonstrates	Data Reprojection, Dynamic Workspaces

Follow these steps to carry out a simple reprojection exercise using FME Workbench.

1) Select **Start > All Programs > FME Desktop 2014 > FME Workbench** from the Windows start menu.

FME Workbench will launch, and the start screen appears.

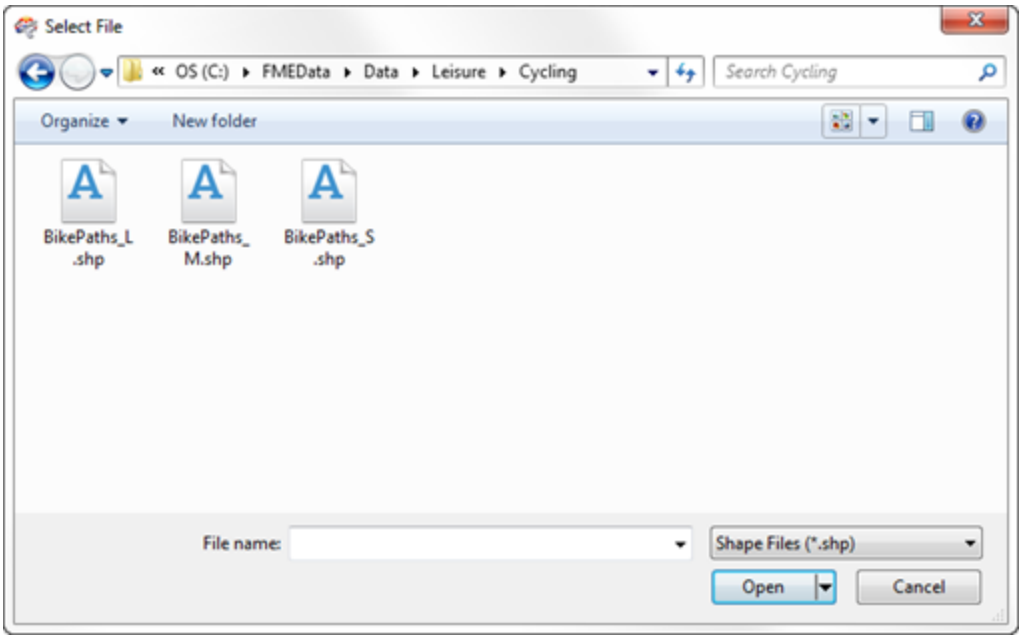
2) Open the Generate Workspace dialog box, either through the Generate Workspace link on the Start tab, or by using the shortcut ctrl-G.



3) In the Generate Workspace dialog box, fill in the Reader format field as Esri Shape

Click the dataset browse button and browse to *C:\FMEData2014\Data\Transportation\Cycling*.

In the file browser select all three of the files with a ".shp" extension.



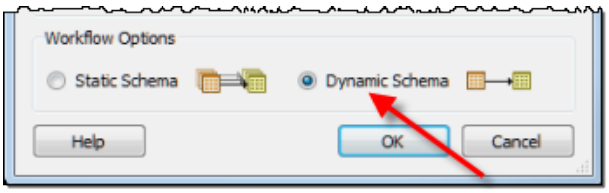
Then click the Open button to accept these files as the workspace input.

4) Back in the Generate Workspace dialog box, fill in the Writer fields as:

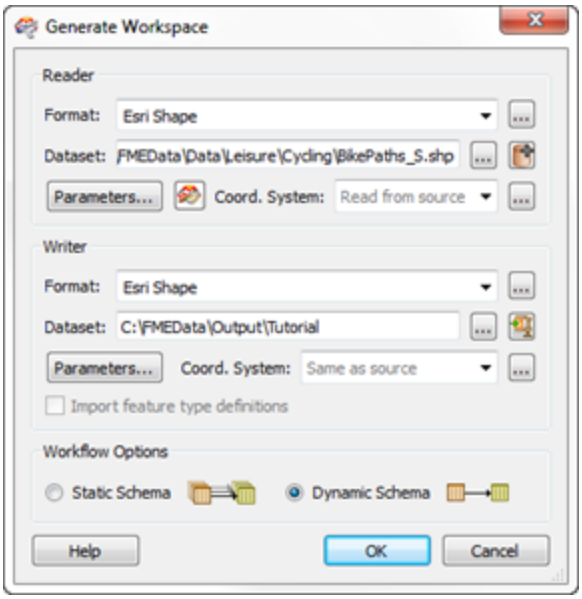
Format	Esri Shape
Dataset	*C:\FMEData2014\Output\Tutorial*

Notice that the workspace is reading and writing using the same format, which implies that this is solely a data transformation process, with no format translation. This is a very common use for FME.

5) In the Workflow Options section, ensure the Dynamic Schema option is checked.

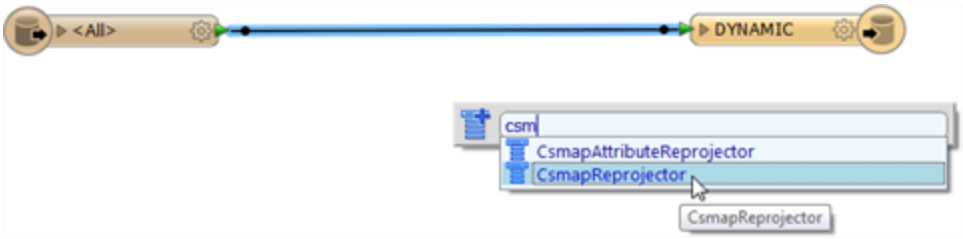


6) Now click OK to accept the chosen setup.

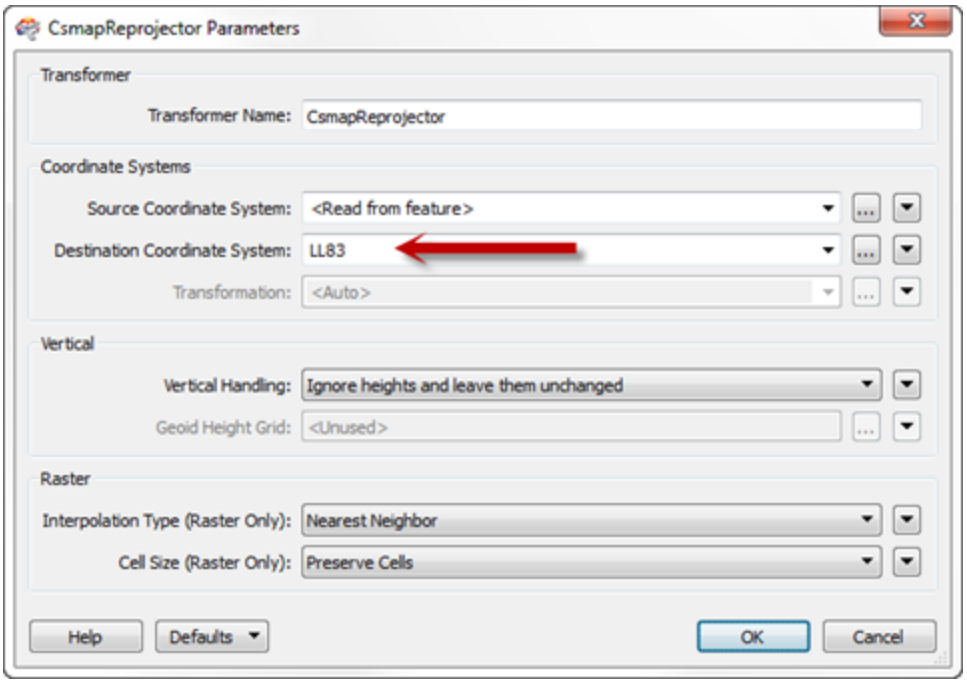


The new workspace is created and can be set up to reproject the data.

7) Click on the connection between the source (Reader) Feature Type and the destination (Writer) Feature Type. Start typing the word "**Csmap**". When the CsmapReprojector (not CsmapAttributeReprojector) appears, click on it to insert an instance of this transformer into the canvas.



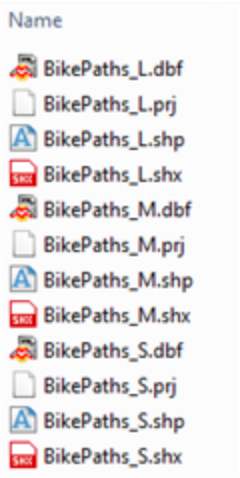
8) Click on the parameters button for the CsmapReprojector (it should be red). A parameters dialog box will open. In the Destination Coordinate System parameter, enter "**LL83**". Leave the Source Coordinate System as "<Read from Feature>."



This will cause the data to be reprojected from its original coordinate system to a Latitude-Longitude system with a datum of NAD83.

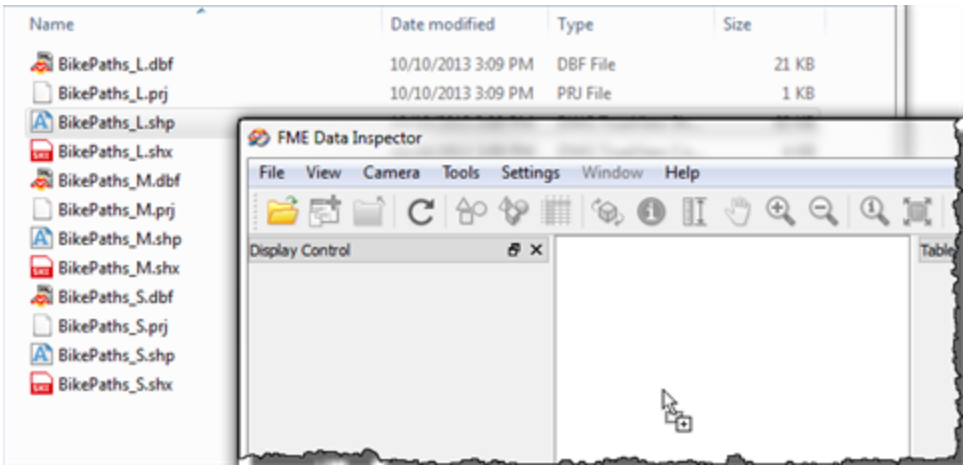
9) Save the workspace as BikePathReproject.fmw, and then run the translation.

Check the output folder to show that all of the files have been translated.

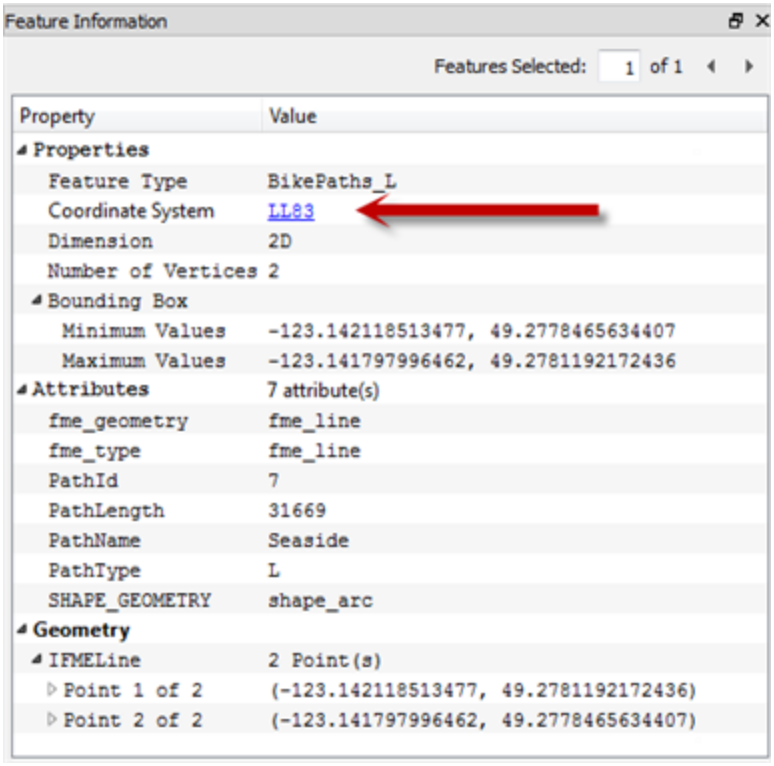


10) Inspect one of the output files. One way to do this is to drag and drop a Shapefile from a file explorer directly into the FME Data Inspector.

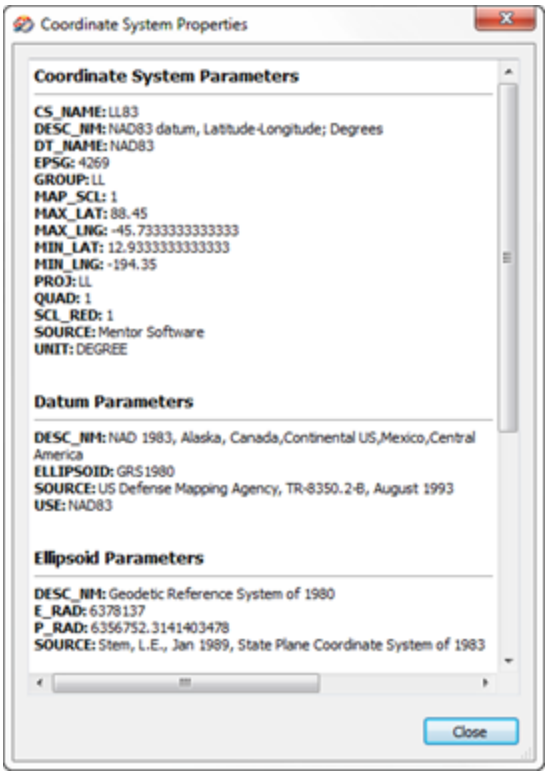
NB: You only have to select the SHP file (the parent) rather than all files in the dataset. This is the same for any multi-file dataset.



11) In the FME Data Inspector, query a feature to verify that the data has been reprojected to the new coordinate system. The coordinate system for a queried feature is displayed near the top of the Information window.



12) Click on the coordinate system (it is a hyperlink) to open a dialog showing the coordinate system properties:



Congratulations! You have now:

- *Reprojected data by using a CsmapReprojector transformer*

Dynamic Workspaces

The prior example used the dynamic schema option.

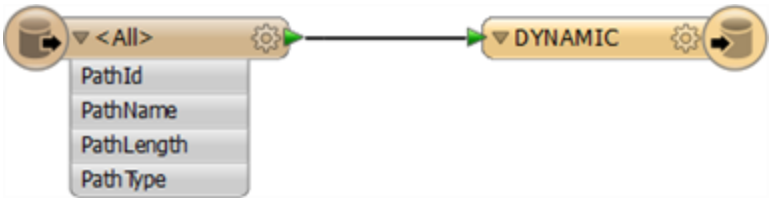
It would have worked just as well with a static schema, but dynamic has two major advantages.

- The workspace is much tidier.

  The reader and writer both have only a single feature type, regardless of how many source layers exist.

- The workspace can be re-used for any source dataset.

  The writer feature type has no attributes defined because it will dynamically create them from any input data. Therefore it can use any source data (of the right format).



Dynamic schemas are powerful and make possible a huge number of different data interoperability scenarios; far more than will be covered in this tutorial.

Novice FME users are advised to use static workspaces when carrying out structural transformations, as data restructuring techniques are different in dynamic mode.

Dynamic schemas are easier to implement when the workspace is intended for format translation only, or transformation of spatial content such as reprojection or clipping.

Exercise 5.b: Dynamic Coordinate Reprojection

The planning department wish to map the bicycle paths against an outline map of the city. To do so the outline map must also be reprojected into Latitude/Longitude but, because the previous example used a dynamic schema, the same workspace can be used to carry out the reprojection.

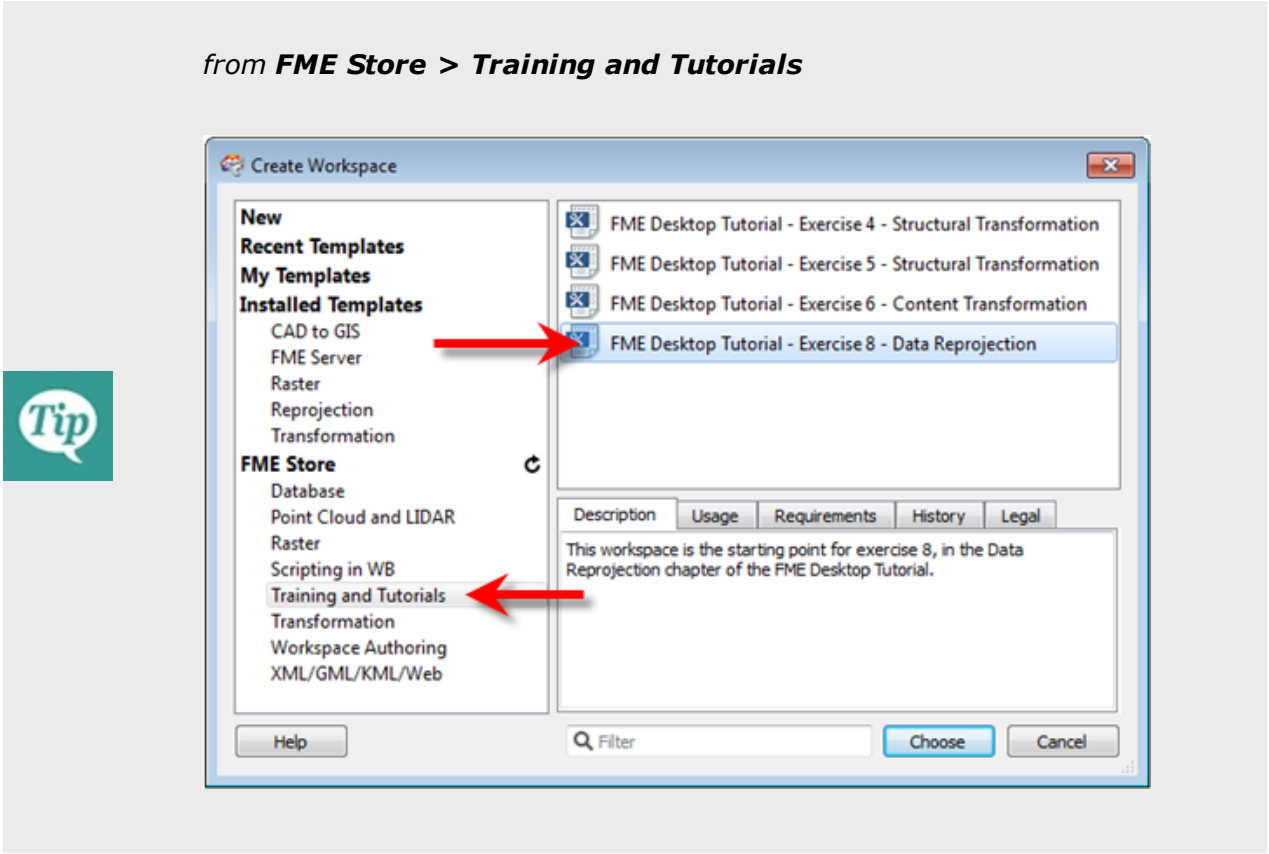
Exercise 5.b: Dynamic Coordinate Reprojection	
Scenario	FME user, City of Interopolis, Planning Department
Data	Vancouver Land Boundary (Esri Shape format)
Overall Goal	Reproject an Esri Shape dataset representing the city boundary
Demonstrates	Reusable workspaces

Follow these steps to re-use the previous example on a new dataset.

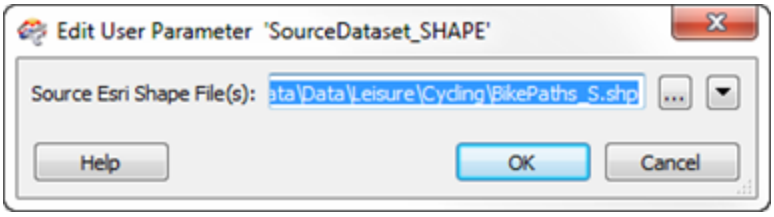
1) Open the workspace from the previous example (if not already open).

There are two alternatives to using the previous workspace:

- *Use **File > Open** on the menu bar to select a predefined workspace C:\FMEData2014\Workspaces\DesktopTutorial\Exercise5b-Begin.fmw*
- *Open the Create Workspace dialog and download the workspace as a template*



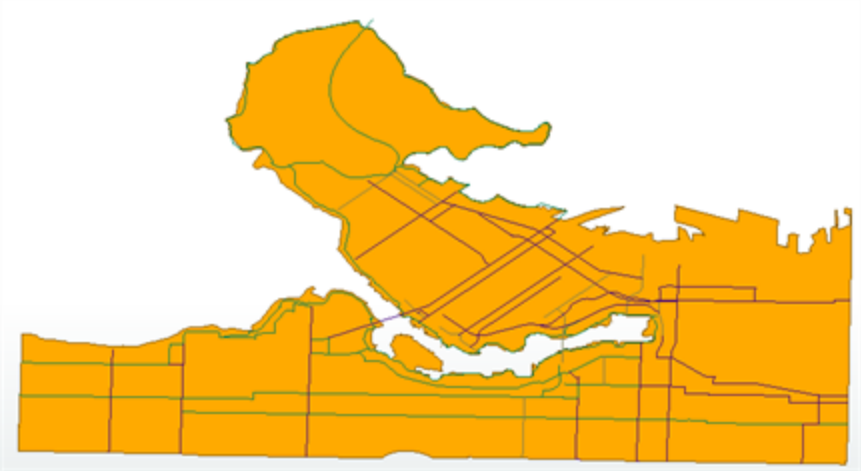
2) Right-click on the Reader feature type on the canvas, and choose the option to Edit Source Esri Shape File(s). A dialog will open in which to change the data being read.



3) Browse to *C:\FMEData2014\Data\Boundaries\LandBoundary* and select the file *VancouverLandBoundary.shp*. Click Open and then OK to accept these changes, then re-run the workspace.

Inspect the output. The data will have been properly translated and transformed, even though the original workspace was not designed with this particular data in mind.

Now the planning department will be able to visualize the bike paths alongside the city boundary.



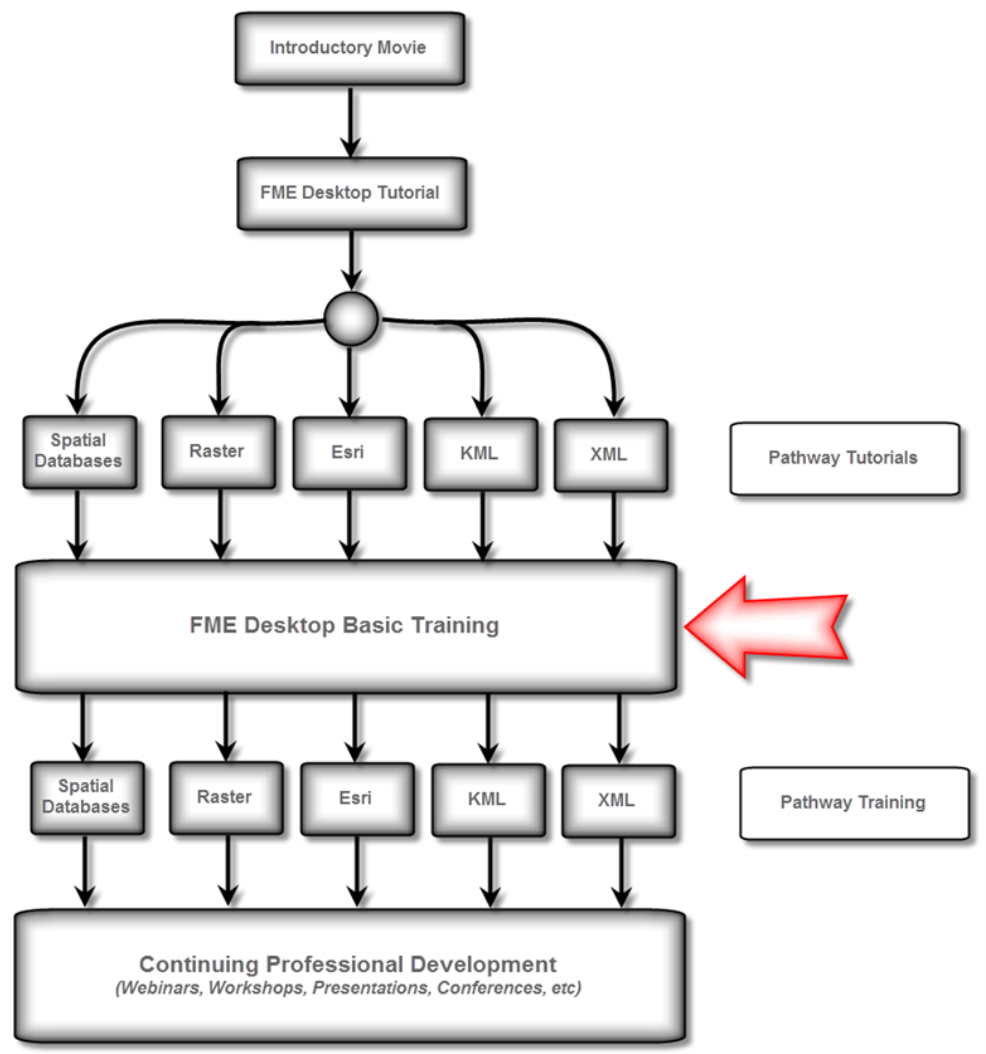
Congratulations! You have now:

- *Used a dynamic schema to allow use of one workspace on multiple datasets*

Conclusion

Next Steps

Now that you have completed this tutorial, your next step in the FME learning program offers a number of different choices. You may either follow a specific path by studying a tutorial such as FME for Raster Data, or go directly on to the FME Desktop Basic Training course.



You might also check out the FME Server tutorial, to find out the basic uses of that product.

Further information on all training options is available on the Safe Software web site at www.safe.com/training.

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