

FME[®] Transformer Reference Guide



604-501-9985 | sales@safe.com | www.safe.com
Suite 1200 - 9639 137A Street, Surrey, BC V3T 0M1 Canada

Copyright © Safe Software Inc. 2019. All rights are reserved.
FME is a registered trademark of Safe Software Inc. All other product names may be trademarks or registered trademarks of their respective owners.

Version 2019

WhiteStarLeaseBuilder	Posts a query to a WhiteStar Legal2Map™ WebServices (W3) server to obtain points or polygons that match a list of legal land descriptions. <i>(Integrations category)</i>
WorkspaceRunner	Runs another FME Workbench workspace on the local computer by spawning a new FME process. This transformer is useful for batch processing, especially in conjunction with the Directory and File Reader. <i>(Workflows category)</i>

X

XMLAppender	Assembles several XML documents into one. <i>(Format Specific, Web categories)</i>
XMLFeatureMapper	Constructs features from XML documents via xMaps. <i>(Format Specific, Web categories)</i>
XMLFlattener	Flattens content of XML element(s) into feature attributes. <i>(Format Specific, Web categories)</i>
XMLFormatter	Provides various options for formatting and cleaning up XML documents. <i>(Format Specific, Web categories)</i>
XMLFragmenter	Maps elements from an XML document into XML fragments. Can decompose large XML documents into parts, where these parts may be further operated on via downstream XML, XQuery, XSLT or generic text processing transformers. <i>(Format Specific, Web categories)</i>
XMLNamespaceDeclarer	Declares missing namespaces in XML documents by matching prefixes from another sample XML file whose namespaces are fully declared. <i>(Format Specific, Web categories)</i>
XMLSampleGenerator	This transformer generates an XML document based on an XML Schema (XSD) file. While the sample document may not pass a schema validation, it will provide a generate outline of what a valid XML document looks like. The XML generated by this transformer can be used as a base for an XML template used in the XMLTemplater transformer. <i>(Format Specific, Web categories)</i>
XMLTemplater	Populates an XML document with FME feature attribute values. The document is provided as a template, and the transformer will use XQuery to insert attribute values and geometry information into the template. <i>(Format Specific, Web categories)</i>
XMLUpdater	This transformer creates, modifies, replaces, or deletes XML elements and attributes in an XML document. <i>(Format Specific, Web categories)</i>
XMLValidator	Validates the syntax or schema of an XML file or text. <i>(Format Specific, Web categories)</i>
XMLXQueryExploder	Uses XQuery expression to extract portions of XML text into new FME features. <i>(Format Specific, Web categories)</i>
XMLXQueryExtractor	Uses XQuery expressions to extract portions of XML text into feature attributes. <i>(Format Specific, Web categories)</i>
XMLXQueryUpdater	Provides updates to an XML document using XQuery Update expressions. <i>(Format Specific, Web categories)</i>

XSLTProcessor	The XSLTProcessor uses an XSL (eXtensible Stylesheet Language) stylesheet to convert an XML document. Common output formats include text, RSS, SVG, and CSV. <i>(Format Specific, Web, Workflows categories)</i>
----------------------	--

FME and Data Transformation

Moving data between different formats and applications often involves more than a format-to-format translation. Datasets can contain more complex components that may not fit the requirements of the destination system. To preserve key aspects of the data and load it seamlessly into the target application, you may need to adjust the data model, contents, descriptive elements, and/or the coordinate system. This is known as **data transformation** and it is one of FME's core capabilities.

FME® contains over 500 transformers that perform different types of data operations. In the FME Workbench interface, transformers are stored in the Transformer Gallery and grouped in categories based on their function. You can also search for transformers by keyword.

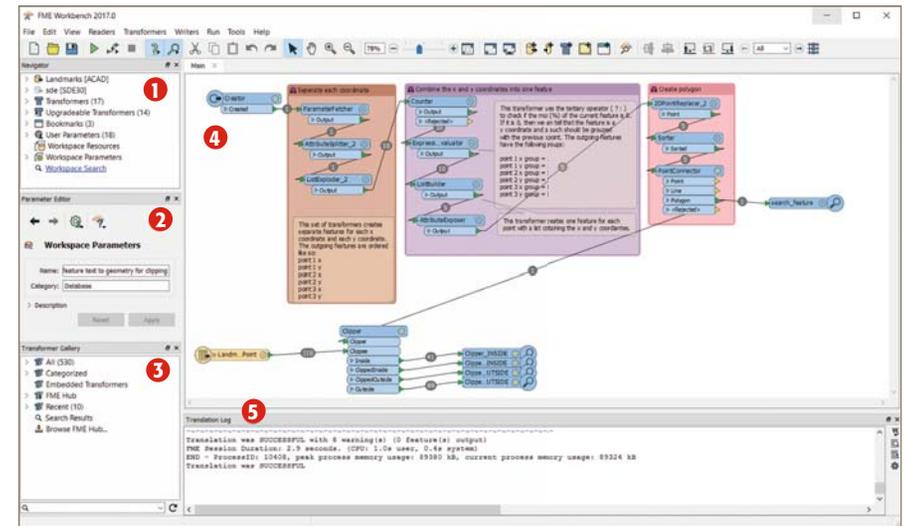


This guide provides a high-level summary of FME Workbench, data inspection, and each transformer's functionality. For detailed information, select FME Transformers from the FME Workbench Help menu, select a transformer on the canvas and press F1, or visit support.safe.com/KnowledgeDocumentation.

FME Workbench Overview

FME Workbench is a powerful tool for data conversion, sharing, transformation, validation, and integration.

Workbench elements are represented graphically on the Workbench canvas, and saved as a **workspace**. By default, the workspace workflow reads from left to right: the **reader** (source data) is on the left, the transformers are in the center, and the **writer** (destination data) is on the right. Connections between each item represent the flow of data: connections can branch in different directions, and through different objects.

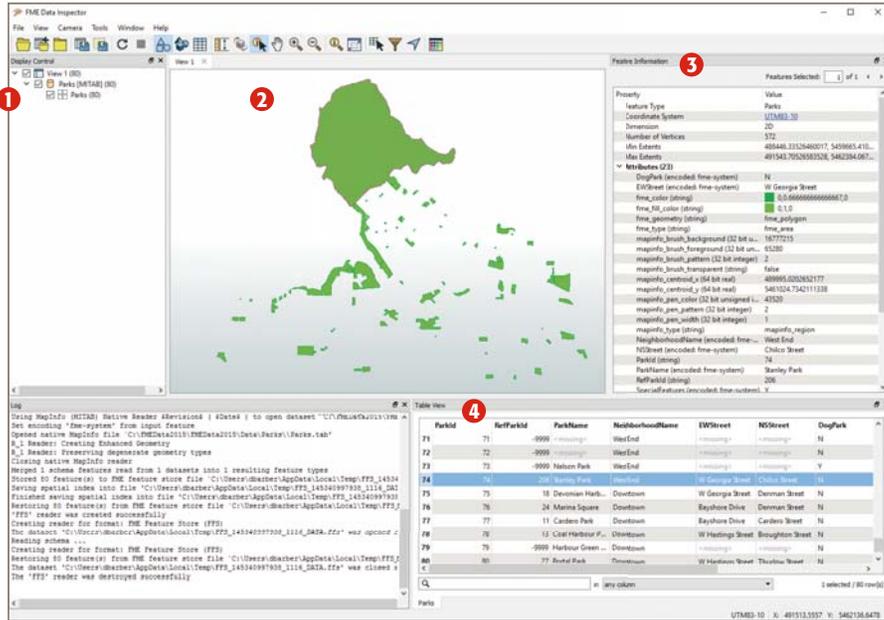


- 1 Navigator:** Shows a hierarchical view of workspace objects.
- 2 Parameter Editor:** Shows configurable settings for any object selected on the canvas.
- 3 Transformer Gallery:** Contains over 500 transformers to restructure features between source and destination data.
- 4 Canvas:** Displays a graphical workflow of the objects and connections that represent data and data transformation.
- 5 Translation Log:** Contains details about the workspace translation.

FME Data Inspector Overview

The FME Data Inspector is used primarily to preview data before translation and verify data after translation, but it can also be used to check data at any point during translation.

One of FME's key abilities is the communication between Workbench and the Data Inspector – an Inspector transformer can start the Data Inspector at almost any point while a workspace is running, and inspection tools allow feature-by-feature analysis.



- 1 **Display Control:** Shows a list of open datasets and their feature types.
- 2 **View:** Displays a single dataset, or multiple datasets at the same time.
- 3 **Feature Information:** Displays information about a queried feature, including feature type, attributes, and geometry details.
- 4 **Table View:** Displays the Feature Information values that are exposed to the end user, in tabular format.

Components of a Simple FME Workspace

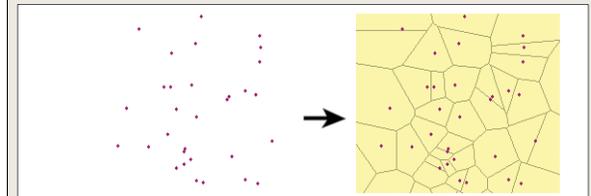
In a workspace, translation components are represented in a visible, related hierarchy. Hierarchy is important because it affects how components are added to a translation and, more importantly, how they are controlled. Components consist of (but are not limited to):

- Readers (source format and data)
- Writers (destination format and output data location)
- Reader and Writer Feature Types (in FME, feature types represent a subset of records; for example, layer, table, or sheet)
- Attributes
- Transformers

This guide is primarily a transformer resource – but it's also important to see why transformers are key to FME's power and versatility. A very simple workspace example on page 4 shows how transformers work; and the rest of this guide describes what each transformer can do.

U	
UUIDGenerator	Calculates a Universally Unique Identifier (UUID) for each incoming feature, and adds it as a new attribute. An example UUID looks like: 7672aac8-fa0b-464c-b0b8-3efa9ae9cd86 (<i>Calculated Values category</i>)

V	
VariableRetriever	Reads the specified variable and puts its value into the specified attribute. This variable must have been previously set using the VariableSetter transformer. (<i>Workflows category</i>)
VariableSetter	Creates and sets the specified variable to the specified value. The variable can later be read back into an attribute using the VariableRetriever transformer. (<i>Workflows category</i>)
VectorOnRasterOverlayer	Overlays vector features onto a single raster feature by drawing them onto the resulting output raster. The properties of the output raster are identical to that of the input raster. (<i>Rasters, Spatial Analysis categories</i>)
VertexCounter	Stores the number of a feature's coordinates into an attribute. (<i>Calculated Values, Coordinates, Data Quality categories</i>)
VertexCreator	Appends coordinates to null, point, text, line, and arc geometry, or replaces existing geometry with point geometry. (<i>Geometries category</i>)
VertexRemover	Removes one or more coordinates from the geometry of the feature. (<i>Coordinates, Geometries categories</i>)
VolumeCalculator	Calculates the volume of a solid object and stores the value in an attribute. (<i>3D, Calculated Values categories</i>)
VoronoiCellGenerator	Outputs circular sectors of influence for point features that have directions defined by azimuths (degrees clockwise from North). (<i>Spatial Analysis category</i>)
VoronoiDiagrammer	Generates a Voronoi diagram or Thiessen polygon. Each polygon in the diagram defines the area of space that is closest to a particular input point. (<i>Spatial Analysis category</i>)



W	
WebMapTiler	Creates a series of image tiles that can be utilized by web mapping applications such as Bing™ Maps, Google Maps™, or Web Map Tile Service. (<i>Cartography and Reports, Format Specific, Rasters, Web categories</i>)
WebSocketReceiver	Receives WebSocket messages from the specified WebSocket server. Produces a feature each time a message is received, and places the contents of the message into the specified attribute. (<i>Web, Workflows categories</i>)
WebSocketSender	Sends WebSocket messages to the specified WebSocket server. (<i>Web, Workflows categories</i>)

U
V
W

TINGenerator	Constructs a Delaunay triangulation based on input points and breaklines. The surface model may be output in a number of representations: a triangulated irregular network (TIN), TIN vertices, TIN edges, and triangles. (3D, Geometries categories)
TopferIndexCalculator	Takes a set of point, linear, polygonal, and/or aggregate features, and calculates the Topfer Index based on the bounding box of the input features. (Spatial Analysis category)
TopologyBuilder	Computes topology on input point, line, and/or area features. (Spatial Analysis category)
TraitMerger	Moves the traits from one geometry onto another geometry. It can also move the attributes from a feature onto a geometry as traits, or the traits from a geometry onto a feature as attributes. (Filters and Joins category)
TransporterReceiver	Receives features from another FME workspace running in a different process, which may be located on the same or a different machine. Used in conjunction with the TransporterSender. (Integrations, Workflows categories)
TransporterSender	Sends features to another FME workspace running in a different process, which may be located on the same machine or on a different machine. Used in conjunction with the TransporterReceiver. (Integrations, Workflows categories)
Triangulator	Breaks an input geometry into triangular units or a mesh. (Geometries category)
Tweeter	Sends a Twitter™ status update from Workbench. (Integrations, Web categories)
TweetSearcher	Runs a search for Twitter™ entries that contain the given query. (Integrations, Web categories)
TweetStreamer	Connects to a Twitter™ stream and outputs a new feature for each tweet. (Integrations, Web categories)
TwitterStatusFetcher	Retrieves the timeline for a particular Twitter™ user or list. (Integrations, Web categories)

The Basics: Placing and Editing Transformers

There are many ways to place a transformer on the Workbench canvas. To start, however, you can simply double-click a transformer name in the Transformer Gallery and it will appear in the workspace.

Every transformer has a Properties button. This button is color-coded to show the status of its parameters.



If the Properties button is the same color as the transformer, you can use the transformer with its existing parameters.

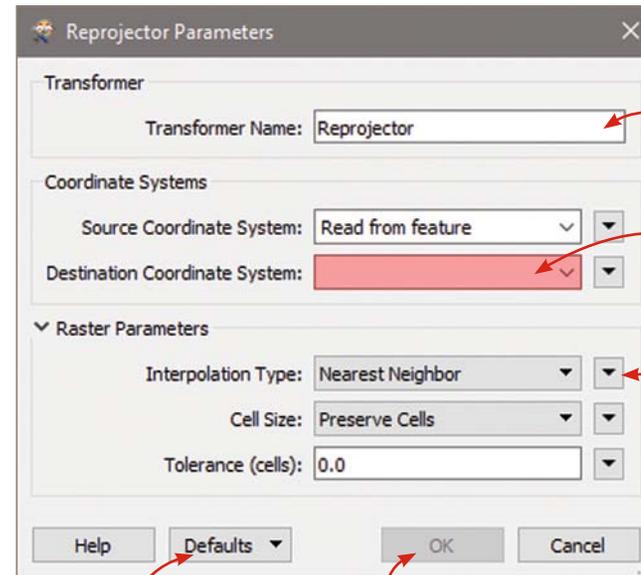


A yellow Properties button indicates that the transformer contains default settings, but you have not yet accepted them. You can use the transformer in this state, but your workspace might produce unexpected results.



A red Properties button means that there is at least one parameter for which FME cannot supply a default value. You must provide a value for all required fields before you can use the transformer in the workspace.

When you click a Properties button, the dialog that appears will usually have some of the common elements shown in this example. The content of this dialog depends on the transformer, and sometimes even on connections to the transformer. Most transformers have some common user interface elements, however, and those are described here.



You can edit the default transformer name.

Required parameters are highlighted.

Transformer parameter menu button.

The Defaults menu gives you options for using default values.

Click OK to accept changes and close the dialog. (This button is disabled if required parameters have not been populated.)

Working with Transformer Parameters

Most transformer parameters can be integrated with other pieces of a workspace. This means that the parameters can be easily configured to work with elements of the source data as well as with other transformers. More advanced functions, such as text and arithmetic editors, are also available in some transformers.

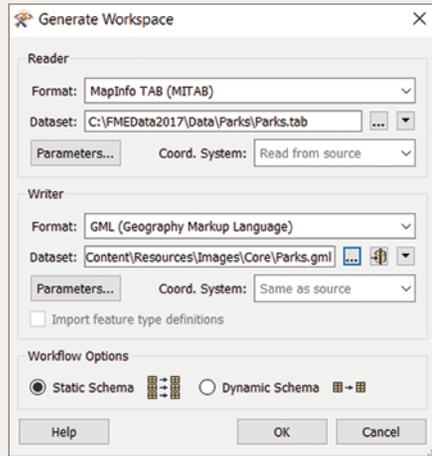
In most cases, you can use a transformer with its displayed default values.



For detailed information on transformer parameters, see the *FME Transformers help*, or select a transformer on the Workbench canvas and view the *Help* tab in the bottom pane.

The Basics: Setting up and Running a Simple Workspace

This simple example shows how to set up a new workspace. The source data used for this example contains information about 80 city parks.

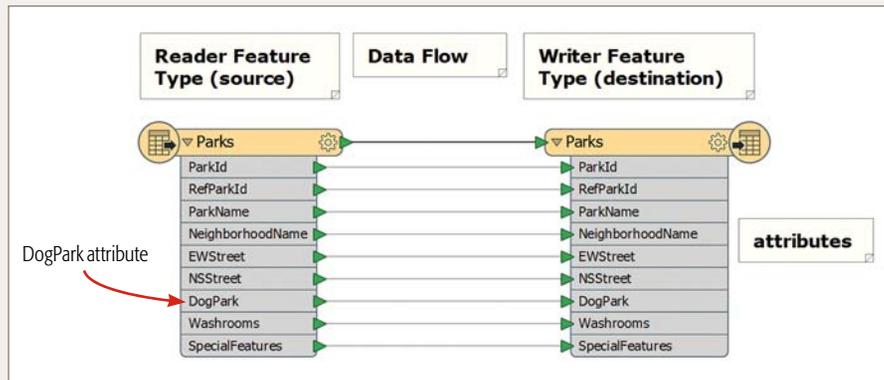


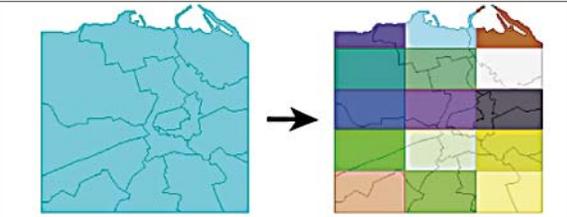
Set up a new workspace by clicking File > Generate Workspace. Then:

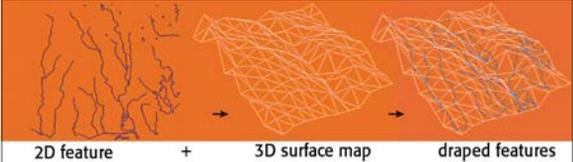
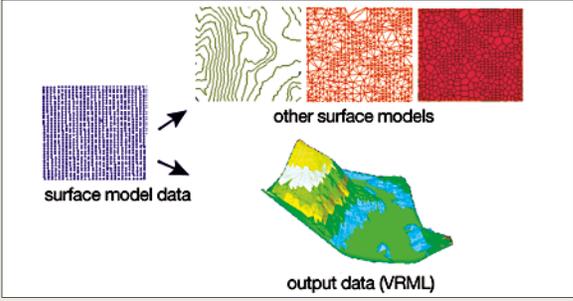
1. Select the format and location of the source data (the Reader),
2. Specify the format and location for the destination data (the Writer), and
3. Accept the defaults in the remaining dialog fields.

Click OK. Workbench reads the data, and generates the initial workspace.

The objects on the canvas represent the data and data flow. The **Reader Feature Type** shows that the data contains an **attribute** called *DogPark*.

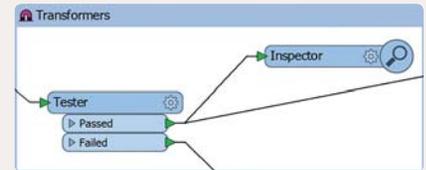


TempPathnameCreator	Reserves and returns a temporary file or directory path that will be deleted upon translation completion. An optional basename and extension can be supplied to further refine the filename portion of the resulting pathname. <i>(Calculated Values, Workflows categories)</i>
Terminator	Stops a translation when it detects detect non-valid situations or input data conditions that should not exist. <i>(Workflows category)</i>
Tester	Evaluates one or more tests on a feature, and routes the feature according to the outcome of the test(s). The tests can consist of any FME-allowed operands. <i>(Data Quality, Filters and Joins categories)</i>
TestFilter	Filters features by test conditions to one or more output ports. <i>(Data Quality, Filters and Joins categories)</i>
TextAdder	Sets the feature's geometry to text using the previous geometry as the text location. <i>(Cartography and Reports, Geometries categories)</i>
TextDecoder	Decodes a string from a number of different text encodings into plain text. <i>(Strings category)</i>
TextEncoder	Encodes a text string using URL, Unicode, XML, HTML, Base64, HEX, or Octal methods. <i>(Strings category)</i>
TextLocationExtractor	Sets a text feature's geometry to the location of the text. <i>(Calculated Values category)</i>
TextPropertyExtractor	Extracts the values of text attributes from input text geometry features. <i>(Calculated Values category)</i>
TextPropertySetter	Sets the properties of a text geometry to the specified properties. <i>(Cartography and Reports category)</i>
TextStroker	Takes as input a font name, text padding and width multiplier, and outputs aggregates that describe the outline of the text. <i>(Cartography and Reports, Rasters category)</i>
	
TextureCoordinateSetter	Assigns texture coordinates to surfaces. <i>(Calculated Values, Coordinates categories)</i>
Tiler	Chops the input features into a series of tiles. This transformer works with raster, vector and point cloud data. <i>(Geometries category)</i>
	

SurfaceDraper	Constructs a Delaunay triangulation based on input points and breaklines. Input drape features will be overlaid onto the surface model, and output as draped features. (3D, Point Clouds, Spatial Analysis categories)
	
SurfaceFootprintReplacer	Replaces the geometry of a feature with a planar representation of the feature's shadow. (3D, Geometries categories)
SurfaceModeller	Constructs a Delaunay triangulation based on input points and breaklines. It is useful when you need multiple representations of the same model. (3D, Point Clouds categories)
	
SurfaceOnSurfaceOverlayer	Performs a surface-on-surface overlay so that all input surfaces are intersected against each other and resultant surface features are created and output. The output surfaces can retain all the attributes of the input features in which they are contained. (3D, Spatial Analysis categories)
SurfaceSplitter	Splits a double-sided input surface geometry into two single-sided surfaces – one equal to the front side of the input surface and one equal to the back side of the input surface. (3D, Geometries categories)
SystemCaller	Runs a program or operating system command, and waits for it to exit before continuing the translation. (Workflows category)

T	
ST	
TclCaller	Runs a Tool Command Language (Tcl) command and assigns its return value to an attribute. (Workflows category)
TCPIPReceiver	Receives raw data over TCP/IP. Produces a feature each time a specified number of bytes is received or a particular sequence is detected. (Integrations, Web, Workflows categories)
TCPIPSender	Sends raw data to the specified host, which may be another FME workspace running in a different process (located on the same machine or on a different machine), or any client application that communicates over TCP/IP. (Integrations, Web, Workflows categories)

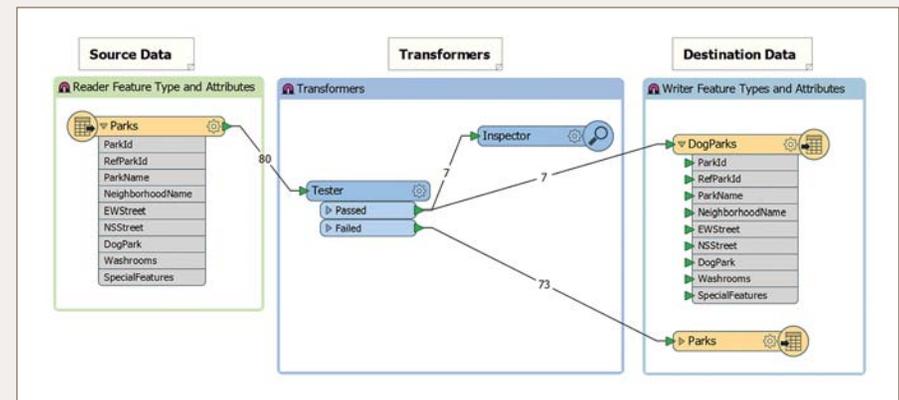
Because we want to determine which parks allow dogs, we add two transformers: a Tester transformer (to filter data) and an Inspector transformer (to view results). The Tester parameters are set to filter only parks that allow dogs, and the Inspector transformer opens the **Data Inspector** to show the results on a map.



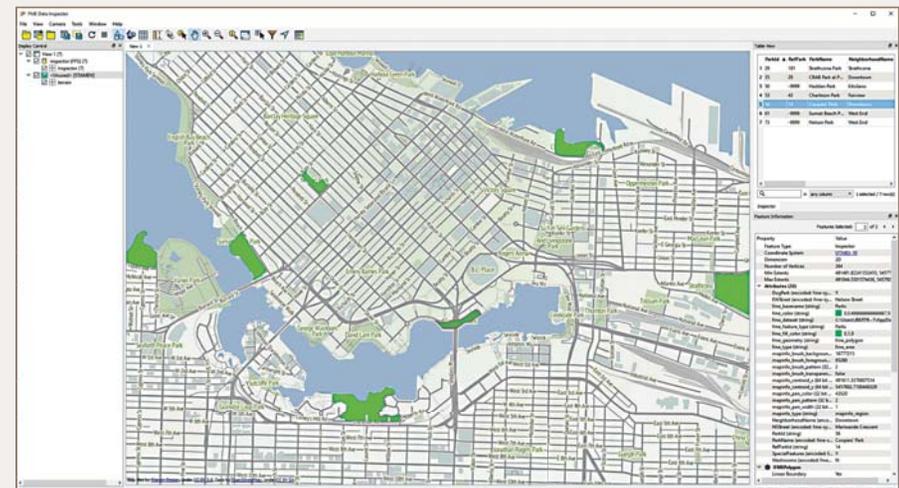
Click the Run tool. 

The resulting workspace shows that 7 parks allow dogs. These results are sent through the **Passed** port of the Tester transformer to a Writer Feature Type that we have added and named *DogParks*.

The workspace also shows that 73 parks do not allow dogs, and we have directed these results through the **Failed** port of the Tester transformer to the original *Parks* writer feature type.



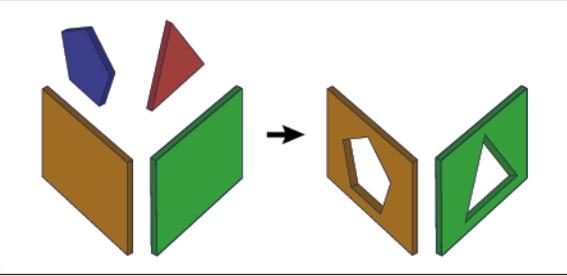
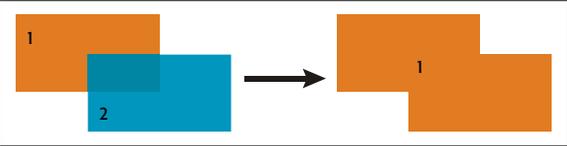
Because we added an Inspector transformer to the Tester transformer's Passed port, the Data Inspector opens automatically. Here, the Background Map option allows us to view the exact locations of the 7 dog parks.

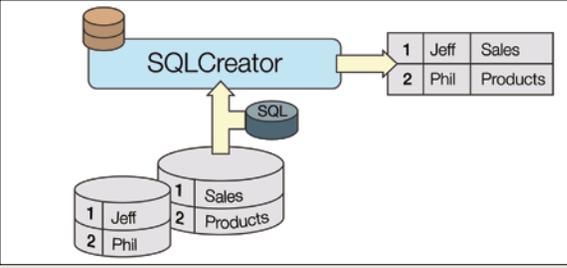
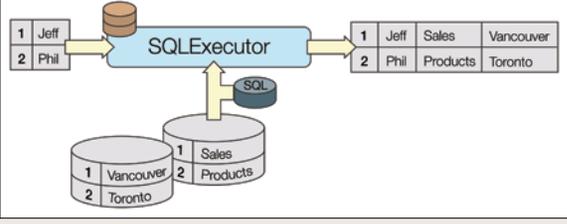
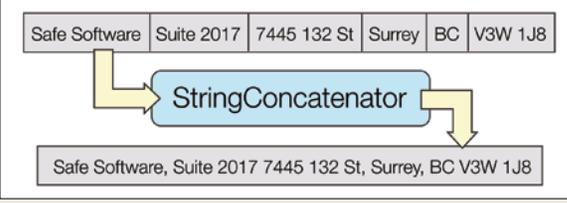


Workbench Keyboard Shortcuts *for Windows*

General Viewing	
New (create a new workspace)	Ctrl+n
Generate workspace	Ctrl+g
Open	Ctrl+o
Exit (workbench)	Ctrl+q
Close (workspace)	Ctrl+w
Change to next tab	Ctrl+Tab
Change to previous tab	Ctrl+Shift+Tab
Select tab number	Ctrl+number_key
Close current tab	Ctrl+F4
Open containing folder	Ctrl+o
Maximize canvas to current window size	Shift+F11
Maximize canvas to full screen	F11
Zoom-in	Ctrl+
Zoom-out	Ctrl-
Zoom 100%	Ctrl+0
Zoom in and out	Ctrl+scroll wheel
Zoom to next/previous bookmark	Space/Ctrl+Space <i>Note: Show Bookmark Navigator must be enabled on the toolbar.</i>
Pan	Click scroll wheel (or middle mouse button) and drag cursor.
Return cursor to action arrow	Right-click anywhere on the canvas.
Search: - Workspace if the focus is in the workspace or the Navigator - Log if the focus is in the Log window	Ctrl+f F3
Connection Style	Ctrl+Shift+C
Print	Ctrl+p
Help	Select an object, then F1

General Editing	
Cut	Ctrl+x
Copy	Ctrl+c
Paste	Ctrl+v
Redo	Ctrl+y
Save	Ctrl+s
Select All	Ctrl+a
Undo	Ctrl+z
Smart Delete (repair connections)	Delete key
Delete (without repair)	Shift+Delete key
Readers, Writers, and Transformers	
Add Reader	Ctrl+Alt+r
Add Writer	Ctrl+Alt+w
Show Parameters	Select an object, then Enter
Connect Inspector	Select the object(s), then Ctrl+Shift+l
Connect Logger	Select the object(s), then Ctrl+Shift+l
Create custom transformer	Select one or more transformers, then Ctrl+t
Duplicate transformer	Ctrl+d <i>Using Quick Add:</i> If you add a transformer and want to add the same transformer again, press the slash "/" key. The Quick Add box will appear showing the last selected transformer. Press Return to include it, then press Return again to edit its parameters.
Rename	Select an object, then F2
Search transformers, readers, and writers	Slash "/" key

StringFormatter	Reformats the data held in each specified attribute according to the Tcl <i>format</i> command, which is similar to the C <i>printf</i> function. Attribute values can be formatted into strings, characters, or numbers. (<i>Strings category</i>)
StringLengthCalculator	Calculates the length of strings and the number of bytes in a blob. (<i>Calculated Values, Strings categories</i>)
StringPadder	Pads the selected attributes with a specified character, either on the right or left side. (<i>Strings category</i>)
StringPairReplacer	Replaces characters in the value contained in the source attribute based on the replacement key-value pairs. (<i>Strings category</i>)
StringReplacer	Replaces substrings matching a string or regular expression in the string contained in the source attribute. (<i>Strings category</i>)
StringSearcher	Performs a regular expression match on the specified expression. (<i>Strings category</i>)
SubstringExtractor	Extracts a substring from the source attribute. (<i>Calculated Values, Strings categories</i>)
SummaryReporter	Writes a summary report of incoming features to a disk file. Features are sorted before they are summarized. (<i>Data Quality, Workflows categories</i>)
SurfaceBuilder	Cuts holes in surface features with other surface features. A surface that is cut by another surface must be co-planar with that second surface, have compatible orientation, and contain that second surface. (<i>3D, Spatial Analysis categories</i>) 
SurfaceDissolver	Detects coplanar regions of input surfaces and dissolves them into single faces. The output faces retain the attributes, traits, and appearances of the input. (<i>3D, Geometries, Spatial Analysis categories</i>) 

SQLCreator	<p>Generates FME features from the results of a SQL query against a database. One FME feature is created for each row of the results of the SQL Query. (<i>Workflows category</i>)</p>  <p>The diagram shows a workflow where two input tables, 'Jeff' and 'Sales', are joined. The 'Sales' table has two rows: (1, Sales) and (2, Products). The 'Jeff' table has two rows: (1, Jeff) and (2, Phil). The SQLCreator tool processes this join and outputs a single table with two rows: (1, Jeff, Sales) and (2, Phil, Products).</p>
SQLExecutor	<p>Performs SQL queries against a database. (<i>Workflows category</i>)</p>  <p>The diagram shows a workflow where two input tables, 'Vancouver' and 'Products', are joined. The 'Products' table has two rows: (1, Sales) and (2, Products). The 'Vancouver' table has two rows: (1, Vancouver) and (2, Toronto). The SQLExecutor tool performs a query and outputs a table with two rows: (1, Jeff, Sales, Vancouver) and (2, Phil, Products, Toronto).</p>
SQSDeleter	<p>Using the Amazon Simple Queue Service (SQS), deletes messages from an Amazon SQS queue. (<i>Integrations, Web categories</i>)</p>
SQSMessageCounter	<p>Using the Amazon Simple Queue Service (SQS), counts the number of messages in an Amazon SQS queue. (<i>Integrations, Web categories</i>)</p>
SQSReceiver	<p>Using the Amazon Simple Queue Service (SQS), receives messages from an Amazon SQS queue. (<i>Integrations, Web categories</i>)</p>
SQSSender	<p>Using the Amazon Simple Queue Service (SQS), sends messages to an Amazon SQS queue. (<i>Integrations, Web categories</i>)</p>
StatisticsCalculator	<p>Calculates statistics based on a designated attribute or set of attributes of the incoming features. (<i>Calculated Values category</i>)</p>
StreamOrderCalculator	<p>Computes the Strahler order and/or Horton order of streams in a river network. (<i>Calculated Values category</i>)</p>
StreamPriorityCalculator	<p>Calculates the primary and secondary streams of multiple stream networks. (<i>Calculated Values category</i>)</p>
StringCaseChanger	<p>Changes the case of text attributes to UPPERCASE, lowercase, Title case, or Full Title Case. (<i>Strings category</i>)</p>
StringConcatenator	<p>Concatenates the values of any number of attributes, user parameters and/or constants, and stores the result in a new attribute. (<i>Strings category</i>)</p>  <p>The diagram shows a workflow where a single input table with columns 'Safe Software', 'Suite 2017', '7445 132 St', 'Surrey', 'BC', and 'V3W 1J8' is processed by the StringConcatenator tool. The output is a single table with one row containing the concatenated string: 'Safe Software, Suite 2017 7445 132 St, Surrey, BC V3W 1J8'.</p>

Other Workspace Authoring	
Add Bookmark	Ctrl+b
Attach annotation	Select the object(s), then Ctrl+k
Attach summary annotation	Select the object(s), then Ctrl+Shift+K
Insert Junction	Ctrl+Shift+J
Enable/disable objects (including links and feature types)	Ctrl+e
Running Workspaces	
Run translation	F5
Rerun entire workspace	Shift+F5
Enable Prompt for User Parameters	Ctrl+Alt+F5
Prompt and run	Ctrl+r
Enable feature caching	Ctrl+F5
Run with feature caching + "Run From This"	F6
Run with breakpoints	Ctrl+Shift+F5
Toggle breakpoints	Select connection, then F9

Transformer Categories

3D

- 3DAffiner 13
- 3DArcReplacer 13
- 3DForcer 13
- 3DInterpolator 13
- 3DRotator 13
- AppearanceExtractor 14
- AppearanceMerger 14
- AppearanceRemover 14
- AppearanceSetter 14
- AppearanceStyler 14
- Bufferer 19
- Creator 22
- CSGBuilder 22
- CSGEvaluator 22
- DEMDistanceCalculator 24
- DEMGenerator 24
- DimensionExtractor 24
- ElevationExtractor 26
- Extruder 26
- FaceReplacer 26
- GeometryInstantiator 29
- GeometryPartExtractor 29
- GeometryPropertyExtractor 29
- GeometryPropertyRemover 29
- GeometryPropertyRenamer 29
- GeometryPropertySetter 29
- IFCPropertySetDefinitionCreator 131
- IFCQuantitySetDefinitionCreator 31
- MeshMerger 36
- MeshSimplifier 36
- MRF3DCleaner 37
- Offsetter 39
- PlanarityFilter 39
- PointCloudSurfaceBuilder 41
- RasterDEMGenerator 44
- RasterHillshader 44
- RasterSlopeCalculator 46
- Scaler 47
- SecondOrderConformer 48
- SharedItemAdder 48
- SharedItemIDExtractor 48
- SharedItemIDSetter 48
- SharedItemRetriever 48
- SolidBuilder 49
- SurfaceBuilder 51
- SurfaceDissolver 51
- SurfaceDraper 52
- SurfaceFootprintReplacer 52
- SurfaceModeller 52
- SurfaceOnSurfaceOverlayer 52
- SurfaceSplitter 52
- TINGenerator 54
- VolumeCalculator 55

Attributes

- Aggregator 14
- AttributeCompressor 16
- AttributeCopier 16
- AttributeCreator 16

- AttributeDecompressor 16
- AttributeDereferencer 16
- AttributeExploder 17
- AttributeExposer 17
- AttributeFileReader 17
- AttributeFileWriter 17
- AttributeKeeper 17
- AttributeManager 17
- AttributeRemover 17
- AttributeRenamer 17
- AttributeSplitter 18
- BulkAttributeRemover 19
- BulkAttributeRenamer 19
- DatabaseJoiner 23
- Deaggregator 23
- ListBuilder 35
- ListConcatenator 35
- ListCopier 35
- ListExploder 35
- ListExpressionPopulator 35
- ListIndexer 35
- ListPopulator 35
- ListRenamer 35
- ListSorter 35
- NullAttributeMapper 38

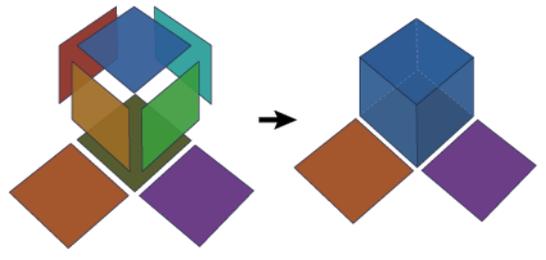
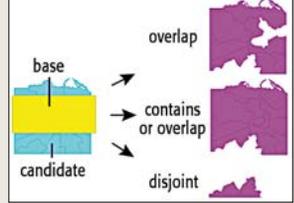
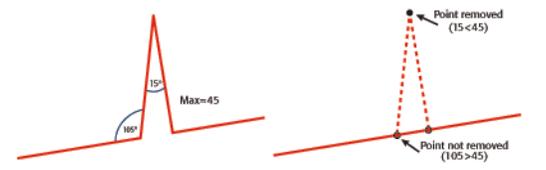
Calculated Values

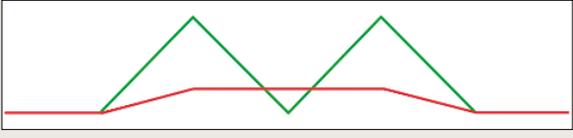
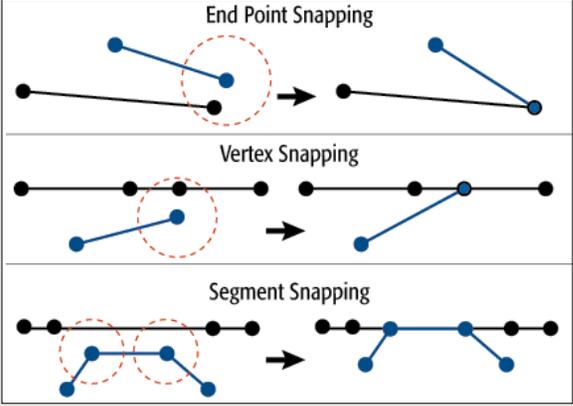
- Aggregator 14
- AngleConverter 14
- AngularityCalculator 14
- ArcPropertyExtractor 15
- AreaCalculator 16
- AttributePivoter 17
- AttributeRounder 17
- BaseConverter 18
- BoundsExtractor 19
- CenterPointExtractor 20
- CircularityCalculator 21
- CoordinateConcatenator 22
- CoordinateExtractor 22
- Counter 22
- CRCCalculator 22
- DateTimeCalculator 23
- DateTimeConverter 23
- DateTimeStamper 23
- DecimalDegreesCalculator 24
- DEMDistanceCalculator 24
- DensityCalculator 24
- DMSCalculator 25
- ElevationExtractor 26
- EllipsePropertyExtractor 26
- ExpressionEvaluator 26
- GeometryExtractor 28
- GOIDGenerator 30
- HoleCounter 30
- LeftRightSpatialCalculator 33
- LengthCalculator 33
- LengthToPointCalculator 33
- ListHistogrammer 35
- ListRangeExtractor 35

- MeasureExtractor 36
- MeasureGenerator 36
- ModuloCounter 37
- NetworkCostCalculator 38
- NetworkTopologyCalculator 38
- OrientationExtractor 39
- PartCounter 39
- PointCloudExpressionEvaluator 40
- PointCloudPropertyExtractor 40
- PointCloudStatisticsCalculator 41
- PointPropertyExtractor 41
- RandomNumberGenerator 42
- RasterAspectCalculator 42
- RasterBandMinMaxExtractor 42
- RasterBandPropertyExtractor 42
- RasterCellValueCalculator 43
- RasterExpressionEvaluator 44
- RasterPropertyExtractor 45
- RasterSingularCellValueCalculator 46
- RasterStatisticsCalculator 46
- ReprojectAngleCalculator 47
- ReprojectLengthCalculator 47
- StatisticsCalculator 50
- StreamOrderCalculator 50
- StreamPriorityCalculator 50
- StringLengthCalculator 51
- SubstringExtractor 51
- TempPathnameCreator 53
- TextLocationExtractor 53
- TextPropertyExtractor 53
- TextureCoordinateSetter 53
- UUIDGenerator 55
- VertexCounter 55
- VolumeCalculator 55

Cartography and Reports

- AreaAmalgamator 15
- ChartGenerator 20
- CommonLocalReprojector 21
- Curvefitter 23
- DGNStyler 24
- Displacer 24
- DWGStyler 25
- ExcelStyler 26
- FeatureColorSetter 26
- Generalizer 28
- GeometryColorSetter 28
- ImageRasterizer 31
- KMLPropertySetter 32
- KMLRegionSetter 32
- KMLStyler 32
- KMLTimeSetter 32
- KMLTourBuilder 33
- KMLViewSetter 33
- Labeller 33
- LabelPointReplacer 33
- MapboxStyler 36
- MapInfoStyler 36
- MapnikRasterizer 36
- MapTextLabeller 36

Snipper	Shortens the geometry of a line feature from the ends by snipping specified distances, indices, or measure values. It operates on features with simple line geometry and polygons without holes. <i>(Data Quality, Geometries categories)</i>
SNSSender	Using the Amazon Simple Notification Service (SNS), sends messages to an Amazon SNS topic. <i>(Integrations, Web categories)</i>
SolidBuilder	Constructs solids from surfaces and cuts hollow regions, or voids, in solid features with other solid features. A solid that is cut by another solid must contain that second solid. <i>(3D, Geometries categories)</i>
	
Sorter	Sorts features by an attribute's value. <i>(Workflows category)</i>
SpatialFilter	Filters point, line, area, and text features based on spatial relationships. Each input CANDIDATE feature is compared against all FILTER features, based on the given spatial tests to meet <i>(Data Quality, Filters and Joins, Spatial Analysis categories)</i>
	
SpatialRelator	Determines topological (spatial) relationships between sets of features. It tags – but does not otherwise change – features when they have certain relationships, such as touches, overlaps, intersects, and so forth. <i>(Data Quality, Filters and Joins, Spatial Analysis categories)</i>
SpikeRemover	Cleans up feature geometries by removing spikes in 2D. <i>(Data Quality, Geometries categories)</i>
	

SecondOrderConformer	Performs a second-order conformal transformation on the feature's geometry. Depending on the input geometry, a 2D or 3D transformation is performed. (3D, Coordinates categories)
SectorGenerator	Outputs circular sectors of influence for point features that have directions defined by azimuths (degrees clockwise from North). (Spatial Analysis category)
SharedItemAdder	Adds or replaces Appearances, Textures, Rasters, or Geometry Definitions in the internal FMELibrary. (3D category)
SharedItemIDExtractor	Extracts Shared Item IDs from the front and/or back side of geometries and adds them as traits or a list attribute. (3D category)
SharedItemIDSetter	Sets Shared Object IDs onto the front and/or back sides of geometries. (3D category)
SharedItemRetriever	Retrieves Appearances, Textures, Rasters, or Geometry Definitions from the internal FMELibrary. (3D category)
SherbendGeneralizer	Uses the Sherbend algorithm to simplify lines by reducing unnecessary details based on the analysis of the line's bends. The generalization process may eliminate, reduce, or combine bends, while resolving conflicts. In this example, three bends are combined into one: (Cartography and Reports, Geometries categories)
	
ShortestPathFinder	Computes the shortest path of a line or lines containing a source and destination node in a network based on the length of the input or the cost (specified in an attribute) of each of the edges. (Spatial Analysis category)
SlackConnector	Posts a message or uploads a file to the Slack group chat service. (Integrations, Web, Workflows categories)
Snapper	Brings lines, segments, end points or vertex points of features together if they are within a certain distance of each other and (optionally) if they have one or more attributes in common. (Data Quality, Geometries, Spatial Analysis categories)
	

MapTextStyle 36
 MSWordStyler 37
 NumericRasterizer 38
 PDFPageFormatter 39
 PDFStyler 39
 PowerPointStyler 42
 RasterHillshader 44
 SherbendGeneralizer 48
 TextAdder 53
 TextPropertySetter 53
 TextStroker 53
 WebMapTiler 55

Coordinates

2DForcer 13
 3DAffiner 13
 3DForcer 13
 Affiner 13
 ArcSDEGridSnapper 15
 AttributeReprojector 17
 BMGRReprojector 18
 CenterPointExtractor 20
 CommonLocalReprojector 21
 CoordinateConcatenator 22
 CoordinateExtractor 22
 CoordinateRounder 22
 CoordinateSwapper 22
 CoordinateSystemDescription Converter 22
 CoordinateSystemExtractor 22
 CoordinateSystemRemover 22
 CoordinateSystemSetter 22
 CsmatAttributeReprojector 22
 CsmatReprojector 23
 DecimalDegreesCalculator 24
 DimensionExtractor 24
 DMSCalculator 25
 ElevationExtractor 26
 EsriReprojector 26
 GridInquestIIReprojector 30
 GridInquestReprojector 30
 GtransAttributeReprojector 30
 GtransReprojector 30
 LatLongToMGRSConverter 33
 LocalCoordinateSystemSetter 35
 MGRSToLatLongConverter 36
 RasterGCPEXtractor 44
 RasterGCPSetter 44
 RasterGeoreferencer 44
 ReframeReprojector 46
 ReprojectAngleCalculator 47
 ReprojectLengthCalculator 47
 Reprojector 47
 RubberSheeter 47
 Scaler 47
 SecondOrderConformer 48
 TextureCoordinateSetter 53
 VertexCounter 55
 VertexRemover 55

Data Quality

AngularityCalculator 14
 AreaGapAndOverlapCleaner 16

AttributeValidator 18
 ChangeDetector 20
 CircularityCalculator 21
 ClosedCurveFilter 21
 CommonSegmentFinder 21
 ConvexityFilter 22
 CRCCalculator 22
 DimensionExtractor 24
 DuplicateFilter 25
 ElevationExtractor 26
 FeatureTypeFilter 27
 GeometryFilter 29
 GeometryValidator 29
 HoleCounter 30
 Inspector 31
 JSONValidator 32
 ListDuplicateRemover 35
 ListElementCounter 35
 ListHistogrammer 35
 Matcher 36
 MRF2DCleaner 37
 MRF2DConflator 37
 MRF2DDangleRemover 37
 MRF2DDuplicateRemover 37
 MRF2DExtender 37
 MRF2DGeneralizer 37
 MRF2DIntersector 37
 MRF2DJoiner 37
 MRF2DShortGeometryRemover 37
 MRF3DCleaner 37
 NullAttributeMapper 38
 PartCounter 39
 PlanarityFilter 39
 Sampler 47
 Snapper 48
 Snipper 49
 SpatialFilter 49
 SpatialRelator 49
 SpikeRemover 49
 SummaryReporter 51
 Tester 53
 TestFilter 53
 VertexCounter 55

Format Specific

ArcSDEGridSnapper 15
 AttributeFileReader 17
 AttributeFileWriter 17
 DatabaseDeleter 23
 DatabaseUpdater 23
 DGNStyler 24
 DWGStyler 25
 EsriReprojector 26
 ExcelStyler 26
 FeatureReader 27
 FeatureWriter 27
 GeometryExtractor 28
 GeometryReplacer 29
 GeorSSFeatureComposer 29
 GeorSSFeatureReader 30
 GMLFeatureComposer 30
 HTMLLayouter 30
 HTMLReportGenerator 30
 HTMLToXHTMLConverter 30
 IFCPropertySetDefinitionCreator 31
 IFCQuantitySetDefinitionCreator 31
 JSONExtractor 32
 JSONFlattener 32
 JSONFormatter 32
 JSONFragmenter 32
 JSONTemplater 32
 JSONUpdater 32
 JSONValidator 32
 KMLPropertySetter 32
 KMLRegionSetter 32
 KMLStyler 32
 KMLTimeSetter 32
 KMLTourBuilder 33
 KMLViewSetter 33
 MapboxStyler 36
 MapInfoStyler 36
 MapTextLabeller 36
 MapTextStyle 36
 PDFPageFormatter 39
 PDFStyler 39

Filters and Joins

AggregateFilter 14
 Aggregator 14
 AreaOnAreaOverlayer 16
 AttributeFilter 17
 AttributePivoter 17
 AttributeRangeFilter 17
 ChangeDetector 20
 ClosedCurveFilter 21
 ConvexityFilter 22
 DatabaseJoiner 23
 Deaggregator 23
 DuplicateFilter 25
 FeatureJoiner 26
 FeatureMerger 26
 FeatureReader 27
 FeatureTypeFilter 27
 GeometryFilter 29

RCaller 46
 WebMapTiler 55
 XMLAppender 56
 XMLFeatureMapper 56
 XMLFlattener 56
 XMLFormatter 56
 XMLFragmenter 56
 XMLNamespacedDeclarer 56
 XMLSampleGenerator 56
 XMLTemplater 56
 XMLUpdater 56
 XMLValidator 56
 XMLQueryExploder 56
 XMLQueryExtractor 56
 XMLQueryUpdater 56
 XSLTProcessor 56

Geometries

2DArcReplacer 13
 2DBoxReplacer 13
 2DEllipseReplacer 13
 2DForcer 13
 2DGridAccumulator 13
 2DGridCreator 13
 3DArcReplacer 13
 3DForcer 13
 3DInterpolator 13
 3DRotator 13
 AffineWarper 14
 AnchoredSnapper 14
 AngleConverter 14
 ArcEstimator 15
 ArcPropertySetter 15
 ArcSDEGridSnapper 15
 ArcStroker 15
 AreaAmalgamator 15
 AreaBuilder 15
 AreaGapAndOverlapCleaner 16
 BoundingBoxReplacer 19
 CenterLineReplacer 19
 CenterPointReplacer 20
 Chopper 21
 CoordinateRounder 22
 CoordinateSwapper 22
 CSGBuilder 22
 Curvefitter 23
 Curvefitter 23
 Curvefitter 23
 Densifier 24
 Displacer 24
 Dissolver 25
 DonutBridgeBuilder 25
 DonutBuilder 25
 DonutHoleExtractor 25
 EllipsePropertySetter 26
 FaceReplacer 26
 Generalizer 28
 GeometryCoercer 28
 GeometryExtractor 28
 GeometryRefiner 29
 GeometryRemover 29
 GeometryReplacer 29
 HullReplacer 31
 Intersector 32

LabelPointReplacer 33
 LineBuilder 34
 LineCloser 34
 LineCombiner 34
 LineExtender 34
 MeasureRemover 36
 MeasureSetter 36
 MeshMerger 36
 MeshSimplifier 36
 MinimumAreaForcer 37
 MinimumSpanningCircleReplacer 37
 MultipleGeometrySetter 37
 OffsetCurveGenerator 39
 Orientor 39
 PathBuilder 39
 PathSplitter 39
 PointCloudSurfaceBuilder 24
 PointPropertySetter 42
 Rotator 47
 RubberSheeter 47
 Scaler 47
 SherbendGeneralizer 48
 Snapper 48
 Snipper 49
 SolidBuilder 49
 SpikeRemover 49
 SurfaceDissolver 51
 SurfaceFootprintReplacer 52
 SurfaceSplitter 52
 TextAdder 53
 Tiler 53
 TINGenerator 54
 Triangulator 54
 VertexCreator 55
 VertexRemover 55

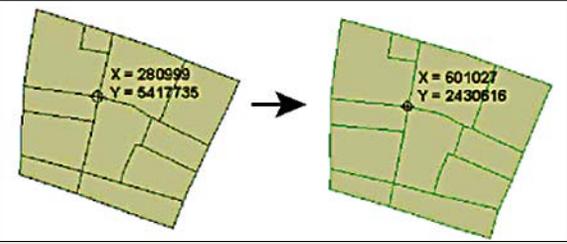
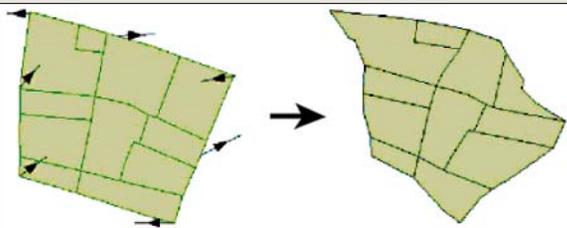
Integrations

AutodeskA360Connector 18
 AzureBlobStorageConnector 18
 BMGReprojector 18
 BoxConnector 19
 CsmapAttributeReprojector 22
 CsmapReprojector 23
 Curvefitter 23
 DatabaseDeleter 23
 DatabaseUpdater 23
 DirectTweeter 24
 Emailer 26
 EsriReprojector 26
 FMEServerJobSubmitter 27
 FMEServerJobWaiter 27
 FMEServerLogFileRetriever 27
 FMEServerNotifier 27
 FMEServerResourceConnector 27
 FTPCaller 27
 GCMMessenger 27
 Geocoder 28
 GoogleDriveConnector 30
 GridInquestIIReprojector 30
 GridInquestReprojector 30
 GtransAttributeReprojector 30
 GtransReprojector 30

HDFSConnector 30
 HTMLExtractor 30
 JMSReceiver 32
 JMSSender 32
 KinesisReceiver 32
 KinesisSender 32
 MRF2DCleaner 37
 MRF2DConflator 37
 MRF2DDangleRemover 37
 MRF2DDuplicateRemover 37
 MRF2DExtender 37
 MRF2DGeneralizer 37
 MRF2DIntersector 37
 MRF2DJoiner 37
 MRF2DShortGeometryRemover 37
 MRF3DCleaner 37
 OneDriveConnector 39
 ProjectWiseWSGConnector 42
 RCaller 46
 ReframeReprojector 46
 S3Connector 47
 SalesforceConnector 47
 SlackConnector 48
 SNSSender 49
 SQSDeleter 50
 SQSMessageCounter 50
 SQSReceiver 50
 SQSSender 50
 TCPIPReceiver 52
 TCPIPSender 52
 TransporterReceiver 54
 TransporterSender 54
 Tweeter 54
 TweetSearcher 54
 TweetStreamer 54
 TwitterStatusFetcher 54
 WhiteStarLeaseBuilder 56

Point Clouds

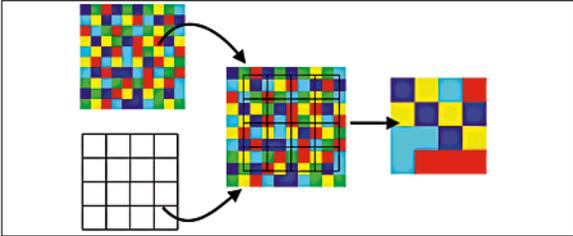
DEMGenerator 24
 GeometryCoercer 28
 PointCloudCoercer 40
 PointCloudCombiner 40
 PointCloudComponentAdder 40
 PointCloudComponentCopier 40
 PointCloudComponentKeeper 40
 PointCloudComponentRemover 40
 PointCloudComponentRenamer 40
 PointCloudComponentTypeCoercer 40
 PointCloudConsumer 40
 PointCloudCreator 40
 PointCloudExpressionEvaluator 40
 PointCloudExtractor 40
 PointCloudFilter 40
 PointCloudMerger 40
 PointCloudOnRasterComponent
 Setter 40
 PointCloudPropertyExtractor 40
 PointCloudReplacer 41
 PointCloudSimplifier 41
 PointCloudSorter 41
 PointCloudSplitter 41

ReprojectAngleCalculator	Converts a given angle from one coordinate system to another. The transformer calculates the reprojected angle of a line starting at the first coordinate in the feature, with the given length and angle. <i>(Calculated Values, Coordinates categories)</i>
ReprojectLengthCalculator	Converts a given distance from one coordinate system to another. The transformer calculates the reprojected length of a line starting at the first coordinate in the feature, with the given length and angle. <i>(Calculated Values, Coordinates categories)</i>
Reprojector	Reprojects feature coordinates from one coordinate system to another. <i>(Coordinates category)</i> 
Rotator	Rotates features in a counterclockwise direction about the specified point by the rotation angle (measured in degrees). <i>(Geometries category)</i>
RubberSheeter	Performs warping operations on the spatial coordinates of features. It is used to adjust a set of observed features so they more closely match a set of reference features. <i>(Coordinates, Geometries categories)</i> 

S

S3Connector 	Accesses the Amazon Simple Storage Service (S3) file storage service to upload, download, or delete files and folders or list file/folder information from an S3 account. <i>(Integrations, Web, Workflows, categories)</i>
SalesforceConnector	Retrieves data from the Salesforce customer relationship platform using Salesforce Object Query Language (SOQL) queries. <i>(Integrations, Web, Workflows categories)</i>
Sampler	Preserves either a total number of features or a sampling of features, depending on the Sampling Type selection. <i>(Data Quality, Filters and Joins, Workflows categories)</i>
Scaler	The Scaler scales objects to make them bigger or smaller. <i>(3D, Coordinates, Geometries categories)</i>
SchemaMapper	Converts the existing schema (data model) of features to a new structure, based on mappings defined in an external lookup table. <i>(Workflows category)</i>

R
S

RasterResampler	Resamples an input raster using the desired dimensions, the desired cell size in ground units, or a percentage of the size. (<i>Rasters category</i>) 
RasterRGBCreator	Creates a feature with a raster of the specified size with an RGB value and sends it into the workspace for processing. (<i>Rasters category</i>)
RasterRotationApplier	Applies the raster rotation angle on the input raster properties to the rest of the raster properties and data values. (<i>Rasters category</i>)
RasterSelector	Selects specific bands and palettes of a raster for subsequent transformer operations. (<i>Rasters category</i>)
RasterSingularCellValue Calculator	Performs an arithmetic operation on two operands: the cell values of a raster and a numeric value. (<i>Calculated Values, Rasters categories</i>)
RasterSlopeCalculator	Calculates the slope (maximum rate of change in z) for each cell of a raster. (<i>3D, Rasters categories</i>)
RasterStatisticsCalculator	Calculates statistics on raster bands and exposes them as attributes. Bands with palettes are valid. (<i>Calculated Values, Rasters categories</i>)
RasterSubsetter	Reduces a raster to a subset of its original size. This is essentially a clipping operation using pixel bounds instead of ground coordinates. (<i>Rasters category</i>)
RasterTiler	Splits each input raster into a series of tiles by specifying either a tile size or a number of tiles. (<i>Rasters category</i>) 
RasterToPolygonCoercer	Creates polygons from input raster features. One polygon is output for each contiguous area of pixels with the same value in the input raster. (<i>Rasters category</i>)
RCaller	Executes an R script that has the ability to access feature data from a temporary R data frame. Input data is set up in the form of tables that will become R data frames. R data frames are tables similar to those of a relational database that support columns of varying types. (<i>Format Specific, Integrations, Rasters categories</i>)
Recorder	Saves a copy of all features that enter to a disk file. (<i>Workflows category</i>)
ReframeReprojector	Reprojects feature coordinates from one coordinate system to another using the REFRAME library. (<i>Coordinates, Integrations categories</i>)

PointCloudStatisticsCalculator 41
 PointCloudSurfaceBuilder 41
 PointCloudThinner 41
 PointCloudTransformationApplier 41
 SurfaceDraper 52
 SurfaceModeller 52

Rasters

AppearanceExtractor 14
 AppearanceMerger 14
 AppearanceRemover 14
 AppearanceSetter 14
 AppearanceStyler 14
 ChartGenerator 20
 DEMDistanceCalculator 24
 ImageFetcher 31
 ImageRasterizer 31
 MapnikRasterizer 36
 NumericRasterizer 38
 PointCloudOnRasterComponent Setter 40
 PointOnRasterValueExtractor 41
 RasterAspectCalculator 42
 RasterBandAdder 42
 RasterBandCombiner 42
 RasterBandInterpretationCoercer 42
 RasterBandKeeper 42
 RasterBandMinMaxExtractor 42
 RasterBandNameSetter 42
 RasterBandNodataRemover 42
 RasterBandNodataSetter 42
 RasterBandOrderer 42
 RasterBandPropertyExtractor 42
 RasterBandRemover 43
 RasterBandSeparator 43
 RasterCellCoercer 43
 RasterCellOriginSetter 43
 RasterCellValueCalculator 43
 RasterCellValueReplacer 43
 RasterCellValueRounder 43
 RasterCheckpointner 43
 RasterConsumer 43
 RasterConvolver 43
 RasterDEMGenerator 44
 RasterExpressionEvaluator 44
 RasterExtentsCoercer 44
 RasterExtractor 44
 RasterGCPEXtractor 44
 RasterGCPSetter 44
 RasterGeoreferencer 44
 RasterHillshader 44
 RasterInterpretationCoercer 44
 RasterMosaicker 45
 RasterNumericCreator 45
 RasterObjectDetectionModelTrainer 45
 RasterObjectDetector 45
 RasterObjectDetectorSample Generator 45
 RasterObjectDetectorSample Preparer 45
 RasterPaletteAdder 45
 RasterPaletteExtractor 45

RasterPaletteGenerator 45
 RasterPaletteInterpretation Coercer 45
 RasterPaletteNodataSetter 45
 RasterPaletteRemover 45
 RasterPaletteResolver 45
 RasterPropertyExtractor 45
 RasterPyramider 45
 RasterReplacer 45
 RasterResampler 46
 RasterRGBCreator 46
 RasterRotationApplier 46
 RasterSelector 46
 RasterSingularCellValue Calculator 46
 RasterSlopeCalculator 46
 RasterStatisticsCalculator 46
 RasterSubsetter 46
 RasterTiler 46
 RasterToPolygonCoercer 46
 RCaller 46
 TextStroker 53
 VectorOnRasterOverlay 55
 WebMapTiler 55

Spatial Analysis

AffineWarper 14
 AnchoredSnapper 14
 ArcSDEGridSnapper 15
 AreaAmalgamator 15
 AreaBuilder 15
 AreaOnAreaOverlay 16
 BoundingBoxAccumulator 19
 Bufferer 19
 CenterLineReplacer 19
 CenterPointReplacer 20
 Clipper 21
 ContourGenerator 21
 DEMDistanceCalculator 24
 Displacer 24
 Dissolver 25
 DonutBridgeBuilder 25
 FeatureReader 27
 GeographicBufferer 28
 HullAccumulator 31
 Intersector 32
 NeighborFinder 38
 NeighborhoodAggregator 38
 NeighborPairFinder 38
 NetworkCostCalculator 38
 NetworkFlowOrientor 38
 NetworkTopologyCalculator 38
 Offsetter 39
 PointOnAreaOverlay 41
 PointOnLineOverlay 41
 PointOnPointOverlay 41
 PointOnRasterValueExtractor 41
 SectorGenerator 48
 ShortestPathFinder 48
 Snapper 48
 SpatialFilter 49
 SpatialRelator 49

SurfaceBuilder 51
 SurfaceDissolver 51
 SurfaceDraper 52
 SurfaceOnSurfaceOverlay 52
 TopferIndexCalculator 54
 TopologyBuilder 54
 VectorOnRasterOverlay 55
 VoronoiCellGenerator 55
 VoronoiDiagrammer 55

Strings

AngleConverter 14
 AttributeCompressor 16
 AttributeDecompressor 16
 AttributeEncoder 16
 AttributeExploder 17
 AttributePivoter 17
 AttributeRangeMapper 17
 AttributeReprojector 17
 AttributeRounder 17
 AttributeSplitter 18
 AttributeTrimmer 18
 AttributeValidator 18
 AttributeValueMapper 18
 BaseConverter 18
 BinaryDecoder 18
 BinaryEncoder 18
 CharacterCodeExtractor 20
 CharacterCodeReplacer 20
 CoordinateConcatenator 22
 CoordinateSystemDescription Converter 22
 DateTimeConverter 23
 DimensionExtractor 24
 ElevationExtractor 26
 ExpressionEvaluator 26
 FilenamePartExtractor 27
 HTMLExtractor 30
 HTMLToHTMLConverter 30
 ListDuplicateRemover 35
 ListRenamer 35
 ListSearcher 35
 ListSummer 35
 NLPClassifier 38
 NLPTrainer 38
 NullAttributeMapper 38
 RandomNumberGenerator 42
 StringCaseChanger 50
 StringConcatenator 50
 StringFormatter 51
 StringLengthCalculator 51
 StringPadder 51
 StringPairReplacer 51
 StringReplacer 51
 StringSearcher 51
 SubstringExtractor 51
 TextDecoder 53
 TextEncoder 53

Web

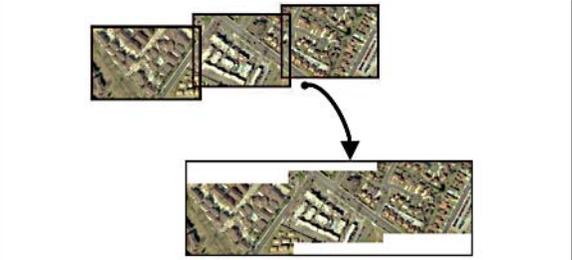
AttributeEncoder 16
 AutodeskA360Connector 18
 AzureBlobStorageConnector 18

BoxConnector 19
 CesiumIonConnector 20
 ChartGenerator 20
 Decelerator 24
 DirectTweeter 24
 DropboxConnector 25
 Emailer 26
 FMEServerJobSubmitter 27
 FMEServerJobWaiter 27
 FMEServerLogFileRetriever 27
 FMEServerNotifier 27
 FMEServerResourceConnector 27
 FTPCaller 27
 GCMMessenger 27
 Generalizer 28
 Geocoder 28
 GeoRSSFeatureComposer 29
 GeoRSSFeatureReader 30
 GoogleDriveConnector 30
 HDFSConnector 30
 HTMLExtractor 30
 HTMLLayouter 30
 HTMLReportGenerator 30
 HTMLToHTMLConverter 30
 HTTPCaller 30
 JMSReceiver 32
 JMSSender 32
 JSONExtractor 32
 JSONFlattener 32
 JSONFormatter 32
 JSONFragmenter 32
 JSONTemplater 32
 JSONUpdater 32
 JSONValidator 32
 OneDriveConnector 39
 ParameterFetcher 39
 ProjectWiseWSGConnector 42
 RasterPyramider 45
 S3Connector 47
 SalesforceConnector 47
 SlackConnector 48
 SNSSender 49
 SQSDeleter 50
 SQSMessageCounter 50
 SQSReceiver 50
 SQSSender 50
 TCPIPReceiver 52
 TCPIPSender 52
 Tweeter 54
 TweetSearcher 54
 TweetStreamer 54
 TwitterStatusFetcher 54
 WebMapTiler 55
 WebSocketReceiver 55
 WebSocketSender 55

XMLAppender 56
 XMLFeatureMapper 56
 XMLFlattener 56
 XMLFormatter 56
 XMLFragmenter 56
 XMLNamespaceDeclarer 56
 XMLSampleGenerator 56
 XMLTemplater 56
 XMLUpdater 56
 XMLValidator 56
 XMLQueryExploder 56
 XMLQueryExtractor 56
 XMLQueryUpdater 56
 XSLTProcessor 56

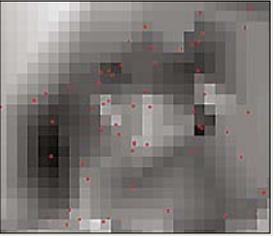
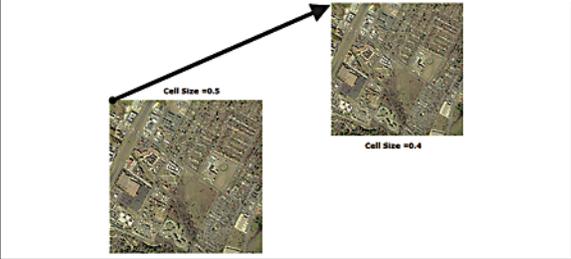
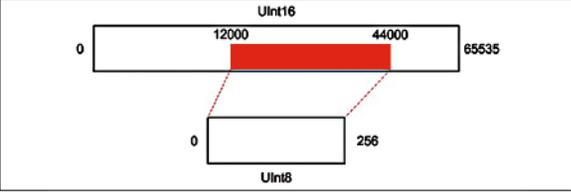
Workflows
 ArcSDEQuerier 15
 AttributeFileReader 17
 AttributeFileWriter 17
 AutodeskA360Connector 18
 AzureBlobStorageConnector 18
 BoxConnector 19
 Cloner 21
 Creator 22
 DatabaseDeleter 23
 DatabaseUpdater 23
 Decelerator 24
 DropboxConnector 25
 EnvironmentVariableFetcher 26
 FeatureHolder 26
 FeatureReader 27
 FeatureTypeExtractor 27
 FeatureWriter 27
 FMEFunctionCaller 27
 FMEServerJobSubmitter 27
 FMEServerJobWaiter 27
 FMEServerLogFileRetriever 27
 FMEServerNotifier 27
 FMEServerResourceConnector 27
 FTPCaller 27
 GeometryExtractor 28
 GeometryReplacer 29
 GoogleDriveConnector 30
 HDFSConnector 30
 HTMLExtractor 30
 HTTPCaller 30
 ImageFetcher 31
 InlineQuerier 31
 Inspector 31
 LicenseChecker 33
 Logger 36
 LogMessageStreamer 36
 OneDriveConnector 39
 ParameterFetcher 39
 Player 40
 ProjectWiseWSGConnector 42

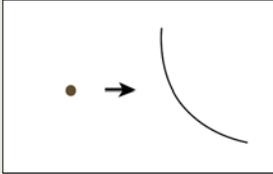
PythonCaller 42
 PythonCreator 42
 RasterCheckpointer 43
 Recorder 46
 S3Connector 47
 SalesforceConnector 47
 Sampler 47
 SchemaMapper 47
 SlackConnector 48
 Sorter 49
 SQLCreator 50
 SQLExecutor 50
 SummaryReporter 51
 SystemCaller 52
 TdCaller 52
 TCPIPReceiver 52
 TCPIPSender 52
 TempPathnameCreator 53
 Terminator 53
 TransporterReceiver 54
 TransporterSender 54
 VariableRetriever 55
 VariableSetter 55
 WebSocketReceiver 55
 WorkspaceRunner 56
 XSLTProcessor 56

RasterMosaicker	Mosaics multiple raster features into a single raster feature. (<i>Filters and Joins, Rasters categories</i>)
	
RasterNumericCreator	Creates a feature with a raster of the specified size with a numeric value and sends it into the workspace for processing. This transformer is useful for creating a very large image with a user-specified width and height. (<i>Rasters category</i>)
RasterObjectDetection ModelTrainer 	Trains a custom raster object detection model based on the positive and negative datasets. The resulting model file can be used to detect the desired object using RasterObjectDetector. (<i>Rasters category</i>)
RasterObjectDetector	Accepts a raster input and outputs rectangular geometries outlining the detected object(s). (<i>Rasters category</i>)
RasterObjectDetector SampleGenerator 	Accepts a single image to generate a large number of artificial samples that can be used to train a custom raster object detection model. (<i>Rasters category</i>)
RasterObjectDetector SamplePreparer 	Prepares manually collected samples to be used to train a custom raster object detection model. (<i>Rasters category</i>)
RasterPaletteAdder	Creates a palette from an attribute and adds this palette to all selected bands on a raster. (<i>Rasters category</i>)
RasterPaletteExtractor	Creates a string representation of an existing palette and saves it to an attribute. (<i>Rasters category</i>)
RasterPaletteGenerator	Generates a palette out of the selected band(s) of a raster. (<i>Rasters category</i>)
RasterPaletteInterpretation Coercer	Alters the underlying interpretation of the palettes of the raster geometry on the input features, using the specified conversion options. (<i>Rasters category</i>)
RasterPaletteNodataSetter	Identifies the nodata value on a raster feature at the palette level. (<i>Rasters category</i>)
RasterPaletteRemover	Removes the selected palette(s) of a raster. (<i>Rasters category</i>)
RasterPaletteResolver	Resolves the palettes of the selected bands of the input raster features by using the band cell values to look up the corresponding palette values, which then replace the original band cell values in the raster. (<i>Rasters category</i>)
RasterPropertyExtractor	Extracts the geometry properties of a raster feature and exposes them as attributes. (<i>Calculated Values, Rasters categories</i>)
RasterPyramider	Creates a series of pyramid levels for each input raster feature by specifying either the smallest pyramid level size or the number of pyramid levels to generate. (<i>Rasters, Web categories</i>)
RasterReplacer	Replaces the feature's geometry with the geometry held in the Raster Blob Attribute. The blob is decoded according to the selected raster format. (<i>Rasters category</i>)

Symbol Reference

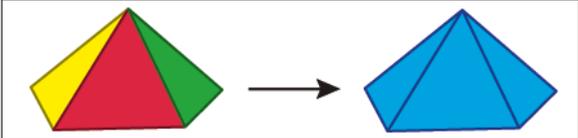
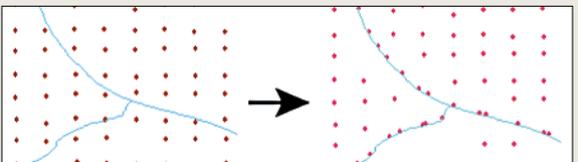
-  Transformers with this symbol are available at extra cost. Please contact Safe Software for more information.
-  Transformers with this symbol are downloadable from FME Hub.
-  Transformers with this symbol are new in this version of FME.

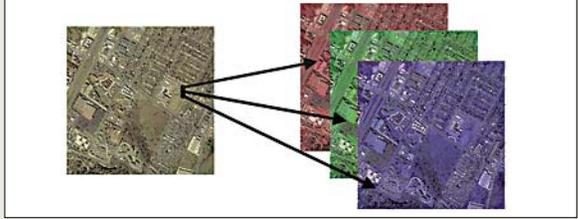
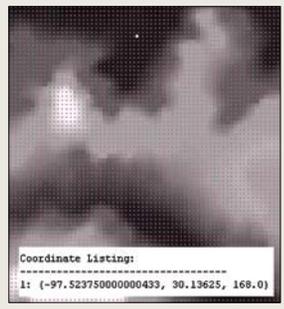
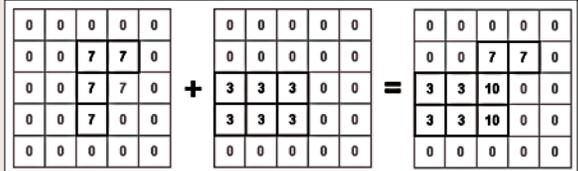
RasterDEMGenerator	Constructs a Delaunay triangulation based on input points and breaklines. That triangulation is then uniformly sampled to produce a raster digital elevation model (DEM raster). (3D, Rasters categories)	
RasterExpressionEvaluator	Evaluates expressions on each cell in a raster, such as algebraic operations or conditional statements. (Calculated Values, Rasters categories)	
RasterExtentsCoercer	Replaces the geometry of input raster features with a polygon that covers the extents of the raster. (Rasters category)	
RasterExtractor	Serializes the geometry of the feature into the Raster Blob Attribute based on the selected writer format. (Rasters category)	
RasterGCPExtractor	Extracts the coordinate system and the Ground Control Points (GCPs) from the raster feature and exposes them as attributes. (Coordinates, Rasters categories)	
RasterGCPSetter	Sets the GCP on a raster with the specified Column (pixel), Row (line), X Coordinate, Y Coordinate and Z Coordinate. (Coordinates, Rasters categories)	
RasterGeoreferencer	Georeferences a raster with the specified parameters. (Coordinates, Rasters categories)	
RasterHillshader	Generates a shaded relief effect, useful for visualizing terrain. (3D, Cartography and Reports, Rasters categories)	
RasterInterpretationCoercer	Alters the underlying interpretation of the bands of the raster geometry on the input features, using the specified conversion options. (Rasters category)	

2D		
2DArcReplacer	Replaces the geometry of the feature with a two-dimensional arc whose shape is set by the parameters, which can be either constant floating point values or the values of existing attributes. (Geometries category)	
2DBoxReplacer	Replaces the geometry of the feature with a two-dimensional box whose minimums and maximums are fixed values or are taken from attributes in the original feature. (Geometries category)	
2DEllipseReplacer	Replaces the feature's geometry with a two-dimensional ellipse whose shape is set by the parameters, values, or the values of existing attributes. (Geometries category)	
2DForcer	Removes any elevation (Z) coordinates which may (or may not) have been present on the original feature. (Coordinates, Geometries categories)	
2DGridAccumulator	Replaces the input features with a grid of two-dimensional point or polygon features that have the specified spacing and which cover (at least) the bounding box area of all features that enter the transformer. (Geometries category)	
2DGridCreator	Creates a grid of two-dimensional point or polygon features, at the origin and uses the offsets specified. Each created feature has a row and column attribute that indicates its position in the grid. (Geometries category)	

3D		
3DAffiner	Performs 3D affine transformation on the coordinates of the feature. An affine transformation preserves parallelism of lines and planes in geometry. Affine transformations include translations, rotations, scalings, and reflections. (3D, Coordinates categories)	
3DArcReplacer	Replaces the feature's geometry with a two-dimensional arc whose shape is set by the parameters, which can be either constant floating point values or the values of existing attributes. (3D, Geometries categories)	
3DForcer	Turns two-dimensional data into three-dimensional data by adding a z-value to every coordinate. (3D, Coordinates, Geometries categories)	
3DInterpolator	Interpolates elevation values along a non-aggregated linear feature from a starting value to an ending value. The resulting feature's elevation monotonically increases (or decreases) from the starting value to the ending value. If the feature was two-dimensional, it becomes three-dimensional. If the feature was three-dimensional, its previous elevations are removed and replaced. (3D, Geometries categories)	
3DRotator	Rotates features according to the right-hand rule, and in a counter-clockwise direction about the specified axis of rotation. (3D, Geometries categories)	

A		
Affiner	Performs an affine transformation on the coordinates of the feature. (Coordinates category)	

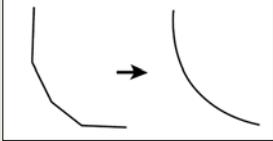
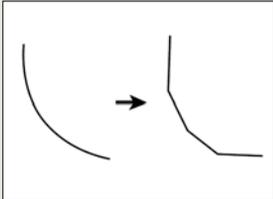
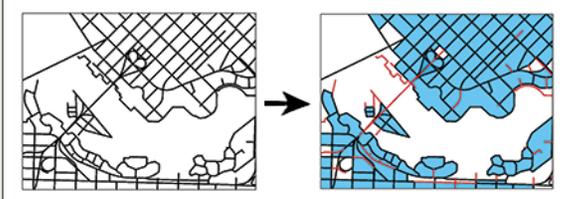
AffineWarper	Performs warping operations on the spatial coordinates of features. It is used to adjust a set of observed input features according to a spatial transform defined by a set of control vectors. <i>(Geometries, Spatial Analysis categories)</i>
AggregateFilter	Routes features differently depending on whether their geometry consists of an aggregate of several primitive geometries or a simple, single piece of geometry. <i>(Filters and Joins category)</i>
Aggregator	Combines feature geometries into heterogeneous or homogeneous aggregates. Alternatively, combines feature attributes without any geometry. <i>(Attributes, Calculated Values, Filters and Joins categories)</i> 
AnchoredSnapper	Takes a series of features that match the input specification and performs snapping on the features that lie within the specified tolerance from other features that match the input specification. <i>(Geometries, Spatial Analysis categories)</i> 
AngleConverter	Converts angles of a feature's geometry and/or attributes from one representation to another. <i>(Calculated Values, Geometries, Strings categories)</i>
AngularityCalculator	Calculates the "angularity" of a linear or area feature. Angularity indicates the degree of curvature of a feature. The higher the value, the more curved its geometry. <i>(Calculated Values, Data Quality categories)</i>
AppearanceExtractor	Extracts appearance style(s) from the front and/or back side of the geometries. <i>(3D, Rasters categories)</i>
AppearanceMerger	Sets the front and/or back appearance style(s) of specified geometries to be identical to that which is on a specific source geometry. <i>(3D, Rasters categories)</i>
AppearanceRemover	Removes appearances from the front and/or back side of geometries. Removing the appearance of a geometry causes that geometry to inherit its appearance from its parent, if a parent with an appearance exists. <i>(3D, Rasters categories)</i>
AppearanceSetter	Sets appearance style(s) onto the front and/or back sides of geometries. <i>(3D, Rasters categories)</i>
AppearanceStyler	Creates an appearance style that can later be applied to a surface (using the AppearanceSetter, for instance). <i>(3D, Rasters categories)</i>

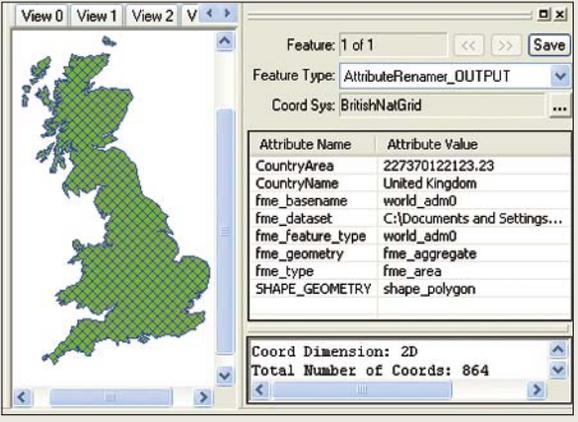
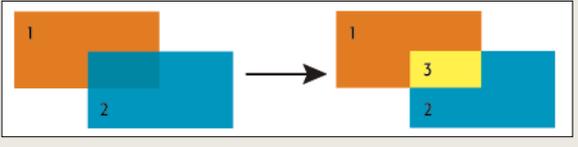
RasterBandRemover	Removes the selected band(s) of a raster. <i>(Rasters category)</i>
RasterBandSeparator	Separates the bands and palettes from each input raster feature into one or more output raster features based on the number of input bands and palettes. <i>(Rasters category)</i> 
RasterCellCoercer	Decomposes all input numeric raster features into individual points or polygons. One vector feature is output for each cell in the band. <i>(Rasters category)</i> 
RasterCellOriginSetter	Sets the raster's cell origin. <i>(Rasters category)</i>
RasterCellValueCalculator	Performs an arithmetical operation on a pair of rasters. The first selected band of raster A is combined with the first selected band of raster B, the second selected band of raster A is combined with the second selected band of raster B, and so on. <i>(Calculated Values, Rasters categories)</i> 
RasterCellValueReplacer	Replaces a range of values in the source raster with a new single value. <i>(Rasters category)</i>
RasterCellValueRounder	Rounds off raster cell values. <i>(Rasters category)</i>
RasterCheckpointter	Sets a checkpoint in the raster processing which forces previous processing to occur immediately. Once complete, it saves the current state to disk. <i>(Rasters, Workflows categories)</i>
RasterConsumer	Requests the tile(s) from the raster geometry but no actual operations are performed on the tile(s). <i>(Rasters category)</i>
RasterConvolver	Accepts input features containing a raster geometry and outputs the features after applying a convolution filter to all the bands. <i>(Rasters category)</i>

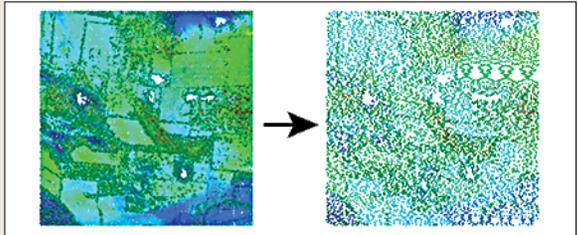
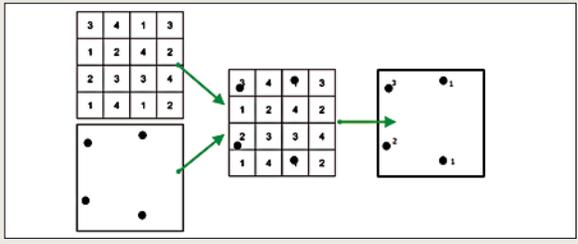
PointPropertySetter	Adds or removes point orientation. (<i>Geometries category</i>)
PowerPointStyler	Prepares features for output to the PowerPoint Writer by providing a convenient interface to set a variety of Microsoft PowerPoint format-specific attributes. (<i>Cartography and Reports category</i>)
ProjectWiseWSGConnector	Accesses ProjectWise through a Bentley Web Services Gateway (WSG) (<i>Integrations, Web, Workflows categories</i>)
PythonCaller	Executes a Python script to manipulate the feature. A Python script can perform specialized and complex operations on a feature's geometry, attributes, and coordinate system. (<i>Workflows category</i>)
PythonCreator	Creates features using the Python script supplied, and sends them into the workspace for processing. (<i>Workflows category</i>)

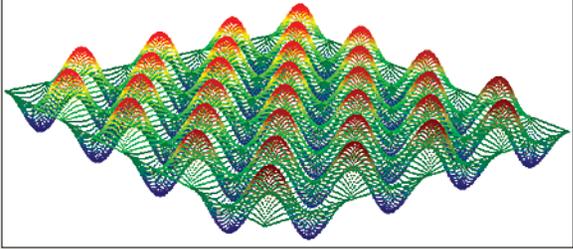
R

RandomNumberGenerator	Generates a uniformly distributed random number. The random number is x , where $\text{Minimum Value} \leq x \leq \text{Maximum Value}$. (<i>Calculated Values, Strings categories</i>)
RasterAspectCalculator	Calculates the aspect (direction of slope) for each cell of a raster. Aspect is measured in degrees from 0 to 360, starting clockwise from the north. (<i>Calculated Values, Rasters categories</i>)
RasterBandAdder	Adds a new band to a raster. The added band will have the same value in all cells, and the same raster-level properties as other bands in the raster (that is, number of rows/columns, cell spacing, cell origin, etc.). (<i>Rasters category</i>)
RasterBandCombiner	Merges multiple overlapping raster features into a single raster feature. (<i>Rasters category</i>)
RasterBandInterpretation Coercer	Alters the underlying interpretation of the selected bands of the raster geometry on the input features, using the specified conversion options. (<i>Rasters category</i>)
RasterBandKeeper	Removes all bands of a raster, except for those that are selected. The RasterSelector can be used to modify the selection. (<i>Rasters category</i>)
RasterBandMinMaxExtractor	Extracts the band minimum and maximum values, palette minimum and maximum keys, and palette minimum and maximum values of a raster feature, and exposes them as attributes. (<i>Calculated Values, Rasters category</i>)
RasterBandNameSetter	Sets the name of selected bands on a raster. (<i>Rasters category</i>)
RasterBandNodataRemover	Removes the existing nodata identifier from the selected bands of a raster feature. That is, any values that were previously equal to the nodata value will now be considered valid data. (<i>Rasters category</i>)
RasterBandNodataSetter	Identifies a value to act as a nodata identifier on a raster feature at the band level. That is, values equal to the specified value will now be considered invalid, and will not be affected by many operations (e.g. offsetting or scaling). (<i>Rasters category</i>)
RasterBandOrderer	Specifies the order of bands in a raster. Bands are reordered according to the input band indices. (<i>Rasters category</i>)
RasterBandPropertyExtractor	Extracts the band and palette properties of a raster feature and exposes them as attributes. (<i>Calculated Values, Rasters category</i>)

ArcEstimator	Replaces the geometry of the feature with a two-dimensional circular arc whose shape is estimated from the first, middle, and last point of the linear feature passed in. (<i>Geometries category</i>)	
ArcPropertyExtractor	Sets the given attributes to the properties of an arc geometry and works on a single feature at a time. (<i>Calculated Values category</i>)	
ArcPropertySetter	Sets the properties of an arc geometry to those specified. (<i>Geometries category</i>)	
ArcSDEGridSnapper	Simulates the ArcSDE conversion on a feature by performing ArcSDE translation, scaling, and coordinate snapping. Also removes duplicate vertices that result from snapping multiple, formerly separate, vertices to the same grid point. (<i>Coordinates, Format Specific, Geometries, Spatial Analysis categories</i>)	
ArcSDEQuerier	Performs queries on an ArcSDE™ spatial database. The queries can have both a spatial and a nonspatial component. (<i>Workflows category</i>)	
ArcStroker	Converts arc features into lines replacing the feature geometry with a series of edges interpolated along the arc boundary. Ellipse features are converted into polygons by interpolating edges along the elliptical boundary. (<i>Geometries category</i>)	
AreaAmalgamator	Generalizes polygonal input by connecting nearby geometries. The AreaAmalgamator accepts polygonal geometries – including donuts – as input, and produces triangles that join input features into connected pieces, or amalgams. (<i>Cartography and Reports, Geometries, Spatial Analysis categories</i>)	
AreaBuilder	Takes a set of topologically connected linework and creates topologically correct polygon features where the linework forms closed shapes. (<i>Geometries, Spatial Analysis categories</i>)	

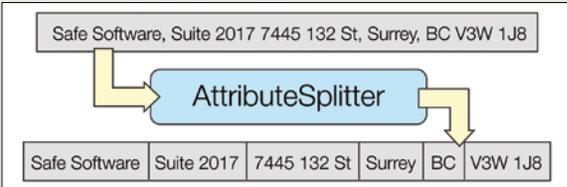
<p>AreaCalculator</p>	<p>Calculates the area of a polygonal object and stores the value in an attribute. The area is calculated in square map units, whatever they are. <i>(Calculated Values category)</i></p> 
<p>AreaGapAndOverlap Cleaner</p>	<p>Repairs area topologies by resolving gaps and overlaps between adjacent areas. An overlap occurs where two or more areas intersect each other, creating a region covered by multiple areas. A gap occurs where two or more areas fail to meet at a boundary. <i>(Data Quality, Geometries categories)</i></p>
<p>AreaOnAreaOverlayer</p>	<p>Performs an area-on-area overlay so that all input areas are intersected against each other and resultant area features are created and output. The resultant areas have all the attributes of all the original features in which they are contained. <i>(Filters and Joins, Spatial Analysis categories)</i></p> 
<p>AttributeCompressor</p>	<p>Compresses and (optionally) encrypts the values of the specified attributes. <i>(Attributes, Strings categories)</i></p>
<p>AttributeCopier</p>	<p>Copies existing attributes to new attributes with user-specified names. The existing attribute remains intact and a new attribute is created that has a different name, but the same values. <i>(Attributes category)</i></p>
<p>AttributeCreator</p>	<p>Adds one or more attributes to the feature and optionally assigns a value derived from constants, attribute values, and expressions. Values can reference adjacent features. <i>(Attributes category)</i></p>
<p>AttributeDecompressor</p>	<p>Decompresses and decrypts the values of the specified attributes that were compressed and encrypted by the AttributeCompressor. <i>(Attributes, Strings categories)</i></p>
<p>AttributeDereferencer</p>	<p>Copies the value of the attribute whose name is held in the source attribute to a newly created attribute. <i>(Attributes category)</i></p>
<p>AttributeEncoder</p>	<p>Encodes the values of the specified attributes to the desired encoding. <i>(Strings, Web categories)</i></p>

<p>PointCloudReplacer</p>	<p>Replaces the geometry of the feature with the geometry held in the Blob Attribute. The blob is decoded according to the selected point cloud format. <i>(Point Clouds category)</i></p>
<p>PointCloudSimplifier</p>	<p>Outputs point cloud features that have fewer points than the original input features while maintaining the original shape. <i>(Point Clouds category)</i></p>
<p>PointCloudSorter</p>	<p>Sorts a point cloud by the values of components. <i>(Point Clouds category)</i></p>
<p>PointCloudSplitter</p>	<p>Splits a single point cloud feature into multiple point cloud features, each having a homogeneous value for the point component that governs the split. <i>(Point Clouds category)</i></p>
<p>PointCloudStatistics Calculator</p>	<p>Calculates statistics on point cloud components and exposes them as attributes. <i>(Calculated Values, Point Clouds categories)</i></p>
<p>PointCloudSurfaceBuilder</p>	<p>Takes an input point cloud and reconstructs it into an output mesh. <i>(3D, Geometries, Point Clouds categories)</i></p>
<p>PointCloudThinner</p>	<p>Outputs point-cloud features that have fewer points than the original input features. <i>(Point Clouds category)</i></p> 
<p>PointCloudTransformation Applier</p>	<p>Applies transformations on a point cloud. <i>(Point Clouds category)</i></p>
<p>PointOnAreaOverlayer</p>	<p>Performs an overlay of points on areas. <i>(Filters and Joins, Spatial Analysis categories)</i></p>
<p>PointOnLineOverlayer</p>	<p>Performs an overlay of points on lines. Each input line is split at its closest place to any point within the specified point tolerance. <i>(Filters and Joins, Spatial Analysis categories)</i></p>
<p>PointOnPointOverlayer</p>	<p>Performs an overlay of points on points. <i>(Filters and Joins, Spatial Analysis categories)</i></p>
<p>PointOnRasterValueExtractor</p>	<p>Extracts the band and palette values from a raster at the location of each input point and sets them as attributes on the feature. <i>(Rasters, Spatial Analysis categories)</i></p> 
<p>PointPropertyExtractor</p>	<p>Extracts point orientation to feature attributes. <i>(Calculated Values category)</i></p>

Player	Retrieves features stored in an FME Feature Store file and outputs them into the workspace. (<i>Workflows category</i>)
PointCloudCoercer	Coerces point cloud geometries into points or multipoints. This transformer can be used to write a point cloud to a format that does not support point clouds. (<i>Point Clouds category</i>)
PointCloudCombiner	Combines multiple geometries into a single point cloud. (<i>Point Clouds category</i>)
PointCloudComponent Adder	Adds new components with constant values to a point cloud. (<i>Point Clouds category</i>)
PointCloudComponent Copier	Copies an existing component to a new component with the specified name. The existing component remains and a new component is created that has a different name, but the same values. (<i>Point Clouds category</i>)
PointCloudComponent Keeper	Removes all components from a point cloud, except for the specified ones. (<i>Point Clouds category</i>)
PointCloudComponent Remover	Removes specified components from a point cloud. (<i>Point Clouds category</i>)
PointCloudComponent Renamer	Renames an existing component. (<i>Point Clouds category</i>)
PointCloudComponent TypeCoercer	Converts the type of point cloud components. (<i>Point Clouds category</i>)
PointCloudConsumer	Requests the point(s) from the point cloud geometry but no actual operations are performed on the point(s). (<i>Point Clouds category</i>)
PointCloudCreator	Creates a new point-cloud feature with the specified size and components and sends it into the workspace for processing. (<i>Point Clouds category</i>)
	
PointCloudExpression Evaluator	Evaluates expressions, such as algebraic operations or conditional statements, to set point cloud component values. (<i>Calculated Values, Point Clouds categories</i>)
PointCloudExtractor	Serializes the geometry of the feature into the Blob Attribute based on the selected writer format. (<i>Point Clouds category</i>)
PointCloudFilter	Filters a point-cloud feature into one or more parts based on evaluating expressions. (<i>Filters and Joins, Point Clouds categories</i>)
PointCloudMerger	Merges component values from one point cloud to another. (<i>Filters and Joins, Point Clouds categories</i>)
PointCloudOnRaster ComponentSetter	Sets point cloud component values by overlaying a point cloud on a raster. (<i>Point Clouds, Rasters categories</i>)
PointCloudPropertyExtractor	Extracts the properties of a point-cloud feature and exposes them as attributes. (<i>Calculated Values, Point Clouds categories</i>)

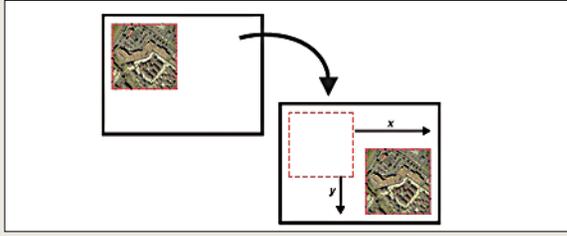
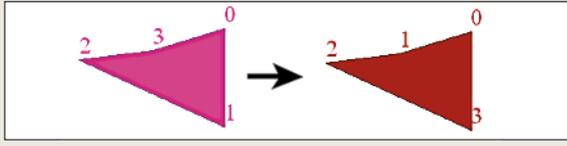
AttributeExploder	Creates a new pair of attributes (attribute name/attribute value) from each attribute on the input feature and either outputs these on a new feature or adds them as a list element to the original feature. In both cases, it is possible to either conserve or delete the original attributes and geometry. (<i>Attributes, Strings categories</i>)
AttributeExposer	Exposes attributes in Workbench so they can be used by downstream transformers and writers. (<i>Attributes category</i>)
AttributeFileReader	Reads the contents of a file and stores them as the value for the specified attribute. (<i>Attributes, Format Specific, Workflows categories</i>)
AttributeFileWriter	Writes the contents of the specified attribute to a file. (<i>Attributes, Format Specific, Workflows categories</i>)
AttributeFilter	Routes features to different output ports depending on the value of an attribute. (<i>Filters and Joins category</i>)
AttributeKeeper	Removes all attributes and list attributes, except the specific ones you specify to be retained. (<i>Attributes category</i>)
AttributeManager	Alters multiple attributes through adding, renaming, copying, deleting and re-ordering. Sets values for new, existing, and modified attributes to any combination of constants, attribute values, conditionals, expressions, and parameters. Values can reference adjacent features. (<i>Attributes category</i>)
AttributePivoter	Restructures and regroups incoming features based on specified "Group by attributes" and calculates summary statistics based on a designated "Attribute To Analyze" in order to form a Pivot table output. (<i>Calculated Values, Filters and Joins, Strings categories</i>)
AttributeRangeFilter	Performs a lookup on a range-based lookup table and routes the feature to the appropriate output port. (<i>Filters and Joins category</i>)
AttributeRangeMapper	Performs a lookup on a range-based lookup table and stores the resulting value, or writes the value to, a new output attribute. (<i>Strings category</i>)
AttributeRemover	Removes the selected attributes and list attributes from the feature. (<i>Attributes category</i>)
AttributeRenamer	Renames one or more attributes, retaining the attribute's current values. (<i>Attributes category</i>)
AttributeReprojector	Reprojects attributes from one coordinate system to another. (<i>Coordinates, Strings categories</i>)
AttributeRounder	Rounds off an attribute to the specified number of decimal places. (<i>Calculated Values, Strings categories</i>)
	<div style="border: 1px solid black; padding: 5px; display: inline-block;">143.178435 → 143.18</div>

A
B

AttributeSplitter	<p>Splits a selected attribute into a list attribute. Each item in the list will contain a single token split from the list. You would use this transformer, for example, to separate an attribute that has a comma-separated value list into its component pieces. (<i>Attributes, Strings categories</i>)</p> 
AttributeTrimmer	<p>Removes leading and trailing trim characters from the selected attributes. (<i>Strings category</i>)</p>
AttributeValidator	<p>Validates any number of attributes against specific test conditions and routes the feature according to the outcome of the test(s). Features that fail one or more tests will have the reasons for failure documented on an attribute and list attribute on the output feature. (<i>Data Quality, Strings categories</i>)</p>
AttributeValueMapper	<p>Looks up and assigns attribute values based on other attributes, and stores the looked-up value in a new attribute. (<i>Strings category</i>)</p> 
AutodeskA360Connector	<p>Accesses the Autodesk A360 file storage service to upload or download files or list file and folder information from a Autodesk A360 account. (<i>Integrations, Web, Workflows categories</i>)</p>
AzureBlobStorage Connector	<p>Accesses the Azure Blob Storage file storage service to upload, download, or delete files and folders or list file/folder information from an Azure account. (<i>Integrations, Web, Workflows categories</i>)</p>

B

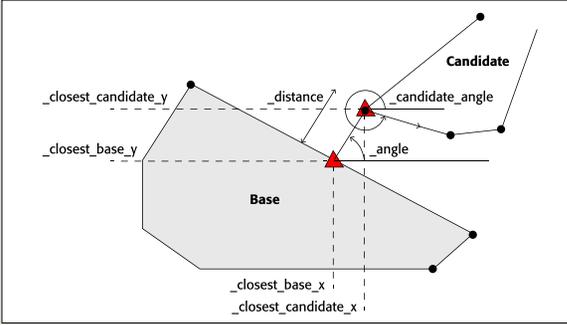
BaseConverter	<p>Converts an attribute's value from one numeric system (base) to another, putting the resulting value in a new attribute. (<i>Calculated Values, Strings categories</i>)</p> 
BinaryDecoder	<p>Decodes Base64 or HEX text to binary data. (<i>Strings category</i>)</p>
BinaryEncoder	<p>Encodes binary data to text using Base64 or HEX encoding methods. (<i>Strings category</i>)</p>
BMGReprojector	<p>Reprojects feature coordinates from one coordinate system to another using the Blue Marble Geographic Calculator library. (<i>Coordinates, Integrations categories</i>)</p>

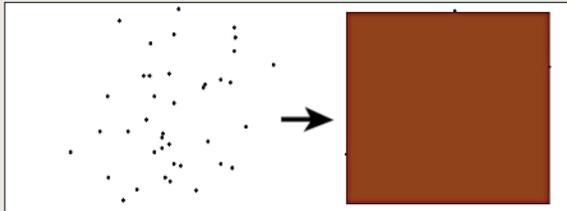
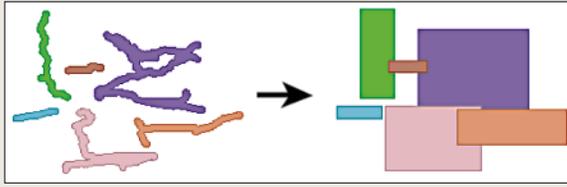
OffsetCurveGenerator	<p>Offsets the segments of linear features, and if necessary, connects them using stroked arcs. (<i>Geometries category</i>)</p>
Offsetter	<p>Adds offsets to the feature's coordinates so that the feature shifts by the specified amount. (<i>3D, Spatial Analysis categories</i>)</p> 
OneDriveConnector	<p>Accesses the Microsoft OneDrive file storage service to upload, download, or delete files and folders or list the contents of a folder from a Microsoft OneDrive account. (<i>Integrations, Web, Workflows categories</i>)</p>
OrientationExtractor	<p>Returns a feature's orientation. This will have different possible return value, based on the input geometry type. (<i>Calculated Values category</i>)</p>
Orienter	<p>Adjusts the orientation of a polygonal feature or the direction of a linear feature. (<i>Geometries category</i>)</p> 

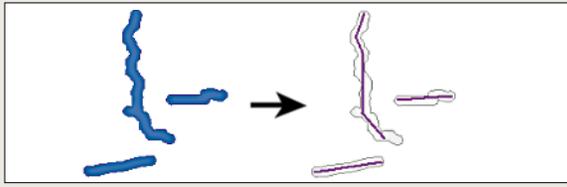
P

ParameterFetcher	<p>Adds an attribute to the feature and supplies it with the value of a previously published parameter. (<i>Web, Workflows categories</i>)</p>
PartCounter	<p>Returns the number of parts in the geometry. For multis and aggregates, this is the number of parts, and for paths, this is the number of segments. (<i>Calculated Values, Data Quality categories</i>)</p>
PathBuilder	<p>Connects input linear features (arcs and lines) in the order they enter, forming path features. (<i>Geometries category</i>)</p>
PathSplitter	<p>Decomposes a path feature into its component segments. Each output feature contains a copy of the source feature's attributes. (<i>Geometries category</i>)</p>
PDFPageFormatter	<p>Prepares features for output to PDF by providing a convenient interface to set the scale and location of features on a page. (<i>Cartography and Reports, Format Specific categories</i>)</p>
PDFStyler	<p>Sets the common Adobe® PDF style attributes for a group of features destined for the GeoSpatial PDF Writer. (<i>Cartography and Reports, Format Specific categories</i>)</p>
PlanarityFilter	<p>Filters features based on their planarity. To be planar, a geometry must have all of its points situated in the same plane. (<i>3D, Data Quality, Filters and Joins categories</i>)</p>

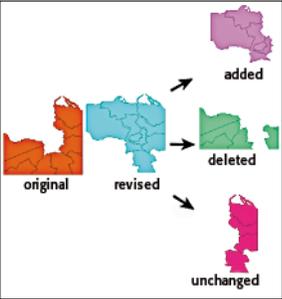
O
P

N	
NeighborFinder	<p>Finds the closest CANDIDATE feature within a specified maximum distance of each BASE feature. <i>(Spatial Analysis category)</i></p> 
NeighborhoodAggregator	<p>Creates aggregates of features based on their proximity to each other. <i>(Filters and Joins, Spatial Analysis categories)</i></p> 
NeighborPairFinder	<p>Finds the closest two CANDIDATE features within some maximum distance of each BASE feature and some minimum separation in heading between the CANDIDATES and the BASE. <i>(Spatial Analysis category)</i></p>
NetworkCostCalculator	<p>Computes and assigns the cost of the shortest path from a source object to each connected object as the Z-values or measure values of the input features. <i>(Calculated Values, Spatial Analysis categories)</i></p>
NetworkFlowOrientor	<p>Fixes the flow (direction) of each edge or linear feature in the network to fit the downstream direction to the destination node. <i>(Spatial Analysis category)</i></p>
NetworkTopologyCalculator	<p>Finds the connected lines that belong to the same network graph. <i>(Calculated Values, Spatial Analysis categories)</i></p>
NEW NLPClassifier ⬇	<p>Classifies natural language text into different categories using a trained model. <i>(Filters and Joins, Strings categories)</i></p>
NEW NLPTrainer ⬇	<p>Trains a natural language processing (NLP) classification model based on the user's specifications and the provided data. <i>(Filters and Joins, Strings categories)</i></p>
NullAttributeMapper	<p>Maps specified attributes on a feature to specified values. This transformer is capable of mapping to and from null values, empty strings, and missing attributes. <i>(Attributes, Data Quality, Strings categories)</i></p>
NumericRasterizer	<p>Draws input point, line, and polygon features onto a numeric raster filled with the background value. The z coordinates of the input vector features are used to generate pixel values. <i>(Cartography and Reports, Rasters categories)</i></p>

BoundingBoxAccumulator	<p>Takes a set of point, linear, polygonal, and/or aggregate features and creates a two-dimensional bounding box, which contains all features. <i>(Spatial Analysis category)</i></p> 
BoundingBoxReplacer	<p>Replaces the geometry of the feature with either its two-dimensional bounding box or its two-dimensional minimum oriented bounding box. <i>(Geometries category)</i></p> 
BoundsExtractor	<p>Extracts the minimum and maximum values of the feature's coordinates into new attributes. <i>(Calculated Values category)</i></p>
BoxConnector	<p>Accesses the Box file storage service to upload, download, or delete files and folders or list file/folder information from a Box account. <i>(Integrations, Web, Workflows categories)</i></p>
Bufferer	<p>Creates a buffer zone of specified size around or inside input geometry. <i>(3D, Spatial Analysis categories)</i></p>
BulkAttributeRemover	<p>Removes all attributes on incoming features that match a given regular expression. It can also be used to remove large numbers of attributes that have common naming. <i>(Attributes category)</i></p>
BulkAttributeRenamer	<p>Renames attributes by adding or removing prefixes or suffixes, or replacing text in regular expressions or character strings. <i>(Attributes category)</i></p>

C	
CenterLineReplacer	<p>Replaces area geometries with their approximate center lines, medial axes, or straight skeletons. This transformer works best with long, narrow areas. <i>(Geometries, Spatial Analysis categories)</i></p> 

B
C

CenterPointExtractor	Extracts and outputs the specified x, y, z attributes of a feature's point that is either in the center of the feature's bounding box, somewhere inside the feature's bounding box or at the center of mass of the feature. <i>(Calculated Values, Coordinates categories)</i>
CenterPointReplacer	Replaces the geometry of the feature with a point that is either in the center of the feature's bounding box, somewhere inside the feature's bounding box or replaces the geometry of the feature with a point at the center of mass of the feature. <i>(Geometries, Spatial Analysis categories)</i>
	
NEW CesiumIonConnector 	Uploads a folder dataset to the Cesium ion service as a new asset. <i>(Web category)</i>
ChangeDetector	Detects changes between two sets of input features. <i>(Data Quality, Filters and Joins categories)</i>
	
CharacterCodeExtractor	Extracts the integral character code of the first character in the source string attribute, and adds its integer value in the character set to the feature as another attribute. This can be used to obtain the integer code of any Unicode character (from Basic Multilingual Plane), including non-printable ones. <i>(Strings category)</i>
CharacterCodeReplacer	Sets the result attribute to the character whose numeric code was contained in the source code attribute (or the entered integer). <i>(Strings category)</i>
ChartGenerator	Creates a raster Line, Bar, Scatter, Histogram or Pie chart based on the values of selected attributes. <i>(Cartography and Reports, Rasters, Web categories)</i>

MinimumAreaForcer	Ensures that features with polygon geometry have an area that is equal to, or in excess of, the specified minimum area. <i>(Geometries category)</i>
MinimumSpanningCircle Replacer	Replaces the geometry of the feature with a polygon representing its minimum spanning circle. The minimum spanning circle is defined as the smallest circle that encloses all vertices of the passed-in feature. <i>(Geometries category)</i>
ModuloCounter	Adds an attribute holding the next integer in a sequence, restarting the count at 0 whenever the sequence reaches the specified maximum value. <i>(Calculated Values category)</i>
MRF2DCleaner 	Fixes geometric problems in input data, such as line overshoots and undershoots within the user-specified tolerance. It is useful for multi-layer and multi-tolerance two-dimensional data cleaning. <i>(Data Quality, Integrations categories)</i>
MRF2DConflator 	Changes the geometry of a feature to match that of another, if the two have approximately the same shape and location, and have matching endpoints. <i>(Data Quality, Integrations categories)</i>
MRF2DDangleRemover 	Removes features that have at least one free endpoint and have lengths smaller than (Dangle Factor * Cleaning Tolerance) or (Dangle Factor * value of Feature Tolerance Attribute). <i>(Data Quality, Integrations categories)</i>
MRF2DDuplicateRemover 	Deletes duplicated features. Features are considered to be duplicates if their geometries are within tolerance and only features with a smaller tolerance will remain after cleaning. <i>(Data Quality, Integrations categories)</i>
MRF2DExtender 	Extends arcs and lines that are within the specified tolerance to correct undershoots while maintaining line-work direction. <i>(Data Quality, Integrations categories)</i>
MRF2DGeneralizer 	Removes a number of vertices from lines. The number of vertices removed is controlled by a weeding tolerance. <i>(Data Quality, Integrations categories)</i>
MRF2DIntersector 	Computes intersections between all input features, breaking arcs and lines wherever an intersection occurs. <i>(Data Quality, Integrations categories)</i>
MRF2DJoiner 	Joins connected features to form longer ones. A pair of linear features become candidates for joining only when the two are connected at a given node or end point. <i>(Data Quality, Integrations categories)</i>
MRF2DShortGeometry Remover 	Removes features that have lengths smaller than the specified tolerance, if Short Geometry Action is set to Remove. <i>(Data Quality, Integrations categories)</i>
MRF3DCleaner 	Fixes geometric problems in input data such as line overshoots and undershoots within the user-specified tolerance. It is useful for multi-layer and multi-tolerance three-dimensional data cleaning. <i>(3D, Data Quality, Integrations categories)</i>
MSWordStyler	Prepares features for output to Microsoft Word Writer by providing a convenient interface to set a variety of MSWord format-specific attributes. <i>(Cartography and Reports category)</i>
MultipleGeometryFilter	Filters aggregate features based on the type of aggregate. <i>(Filters and Joins category)</i>
MultipleGeometrySetter	Provides the ability to set up an aggregate where each part is independent from the others and is its own complete geometry. <i>(Geometries category)</i>

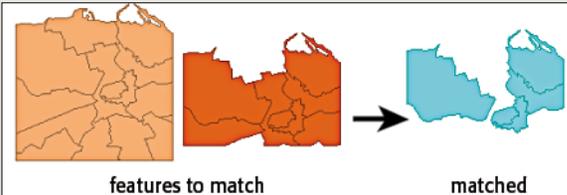
Logger	Logs each feature to the translation log. All attributes and geometry of the feature will be output. (<i>Workflows category</i>)
LogMessageStreamer	Captures messages from the FME logfile and/or the Logger transformer. The messages are loaded onto features created by the transformer. Limitations: Messages outside the lifetime of the transformer cannot be captured. (<i>Workflows category</i>)

M

MapboxStyler	Creates a common style for a group of features destined for the GeoJSON writer. (<i>Cartography and Reports, Format Specific categories</i>)
MapInfoStyler	Prepares features for output to Mapinfo® MIF/MID or MapInfo TAB by providing a convenient interface to set a variety of format-specific attributes. (<i>Cartography and Reports, Format Specific categories</i>)
MapnikRasterizer	Draws input point, line, polygon, and raster features onto a raster using the Mapnik toolkit. (<i>Cartography and Reports, Rasters categories</i>)
MapTextLabeller 	Creates text labels for features using the MapText Label Manager. (<i>Cartography and Reports, Format Specific categories</i>)
MapTextStyler	Prepares features for labelling by the MapTextLabeller by specifying no-label zones around features. (<i>Cartography and Reports, Format Specific categories</i>)

Matcher

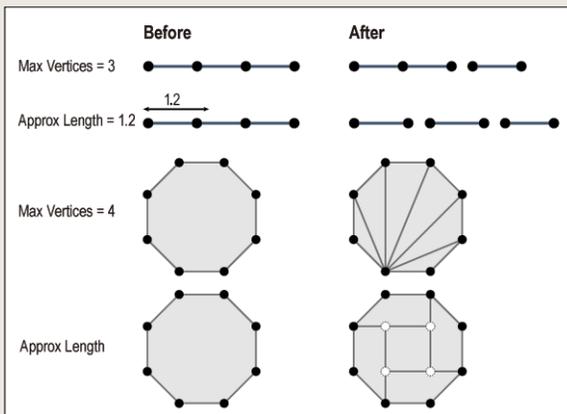
Detects features that are matches of each other. Features are declared to match when they have matching geometry, matching attribute values, or both. (*Data Quality category*)



MeasureExtractor	Extracts the measures of geometries that match the given type, and places them in attributes or list attributes. (<i>Calculated Values category</i>)
MeasureGenerator	Creates a set of measures attached to the geometry of the feature, where each value is the distance from the start of the line to that vertex, multiplied by the given Multiplier. (<i>Calculated Values category</i>)
MeasureRemover	Removes measures from a feature's geometry. (<i>Geometries category</i>)
MeasureSetter	Sets measure(s) on a point, line, arc, area geometry or a vertex of a linear geometry to attribute value(s) of given attribute(s) or list attribute. (<i>Geometries category</i>)
MeshMerger	Merges mesh features (features with IFMEMesh geometries) into a single output mesh. (<i>3D, Geometries categories</i>)
MeshSimplifier	Simplifies mesh features (features with IFMEMesh geometries) to a reduced level of detail. The amount of simplification can be specified as a ratio or as a limit on the number of vertices. (<i>3D, Geometries categories</i>)
MGRSToLatLongConverter	Converts Military Grid Reference System (MGRS) code to longitude and latitude coordinates. (<i>Coordinates category</i>)

Chopper

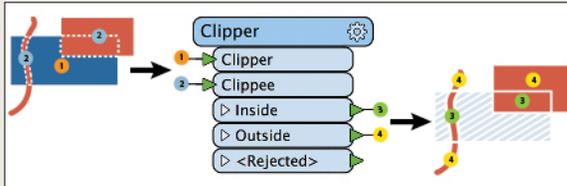
Breaks input features into points, lines, or areas. Chopped features contain the same set of vertices as input features. (*Geometries category*)



CircularityCalculator	Calculates the circularity of an area feature, which indicates how elongated the feature is. (<i>Calculated Values, Data Quality categories</i>)
------------------------------	--

Clipper

Performs a geometric clipping operation. (*Spatial Analysis category*)



Cloner	Makes the specified number of copies of the input features and outputs all copies through its single output port. (<i>Workflows category</i>)
---------------	---

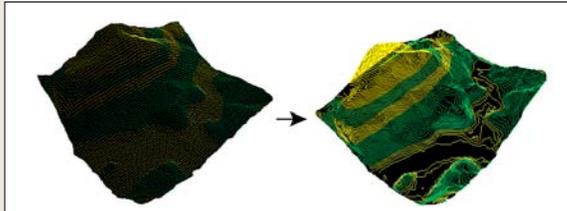
ClosedCurveFilter	Checks if curves form closed loops. Curves include lines, arcs, and paths. This transformer can also check aggregates of curves. An aggregate is closed if all of its elements are closed. If any element of an aggregate is not a curve, the aggregate is rejected. (<i>Data Quality, Filters and Joins categories</i>)
--------------------------	--

CommonLocalReprojector	Reprojects a set of features to a local coordinate system with units of meters centered on the bounding box of the features. (<i>Cartography and Reports, Coordinates categories</i>)
-------------------------------	---

CommonSegmentFinder	Tests to see which of the CANDIDATE features have even one line segment in common with any BASE feature. (<i>Data Quality category</i>)
----------------------------	---

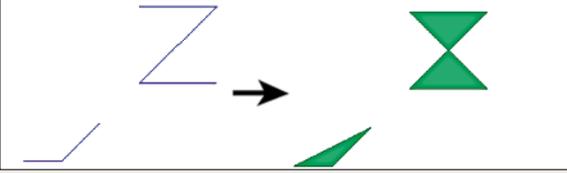
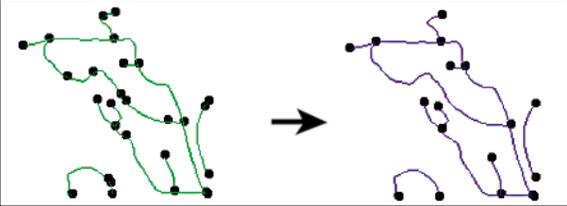
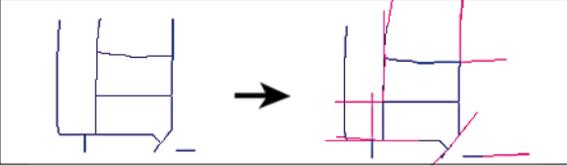
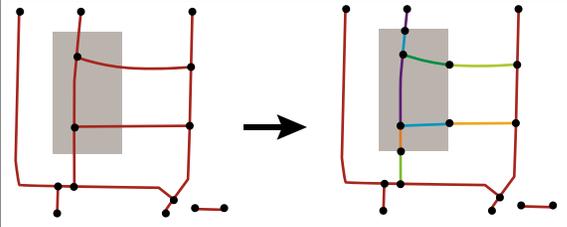
ContourGenerator

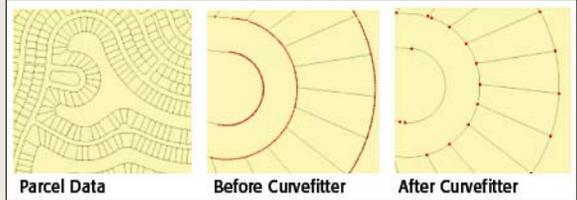
Constructs a Delaunay triangulation based on input points and breaklines. Contour lines are then generated from the triangulation. (*Spatial Analysis category*)

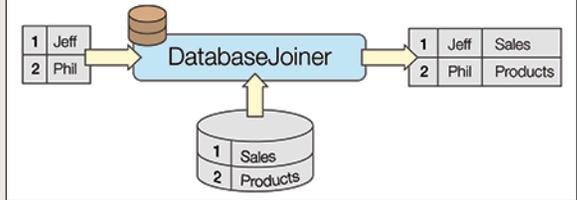
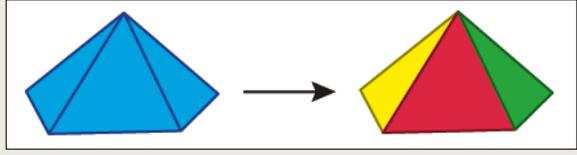


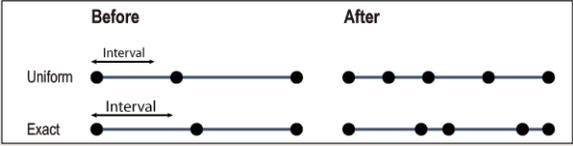
ConvexityFilter	Determines whether areas, surfaces, and solids are convex or concave. A polygon is simple when it is not self-intersecting and has a non-zero area. Simple polygons are convex if every internal angle is less than or equal to 180 degrees. All other polygons are considered concave. <i>(Data Quality, Filters and Joins categories)</i>
CoordinateConcatenator	Retrieves the value of all of the feature's coordinates into an attribute, separated by the delimiter characters. <i>(Calculated Values, Coordinates, Strings categories)</i>
CoordinateExtractor	Retrieves the value of the x, y, and z coordinates at the specified index into attributes. <i>(Calculated Values, Coordinates categories)</i>
CoordinateRounder	Rounds off the feature's coordinates to the specified number of decimal places. Any consecutive points that become duplicates as a result of the rounding are thinned by removing the redundant points. <i>(Coordinates, Geometries categories)</i>
CoordinateSwapper	Swaps coordinate axes of the input features. <i>(Coordinates, Geometries categories)</i>
CoordinateSystemDescription Converter	Converts coordinate systems between FME and Autodesk® WKT, EPSG, Esri® WKT, MapInfo®, OGC® WKT, Oracle® SRID, and PROJ.4 representations. <i>(Coordinates, Strings categories)</i>
CoordinateSystemExtractor	Retrieves the feature's coordinate system into an attribute. <i>(Coordinates category)</i>
CoordinateSystemRemover	Removes the coordinate system from all input features. This transformer does not reproject features or otherwise modify their geometry. <i>(Coordinates category)</i>
CoordinateSystemSetter	Tags all features with the specified coordinate system. It does not reproject features or otherwise modify their geometry. <i>(Coordinates category)</i>
Counter	Adds a numeric attribute to a feature and assigns a value. <i>(Calculated Values category)</i>
CRC Calculator	Calculates a CRC (Cyclic Redundancy Check) value for a feature and places the calculated CRC value into the attribute specified. <i>(Calculated Values, Data Quality categories)</i>
Creator	Creates features using the parameters supplied and sends them into the workspace for processing. <i>(3D, Workflows categories)</i>
CSG Builder	Creates Constructive Solid Geometry (CSG) from pairs of solid geometry features which are input through the A and B ports. <i>(3D, Geometries categories)</i>
CSG Evaluator	Recursively replaces the geometry of a feature that has CSG (Constructive Solid Geometry) by evaluating the tree of the CSG solid, effectively removing the constructive aspect of the geometry. <i>(3D category)</i>
CsmatAttributeReprojector	Reprojects attributes from one coordinate system to another using the CS-MAP library. <i>(Coordinates, Integrations categories)</i>

LineOnLineOverlayer	Performs a line-on-line overlay in which all input lines are intersected against each other and resultant line features are created and output. <i>(Filters and Joins category)</i>
ListBasedFeatureMerger	Copies and merges the attributes/geometry from one feature (or multiple features) onto another feature (or multiple features). <i>(Filters and Joins category)</i>
ListBuilder	Combines attributes of the input features into a single list structure. <i>(Attributes category)</i>
ListConcatenator	Concatenates all values of a list into a single attribute. <i>(Attributes category)</i>
ListCopier	Copies a complete attribute list, including all nested attributes, from one list name to another. <i>(Attributes category)</i>
ListDuplicateRemover	Removes all duplicate values from a list attribute. In the resulting list, only distinct values for the list attribute will be present. <i>(Data Quality, Strings categories)</i>
ListElementCounter	Stores the number of member elements found in the specified list into an attribute. <i>(Data Quality category)</i>
ListExploder	Explodes each list member on each input feature out into its own feature. <i>(Attributes category)</i>
ListExpressionPopulator	Populates a new list from a series of attributes, specified using a regular expression. <i>(Attributes category)</i>
ListHistogrammer	Computes a histogram of the values found in a list and returns these in a new list attribute on the feature. <i>(Calculated Values, Data Quality categories)</i>
ListIndexer	Copies the attributes of the list element specified by the index to become main attributes of the feature. <i>(Attributes category)</i>
ListPopulator	Populates a new list from a series of attributes. The attributes to be used are specified by the prefix parameter. <i>(Attributes category)</i>
	<p>Example:</p> <pre>myattrib0 myattrib1 myattrib2</pre> <p>becomes a list <code>myattrib{}</code> containing entries <code>myattrib{0}</code>, <code>myattrib{1}</code>, <code>myattrib{2}</code></p>
ListRangeExtractor	Extracts the minimum and maximum values found in a list. <i>(Calculated Values category)</i>
ListRenamer	Renames or promotes list names or components. <i>(Attributes category)</i>
ListSearcher	Searches a list to find a value and returns the index of the value in the list. <i>(Strings category)</i>
ListSorter	Sorts the elements of the given list into a new list. <i>(Attributes category)</i>
ListSummer	Computes the sum of all elements of a list. <i>(Strings category)</i>
LocalCoordinateSystemSetter	Tags all features with the local coordinate system defined by the specified parameters. It does not reproject features, or otherwise modify their geometry. <i>(Coordinates category)</i>

LineBuilder	<p>Connects input point features in the order they enter, forming linear or polygonal features. <i>(Geometries category)</i></p> 
LineCloser	<p>Turns input linear features into areas by adding their start point as the end point. <i>(Geometries category)</i></p> 
LineCombiner	<p>Takes lines and connects them to form longer lines. Each connecting line must meet at the exact same start/end point, but otherwise they must not intersect. <i>(Geometries category)</i></p> 
LineExtender	<p>Creates two-point extensions to linear features that extend the feature by a user-specified length. This transformer can also output the original feature with the first and last segments stretched by a user-specified amount. <i>(Geometries category)</i></p> 
LineOnAreaOverlayer	<p>Performs a line-on-area overlay. Each input line is split at any area boundaries it intersects. <i>(Filters and Joins category)</i></p> 

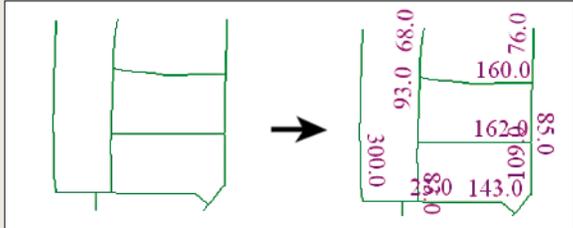
CsmapReprojector	<p>Reprojects feature coordinates from one coordinate system to another using the CS-MAP library. <i>(Coordinates, Integrations categories)</i></p>
Curvefitter	<p>Smooths lines derived from line segments, points, or raster data, and replaces a series of line segments with the optimal combination of straight lines and embedded arc segments required to create smooth curving lines. This process provides a truer representation of real-world features and can reduce file sizes by up to 80%. In addition to processing simple line features, the Curvefitter preserves feature topology when smoothing boundaries of adjacent area features. <i>(Cartography and Reports, Geometries, Integrations categories)</i></p> 

D	
DatabaseDeleter	<p>Delete rows in a database table based on the condition specified. <i>(Format Specific, Integrations, Workflows categories)</i></p>
DatabaseJoiner	<p>Joins attributes from an external table to incoming features as they are being processed through a translation. <i>(Attributes, Filters and Joins categories)</i></p> 
DatabaseUpdater	<p>Update fields in a database table based on the condition specified. <i>(Format Specific, Integrations, Workflows categories)</i></p>
DateTimeCalculator	<p>Performs arithmetic on date, time, datetime, and interval values. <i>(Calculated Values category)</i></p>
DateTimeConverter	<p>Converts a set of input date/time attributes from one format to another, in place. <i>(Calculated Values, Strings categories)</i></p>
DateTimeStamper	<p>Adds a timestamp to a feature as a new attribute in the form of a date, time (with or without UTC offset), or datetime (with or without UTC offset), in local or UTC time. <i>(Calculated Values category)</i></p>
Deaggregator	<p>Decomposes an aggregate feature into its components. <i>(Attributes, Filters and Joins categories)</i></p> 

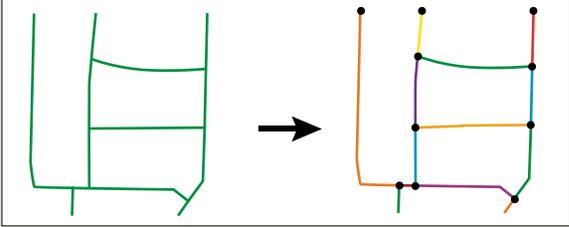
Decelerator	Slows down the flow of features through the workspace. (<i>Web, Workflows categories</i>)
DecimalDegreesCalculator	Calculates a decimal degree value from separate degrees, minutes, and seconds (DMS) values, stored in attributes. (<i>Calculated Values, Coordinates categories</i>)
DEMDistanceCalculator	Calculates the distance between a number of input vector lines and the elevation values of a reference DEM raster. Outputs a new DEM raster per input line. The data contained in the resulting DEM consists of the 3D distance between the line being considered and the corresponding point on the reference DEM. (<i>3D, Calculated Values, Rasters, Spatial Analysis categories</i>)
DEMGenerator	Constructs a Delaunay triangulation based on input points and breaklines. That triangulation is then uniformly sampled to produce a digital elevation model (DEM points). (<i>3D, Point Clouds categories</i>)
Densifier	Adds vertices to each feature by interpolating new coordinates at fixed intervals. (<i>Geometries category</i>) 
DensityCalculator	Determines the density of a group of CANDIDATE features based on the area of a corresponding AREA feature. (<i>Calculated Values category</i>)
DGNStyler	Prepares features for output to Bentley® Microstation® Design V7/V8 by providing a convenient interface to set a variety of format-specific attributes. (<i>Cartography and Reports, Format Specific categories</i>)
DimensionExtractor	Returns the dimension of the feature as a new attribute. (<i>3D, Calculated Values, Coordinates, Data Quality, Strings categories</i>)
DirectTweeter	Sends a Twitter™ direct message from FME. (<i>Integrations, Web categories</i>)
Displacer	Solves proximity conflicts between features using a variant of the Nickerson displacement algorithm. (<i>Cartography and Reports, Geometries, Spatial Analysis categories</i>)

KMLTourBuilder	Generates a KML Tour from the input features. The tour consists of tour stops that correspond to each input feature. (<i>Cartography and Reports, Format Specific categories</i>)
KMLViewSetter	Sets the view-related KML attributes for a group of features that are destined for the OGCKML Writer. Creation of LookAt or Camera views are supported. (<i>Cartography and Reports, Format Specific categories</i>)

L

Labeller	Interpolates labels along a linear or polygonal feature. (<i>Cartography and Reports category</i>) 
LabelPointReplacer	Replaces the geometry of the feature with a label point. The insertion point of the text is guaranteed to be inside (in case of polygons) or on (lines and points) the original object. Note that since the text itself may be larger than an input area feature, the bounds of the label may exceed the bounds of the area. (<i>Cartography and Reports, Geometries categories</i>) 
LatLongToMGRSConverter	Calculates a Military Grid Reference System (MGRS) code based on the latitude and longitude values supplied in a feature's attributes. (<i>Coordinates category</i>)
LeftRightSpatialCalculator	Computes relative position of CANDIDATE input features relative to BASE input features. The geometry of a BASE feature is restricted to lines. (<i>Calculated Values category</i>)
LengthCalculator	Calculates the length of a feature and adds it as a new attribute. (<i>Calculated Values category</i>)
LengthToPointCalculator	Calculates the length of a feature from its start until the closest spot to a point and adds it as a new attribute. The point coordinates are taken from attributes in the original feature. (<i>Calculated Values category</i>)
LicenseChecker	Checks whether the license file is valid and the specified product name is licensed, based on a vendor key and vendor registration code. (<i>Workflows category</i>)

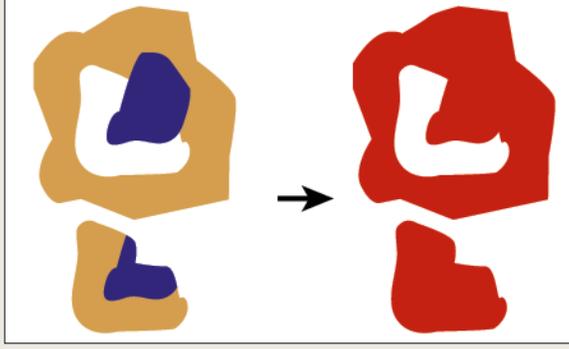
Intersector	Computes intersections between all input features, and breaks lines and polygons wherever an intersection occurs. (<i>Geometries, Spatial Analysis categories</i>)
--------------------	---



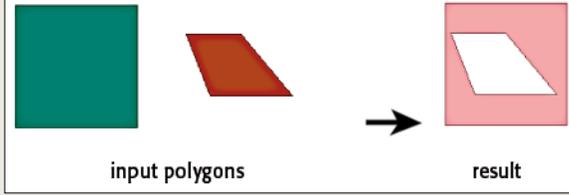
J	
JMSReceiver	Using the Java Message System (JMS), receives messages from a message broker. (<i>Integrations, Web categories</i>)
JMSSender	Using the Java Message System (JMS), sends messages to a message broker. (<i>Integrations, Web categories</i>)
JSONExtractor	Extracts portions of JSON (JavaScript Object Notation) formatted text into feature attributes. (<i>Format Specific, Web categories</i>)
JSONFlattener	Flattens JSON objects, extracting the object keys and values into FME feature attributes. (<i>Format Specific, Web categories</i>)
JSONFormatter	Provides options for formatting JSON text. (<i>Format Specific, Web categories</i>)
JSONFragmenter	Extracts portions of JSON formatted text into new FME features. (<i>Format Specific, Web categories</i>)
JSONTemplater	Populates a JSON document with FME feature attribute values. (<i>Format Specific, Web categories</i>)
JSONUpdater	This transformer creates, modifies, replaces or deletes object and array values in a JSON document. (<i>Format Specific, Web categories</i>)
JSONValidator	Validates the syntax of JSON text. (<i>Data Quality, Format Specific, Web categories</i>)

K	
KinesisReceiver	Using the Amazon Kinesis service, receives data records from an Amazon Kinesis stream. (<i>Integrations category</i>)
KinesisSender	Using the Amazon Kinesis service, sends data records to an Amazon Kinesis stream. (<i>Integrations category</i>)
KMLPropertySetter	Sets common properties for groups of vector and raster features destined for the OGCKML Writer. (<i>Cartography and Reports, Format Specific categories</i>)
KMLRegionSetter	Sets the region-related KML attributes for a group of features destined for the OGCKML Writer. (<i>Cartography and Reports, Format Specific categories</i>)
KMLStyler	Creates a common style for a group of features destined for the OGCKML writer. (<i>Cartography and Reports, Format Specific categories</i>)
KMLTimeSetter	Sets the time-related KML attributes for a group of features destined for the OGCKML Writer. (<i>Cartography and Reports, Format Specific categories</i>)

Dissolver	Dissolves area features by removing common boundaries to create larger areas. Input attributes may be accumulated. (<i>Geometries, Spatial Analysis categories</i>)
------------------	--

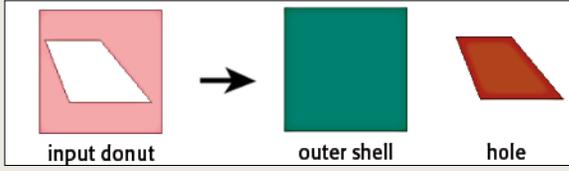


DMSCalculator	Calculates degrees, minutes, and seconds (DMS) from a decimal degrees value stored in an attribute. (<i>Calculated Values, Coordinates categories</i>)
DonutBridgeBuilder	Builds connections between donut holes with the outer boundary of a donut, resulting in a polygon-equivalent representation of the input donut. (<i>Geometries, Spatial Analysis categories</i>)
DonutBuilder	Cuts holes in polygonal features by making polygons completely enclosed in other polygons into holes of the containing polygon. (<i>Geometries category</i>)



input polygons **result**

DonutHoleExtractor	Splits an area feature that has holes into its component rings. (<i>Geometries category</i>)
---------------------------	--



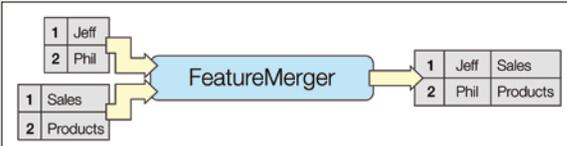
input donut **outer shell** **hole**

DropboxConnector	Accesses the Dropbox file storage service to upload, download, or delete files and folders or list the contents of a folder from a Dropbox account. (<i>Integrations, Web, Workflows categories</i>)
DuplicateFilter	Detects duplicate features based on the value of one or more key attributes. (<i>Data Quality, Filters and Joins categories</i>)
DWGStyler	Prepares features for output to AutoCAD® DWG™/DXF™ by providing a convenient interface to set a variety of AutoCAD DWG/DXF format-specific attributes. (<i>Cartography and Reports, Format Specific categories</i>)

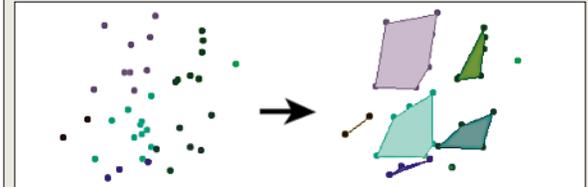
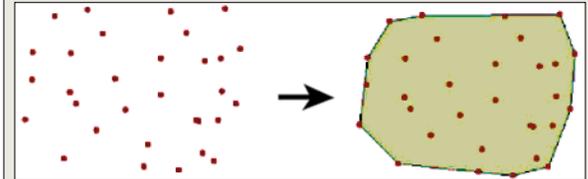
E	
ElevationExtractor	Extracts the elevation of the first coordinate and assigns it to the named attribute. (3D, Calculated Values, Coordinates, Data Quality, Strings categories)
EllipsePropertyExtractor	Sets the given attributes to the properties of an ellipse geometry. (Calculated Values category)
EllipsePropertySetter	Sets the properties of an ellipse geometry. (Geometries category)
Emailer	Sends one email per input feature via Simple Mail Transfer Protocol (SMTP). Both HTML and Plain Text emails may be sent, each with one or more attachments. (Integrations, Web categories)
EnvironmentVariableFetcher	Fetches the specified environment variable and includes it in a new attribute. (Workflows category)
EsriReprojector	Reprojects feature coordinates from one coordinate system to another using the Esri reprojection library. (Coordinates, Format Specific, Integrations categories)
ExcelStyler	Sets common Excel style attributes for a group of features destined for the Excel Writer. (Cartography and Reports, Format Specific categories)
ExpressionEvaluator	Performs a mathematical calculation on an expression that consists of FME Feature Functions, String Functions, Math Functions, and Math Operators. (Calculated Values, Strings categories)
Extruder	Creates line, surface or solid geometries with a fixed cross-sectional profile taken from the original geometry of the feature. (3D category)



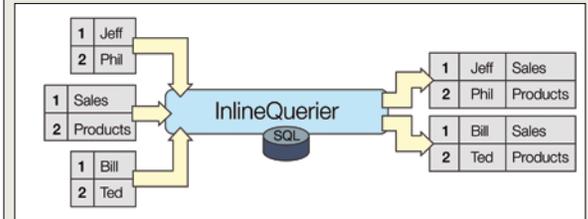
F	
FaceReplacer	Replaces the geometry of a feature from donut, raster or polygon to face. (3D, Geometries categories)
FeatureColorSetter	Assigns colors to incoming features. (Cartography and Reports category)
FeatureHolder	Stores incoming features until they have all arrived and then releases them in their original order. (Workflows category)
FeatureJoiner	Joins features by combining the attributes/geometry of features based on common attribute values, like a SQL join operation. (Filters and Joins category)
FeatureMerger	Copies and merges the attributes/geometry from one feature (or multiple features) onto another feature (or multiple features). (Filters and Joins category)



HullAccumulator	Creates convex or concave hulls for groups of features. One hull feature is output for each unique combination of values of the attributes specified in the Group By parameter. (Spatial Analysis category)
HullReplacer	Replaces the geometry of the feature with a polygon representing its hull. (Geometries category)

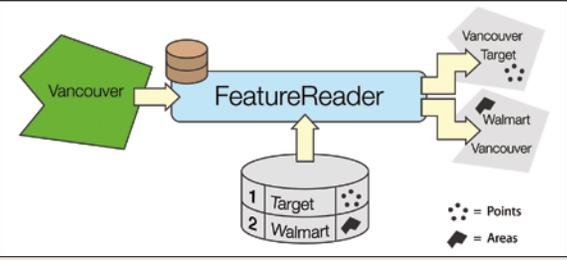


I	
IFCPropertySetDefinition Creator	Creates a feature whose attributes contain the definition of an IFC property set. The features output from this transformer are similar to the PropertySetDefinition features produced by the IFC reader. (3D, Format Specific categories)
IFCQuantitySetDefinition Creator	Creates a feature whose attributes contain the definition of an IFC quantity set. The features output from this transformer are similar to the QuantitySetDefinition features produced by the IFC reader. (3D, Format Specific categories)
ImageFetcher	Fetches an image by performing an HTTP GET operation on the specified URL, and then returning the resulting data as the geometry of a raster feature. (Rasters, Workflows categories)
ImageRasterizer	Draws input point, line, and polygon features onto a color raster filled with the background color. (Cartography and Reports, Rasters categories)
InlineQuerier	Executes SQL queries against a temporary database consisting of tables created from incoming features, returning the results as new features. (Workflows category)
Inspector	Sends features to the FME Data Inspector for display. (Data Quality, Workflows categories)

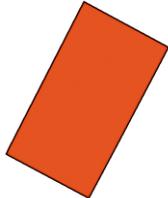


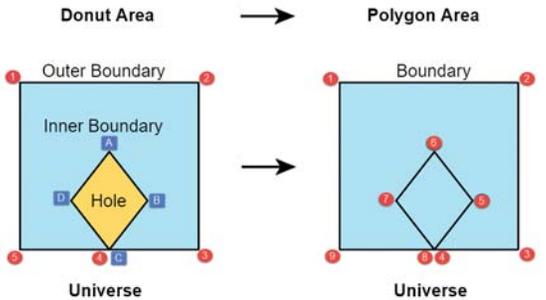
GeoRSSFeatureReader	Constructs features out of GeoRSS documents/URLs that are stored in a specified attribute of the input features. The features from the GeoRSS document/URL are output with the attributes from the original feature and are merged, if desired. <i>(Format Specific, Web categories)</i>
GMLFeatureComposer	Writes out GML features corresponding to feature types from existing GML application schema. <i>(Format Specific category)</i>
GOIDGenerator	Calculates a GOID (Geographic Object Identifier) for each incoming feature, and adds it as a new attribute. The GOID is a unique 128-bit number that incorporates the position of a feature with other numbers. The result is a unique value that may be used to distinguish features from each other. <i>(Calculated Values category)</i>
GoogleDriveConnector	Accesses the Google Drive file storage service to upload, download, or delete files and folders or list the contents of a folder from a Google Drive account. <i>(Integrations, Web, Workflows categories)</i>
GridInquestIIReprojector	Reprojects feature coordinates from one coordinate system to another using the Grid InQuestII reprojection library. <i>(Coordinates, Integrations categories)</i>
GridInquestReprojector	Reprojects feature coordinates from one coordinate system to another using the Grid InQuest reprojection library. <i>(Coordinates, Integrations categories)</i>
GtransAttributeReprojector	Reprojects attributes holding coordinate values from one coordinate system to another using the Gtrans reprojection library (from the National Land Survey of Sweden), and the specified translation file. <i>(Coordinates, Integrations categories)</i>
GtransReprojector	Reprojects features from one coordinate system to another using the Gtrans reprojection library (from the National Land Survey of Sweden) and the specified translation file. <i>(Coordinates, Integrations categories)</i>

H	
HDFSConnector	Accesses a HDFS (Hadoop Distributed File System) to upload, download, or delete files and folders or list the contents of a folder from a HDFS service. <i>(Integrations, Web, Workflows categories)</i>
HoleCounter	Adds a new attribute whose value is the number of holes in the feature. <i>(Calculated Values, Data Quality categories)</i>
HTMLExtractor	Extracts structured data from web page or other HTML sources that are formatted for human readability (screen scraping), using CSS selectors to extract portions of HTML content into feature attributes. <i>(Integrations, Strings, Web, Workflows categories)</i>
HTMLLayouter	Allows users to combine web reports generated by the HTMLReportGenerator into a bootstrap grid or vertical layout. <i>(Format Specific, Web categories)</i>
HTMLReportGenerator	Allows users to create a basic web report of vertically-stacked elements using the geometry and selected attributes from features. <i>(Format Specific, Web categories)</i>
HTMLToXHTMLConverter	Converts HTML document into valid XHTML document. <i>(Format Specific, Strings, Web categories)</i>
HTTPCaller	Accesses a URL via HTTP or HTTPS, performing a GET, PUT, POST, DELETE, HEAD, PATCH or OPTIONS operation. <i>(Web, Workflows categories)</i>

FeatureReader	Reads features from any FME-supported format. <i>(Filters and Joins, Format Specific, Spatial Analysis, Workflows categories)</i>
	 <p>The diagram illustrates the FeatureReader workflow. On the left, a green arrow labeled 'Vancouver' points to a blue cylinder representing a database. An arrow points from this database to a blue box labeled 'FeatureReader'. Below the FeatureReader box is another database cylinder with two entries: '1 Target' and '2 Walmart'. An arrow points from the FeatureReader box to the right, where it branches into two paths. The top path leads to a grey box labeled 'Vancouver Target' containing a cluster of dots representing points. The bottom path leads to a grey box labeled 'Walmart Vancouver' containing a black arrow representing an area. A legend at the bottom right indicates that dots represent 'Points' and a black arrow represents 'Areas'.</p>
FeatureTypeExtractor	Adds an attribute containing the original feature type of a feature. <i>(Workflows category)</i>
FeatureTypeFilter	Routes input features to different output ports based on their original feature type. <i>(Data Quality, Filters and Joins categories)</i>
FeatureWriter	Writes features to any FME-supported Writer. <i>(Format Specific, Workflows categories)</i>
FilenamePartExtractor	Extracts specified parts of a filename path and returns the results as string attributes. <i>(Strings category)</i>
FMEFunctionCaller	Calls the specified FME function, optionally putting the resulting value in the Result Attribute. <i>(Workflows category)</i>
FMEServerJobSubmitter	Submits FME jobs to be run on an FME Server. A job consists of a workspace (housed within a repository on an FME Server) together with values for each of its published parameters. <i>(Integrations, Web, Workflows categories)</i>
FMEServerJobWaiter	Waits until submitted FME jobs are completely processed by an FME Server. The list of jobs to wait for is identified by the job IDs of the input features. When a job that the transformer is waiting for is completed, it outputs the corresponding feature immediately. <i>(Integrations, Web, Workflows categories)</i>
FMEServerLogFileRetriever	Accesses the translation log for a specified FME Server-run translation. The translation log to access is identified by the job ID input parameter. <i>(Integrations, Web, Workflows categories)</i>
FMEServerNotifier	Sends a notification to a specified FME Server. The notification may be used for a variety of actions, such as triggering a downstream workspace, or sending an e-mail message to subscribed clients. <i>(Integrations, Web, Workflows categories)</i>
FMEServerResource Connector	Accesses the FME Server file storage service to upload, download, or delete files and folders or list information about files/folders from a FME Server account. <i>(Integrations, Web, Workflows categories)</i>
FTPCaller	Uploads and downloads data from an FTP server. <i>(Integrations, Web, Workflows categories)</i>

G	
GCMMessenger	Sends messages to Android devices using Google Cloud Messaging (GCM). <i>(Integrations, Web categories)</i>

Generalizer	<p>Transforms or measures geometry features based on a specified algorithm. There are four algorithm types:</p> <ul style="list-style-type: none"> Generalizing algorithms reduce the density of coordinates by removing vertices. Smoothing algorithms determine a new location for each vertex. Measuring algorithms calculate the location of points and return a list of these points (for example, to measure the sinuosity of a feature). Fitting algorithms replace the original geometry completely, with a new feature fitted to a specified line (for example, to minimize the orthogonal distance to the original). <p><i>(Cartography and Reports, Geometries, Web categories)</i></p>
Geocoder	<p>Uses various external web services to convert addresses to latitude/longitude coordinates, or to find the closest addresses to latitude/longitude coordinates (reverse geocode). Some services have additional information available, such as time zone or elevation. <i>(Integrations, Web categories)</i></p>
GeographicBufferer	<p>Expands or shrinks the boundary segments in the input geometry by a specified amount, and if necessary, connects them using stroked arcs. <i>(Spatial Analysis category)</i></p>
GeometryCoercer	<p>Resets the geometry type of the feature. <i>(Geometries, Point Clouds categories)</i></p>
GeometryColorSetter	<p>Sets colors, via appearances, on geometries (such as surfaces) that support appearances, and match a Geometry XQuery. <i>(Cartography and Reports category)</i></p> <div data-bbox="367 764 938 1081" style="text-align: center;">  <p>Random Randomize by Trait</p> </div>
GeometryExtractor	<p>Extracts the geometry of a feature according to the setting of the geometry encoding parameter. The resulting encoded geometry is added to the feature in an attribute. This attribute can later be restored as the feature's geometry using the GeometryReplacer transformer.</p> <p><i>(Calculated Values, Format Specific, Geometries, Workflows categories)</i></p> <div data-bbox="367 1243 938 1513" style="text-align: center;">  <pre data-bbox="646 1243 938 1513" style="font-family: monospace;"> <?xml version="1.0"?> <geometry> <polygon> <line> <coord x="3128835.08" y="10085908.66"/> <coord x="3128900.58" y="10085874"/> <coord x="3128963.41" y="10085992.41"/> <coord x="3128896.66" y="10086028.33"/> <coord x="3128835.08" y="10085908.66"/> </line> </polygon> </geometry> </pre> </div>

GeometryFilter	<p>Routes a feature based on its geometry type. <i>(Data Quality, Filters and Joins categories)</i></p>
GeometryInstantiator	<p>Replaces a geometry definition with independent geometry instances that are copies of the original geometry definition. The affine transformation that defined the position of each instance in the geometry definition, including position, scale, and rotation, is applied to each instance. <i>(3D category)</i></p>
GeometryPartExtractor	<p>Extracts or removes selected geometry parts based on a Geometry XQuery. <i>(3D category)</i></p>
GeometryPropertyExtractor	<p>Extracts selected geometry names or traits to feature attributes. <i>(3D category)</i></p>
GeometryPropertyRemover	<p>Removes selected geometry names or traits. <i>(3D category)</i></p>
GeometryPropertyRenamer	<p>Renames geometry names or traits. <i>(3D category)</i></p>
GeometryPropertySetter	<p>Sets selected geometry names or traits from feature attributes or constants. <i>(3D category)</i></p>
GeometryRefiner	<p>Performs the following refinements on the feature's geometry:</p> <ul style="list-style-type: none"> Any homogeneous IFMEAggregate becomes a multi (IFMEMultiCurve, IFMEMultiArea, IFMEMultiPoint, or IFMEMultiText). Any IFMEAggregate or multi with only one member is replaced by its single part. Any IFMEDonut with no holes becomes an IFMEPolygon or IFMEEllipse. Any IFMEPath with only one segment is replaced by that segment. Consecutive IFMELine segments within an IFMEPath are combined <p><i>(Geometries category)</i></p>
GeometryRemover	<p>Completely removes the geometry of the feature, for example, if you want to turn spatial data into non-spatial data. <i>(Geometries category)</i></p>
GeometryReplacer	<p>Replaces the feature's geometry according to the setting of the geometry encoding parameter. This transformer is typically used to restore geometry previously extracted into an attribute by the GeometryExtractor. <i>(Format Specific, Geometries, Workflows categories)</i></p>
GeometryValidator	<p>Detects selected issues in input features, and optionally repairs detected issues. Each input feature is processed individually. <i>(Data Quality category)</i></p> <div data-bbox="1438 1105 2016 1422" style="text-align: center;">  </div>
GeoRSSFeatureComposer	<p>Constructs GeoRSS documents from the input features and stores them in the specified attribute for the features that are output by the GeoRSS port. <i>(Format Specific, Web categories)</i></p>