THE PEAK OF DATA INTEGRATION
2022 UC

Attribute Alchemy

Advanced Attribute and List Handling

SAFE SOFTWARE

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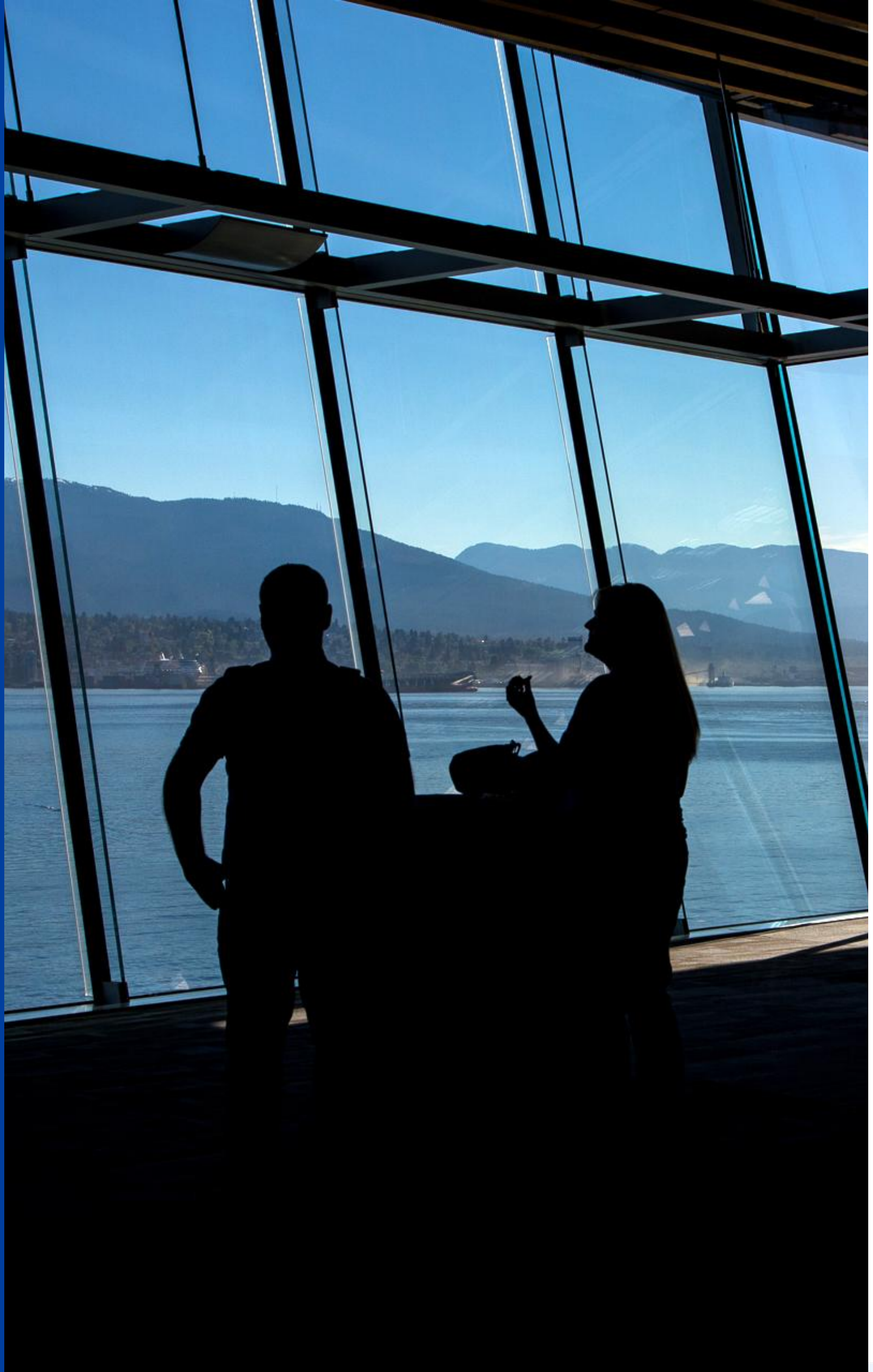
Start Your Journey

Please request a virtual machine:

HTTP: http://fme.ly/UC22Training
User: Administrator
Pass: FMElearnings#1



Agenda

We're going to cover two broad topics:

- Part I: Advanced Attribute Manipulation
  - Date/Time in FME
  - Finding Patterns with Regex
  - Comparing Adjacent Features
  - Name / Value Pairs
  - The Hidden String Functions
  - Bulk Transformers
- Part II: FME List Attributes
  - What are List Attributes
  - Creating List Attributes
  - Working with List Attributes
  - A little bit of Python

Training Resources

- Virtual machine
- Training Data
  - `C:\FMEData-2022\Resources\FMEUC22\Advanced Attribute and List Handling`
- These slides (as PDF)
- Tutorial: Getting Started with List Attributes
  - Creating Lists Using Transformers
  - Transformers for Working with List Attributes

20
22

FME User Conference

Part I: Advanced Attribute Manipulation

Dates & Times in FME

Dates and Times are Complicated
Formatting?

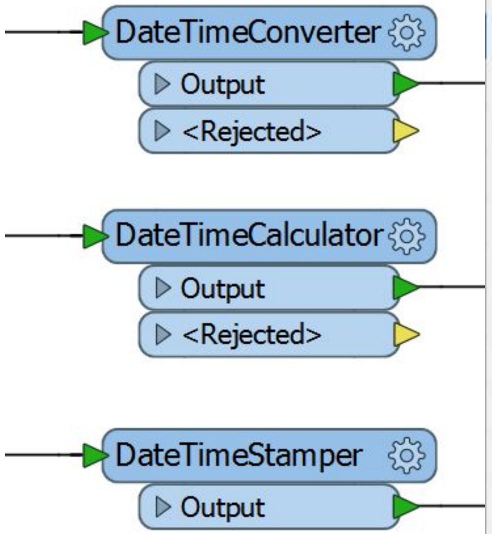
- <d v="2016-12-13T00:00:00"/> *(Excel)*
- YYMMDD, HHMMSS, UTC
- Jun 2016
- 'on Saturday, Jan 9th 2016, 01:00 am' & '+0530'
- 2016-12-07 12:20:07.785403-05
- YYYY-MM-DD hh:mm:ss[.nnnnnnn] *(SQL Server 'datetime2' value)*
- **YYYYMMDDHHMMSS.SS *(FME)***

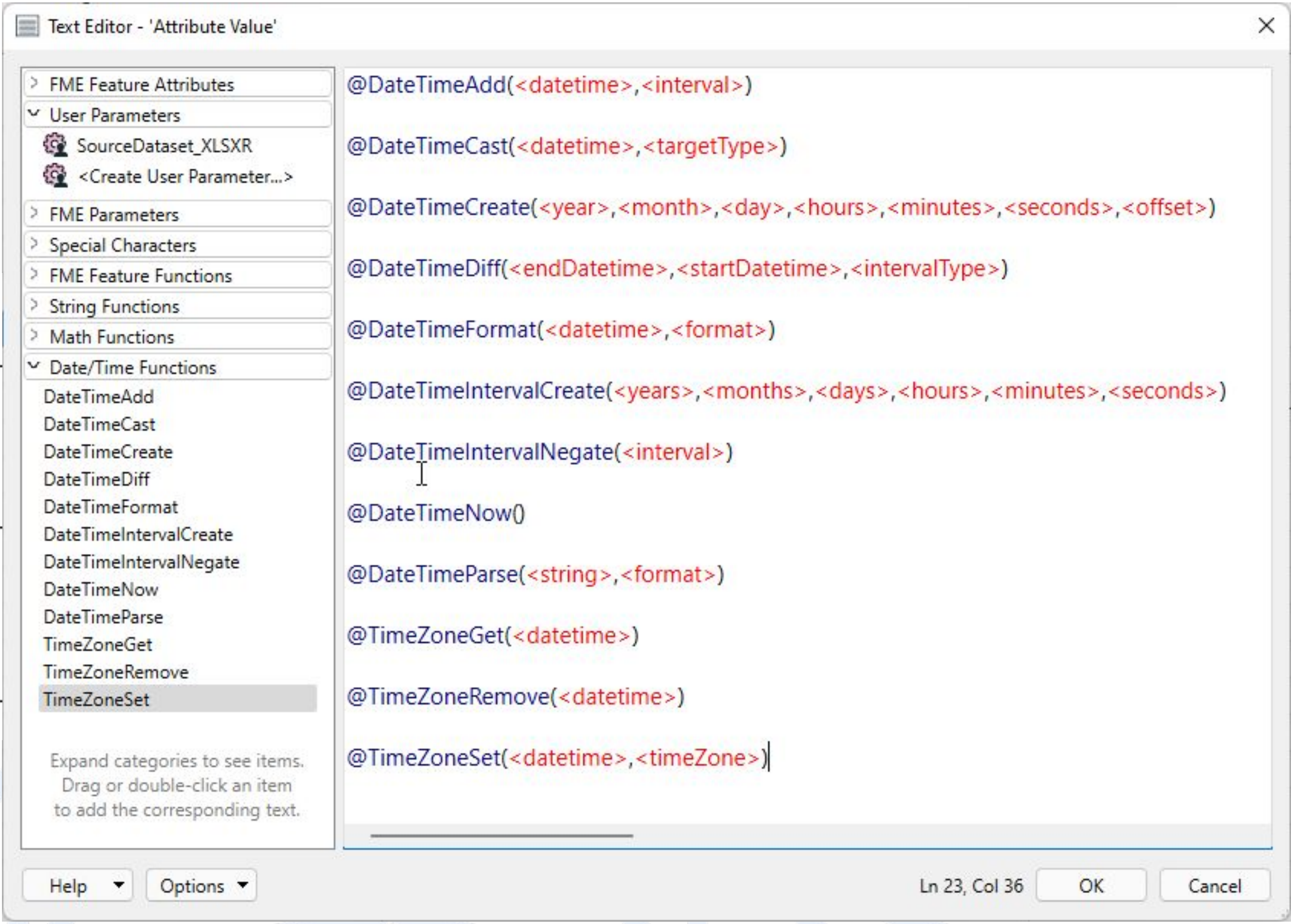
Calculations?

- FME Date / Time functions
  - Date2-Date1 = How many days?

Date Time Tools

Transformers & Functions



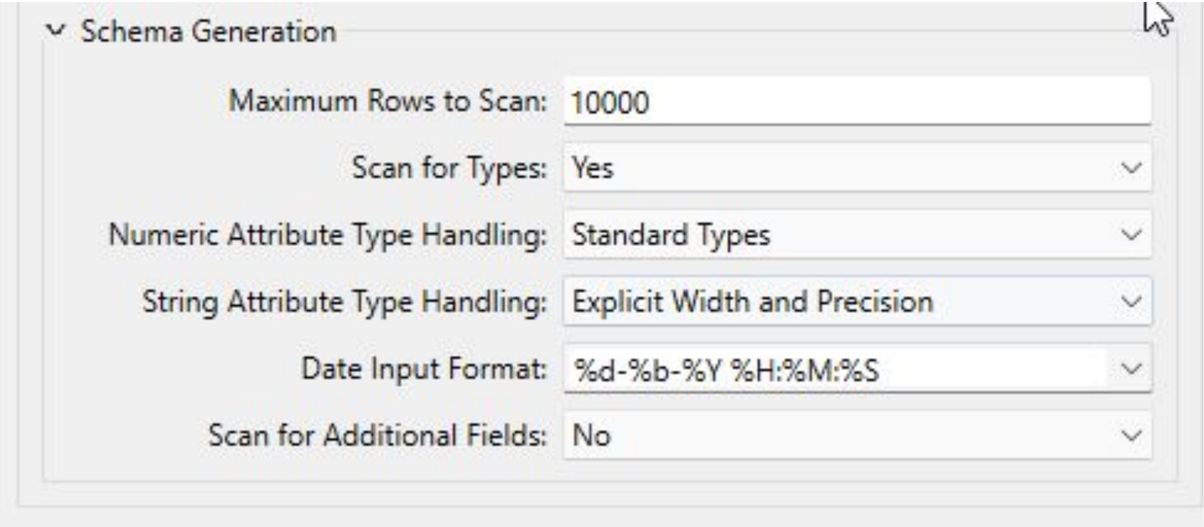


Expand categories to see items. Drag or double-click an item to add the corresponding text.

```
@DateTimeAdd(<datetime>,<interval>)

@DateTimeCast(<datetime>,<targetType>)

@DateTimeCreate(<year>,<month>,<day>,<hours>,<minutes>,<seconds>,<offset>)

@DateTimeDiff(<endDatetime>,<startDatetime>,<intervalType>)

@DateTimeFormat(<datetime>,<format>)

@DateTimeIntervalCreate(<years>,<months>,<days>,<hours>,<minutes>,<seconds>)

@DateTimeIntervalNegate(<interval>)

@DateTimeNow()

@DateTimeParse(<string>,<format>)

@TimeZoneGet(<datetime>)

@TimeZoneRemove(<datetime>)

@TimeZoneSet(<datetime>,<timeZone>)
```

Date Time in CSV

CSV Reader can parse dates:



Schema Generation

Maximum Rows to Scan: 10000

Scan for Types: Yes

Numeric Attribute Type Handling: Standard Types

String Attribute Type Handling: Explicit Width and Precision

Date Input Format: %d-%b-%Y %H:%M:%S

Scan for Additional Fields: No

... to create the FME formatted date and a date/time data type

Why might it be better to sort out the dates in the CSV reader rather then, say, DateTimeConverter?

Gotcha: FME won’t recognise the FME date time in a SQL query - use the ***native*** date time format, i.e.: "2021-12-01"

POP TEST

Date & Time

Finding patterns: regex

Most regex patterns have been solved by someone!

Problem: extract the first three letters:

Code ABD3705337067

Regular Expression: ([A-Z]{3})([0-9]+)

Use the FME Regex editor

Replacement text: **\1** - replaces with the sub-expression

regex is great - but there are many FME string function alternatives if you're not familiar with regex…

String Functions:

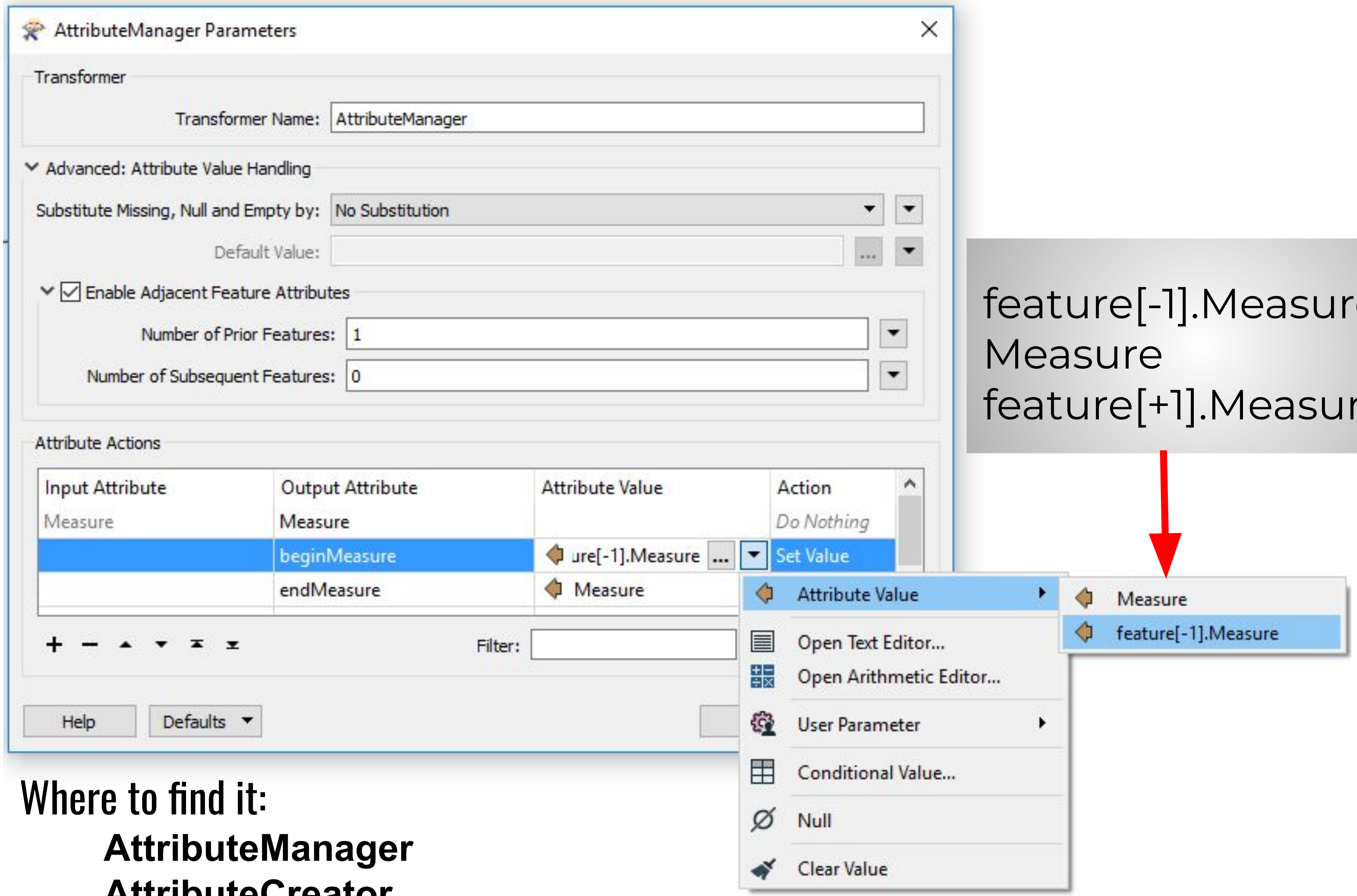
Attribute	String Function
alpha	@Left(@Value(Code),3)
beta	@Substring(@Value(Code),3,-1)

Fun regex learning website: https://regexr.com/

Past, Present & Future Attributes

Adjacent Attributes

- Great for sequenced or ordered data



AttributeManager Parameters

Transformer

Transformer Name: AttributeManager

Advanced: Attribute Value Handling

Substitute Missing, Null and Empty by: No Substitution

Default Value:

☑ Enable Adjacent Feature Attributes

Number of Prior Features: 1

Number of Subsequent Features: 0

Attribute Actions

Input Attribute	Output Attribute	Attribute Value	Action
Measure	Measure		Do Nothing
	beginMeasure	ure[-1].Measure	Set Value
	endMeasure	Measure	

Filter:

feature[-1].Measure
Measure
feature[+1].Measure

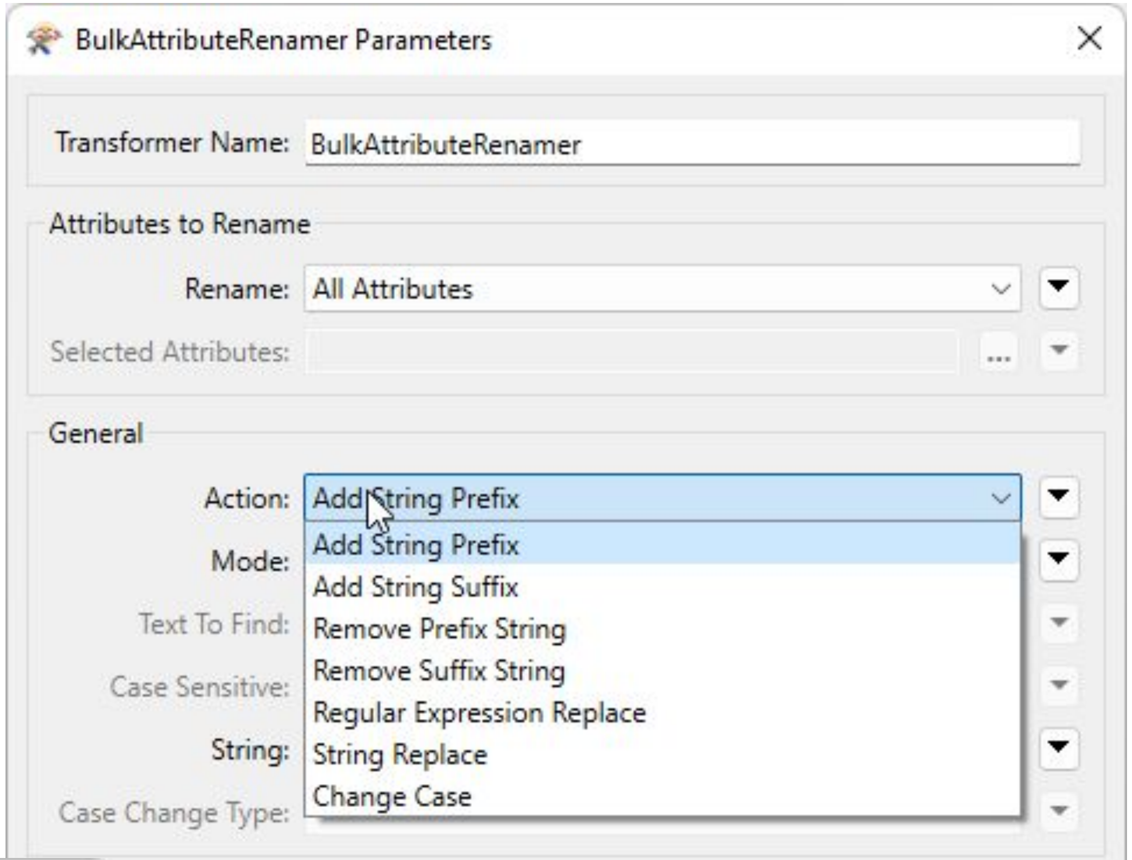
Where to find it:

AttributeManager
AttributeCreator

Bulk-up

Manipulate Attribute Names

- BulkAttributeRenamer
  - Prefix,Suffix
  - Case Change
  - Regex
- BulkAttributeRemover
  - Regex for attribute cleanup



BulkAttributeRenamer Parameters

Transformer Name: BulkAttributeRenamer

Attributes to Rename

Rename: All Attributes

Selected Attributes:

General

Action: Add String Prefix

- Add String Prefix
- Add String Suffix
- Remove Prefix String
- Remove Suffix String
- Regular Expression Replace
- String Replace
- Change Case

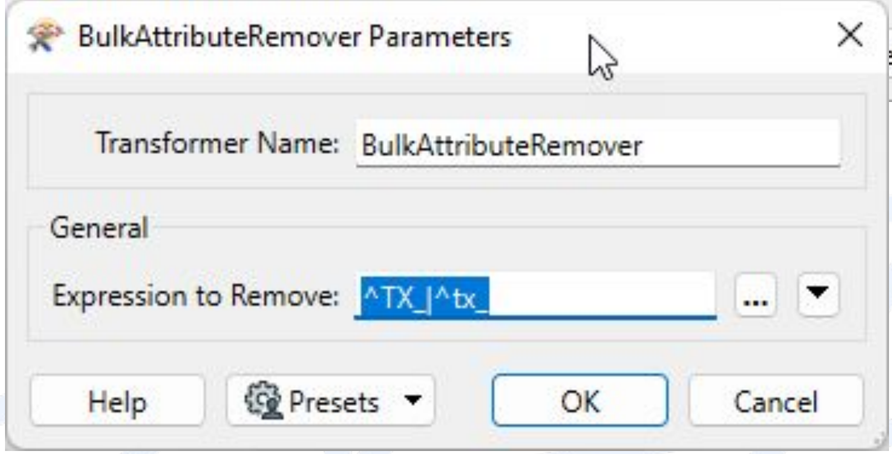
Mode:

Text To Find:

Case Sensitive:

String:

Case Change Type:



BulkAttributeRemover Parameters

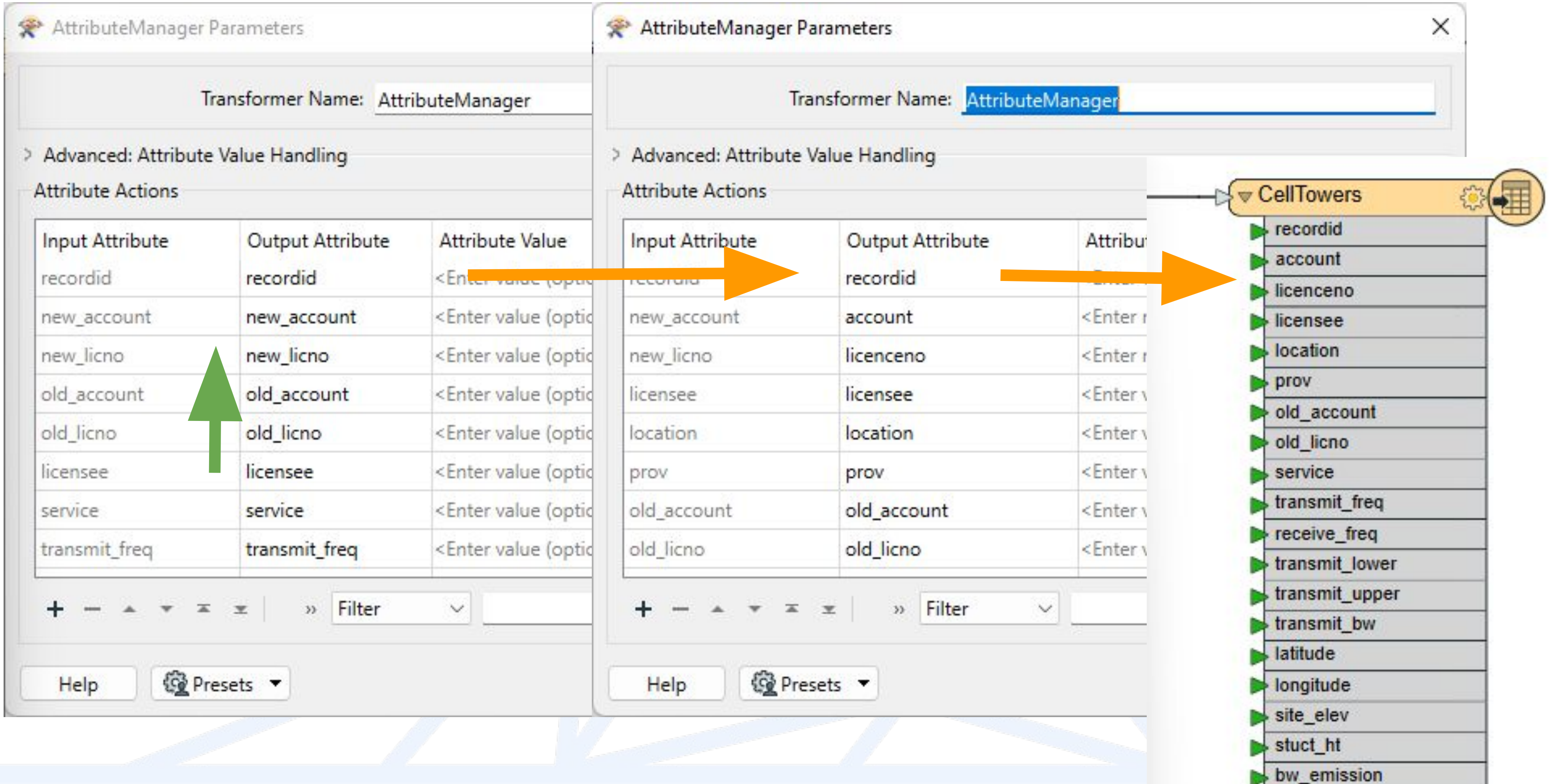
Transformer Name: BulkAttributeRemover

General

Expression to Remove: ^TX_|^tx_

AttributeManager

AttributeManager can reorder attributes



AttributeManager Parameters

Transformer Name: AttributeManager

› Advanced: Attribute Value Handling

Attribute Actions

Input Attribute	Output Attribute	Attribute Value
recordid	recordid	<Enter value (optic
new_account	new_account	<Enter value (optic
new_licno	new_licno	<Enter value (optic
old_account	old_account	<Enter value (optic
old_licno	old_licno	<Enter value (optic
licensee	licensee	<Enter value (optic
service	service	<Enter value (optic
transmit_freq	transmit_freq	<Enter value (optic

AttributeManager Parameters

Transformer Name: AttributeManager

› Advanced: Attribute Value Handling

Attribute Actions

Input Attribute	Output Attribute	Attribu
recordid	recordid	<Enter
new_account	account	<Enter
new_licno	licenceno	<Enter
licensee	licensee	<Enter
location	location	<Enter
prov	prov	<Enter
old_account	old_account	<Enter
old_licno	old_licno	<Enter

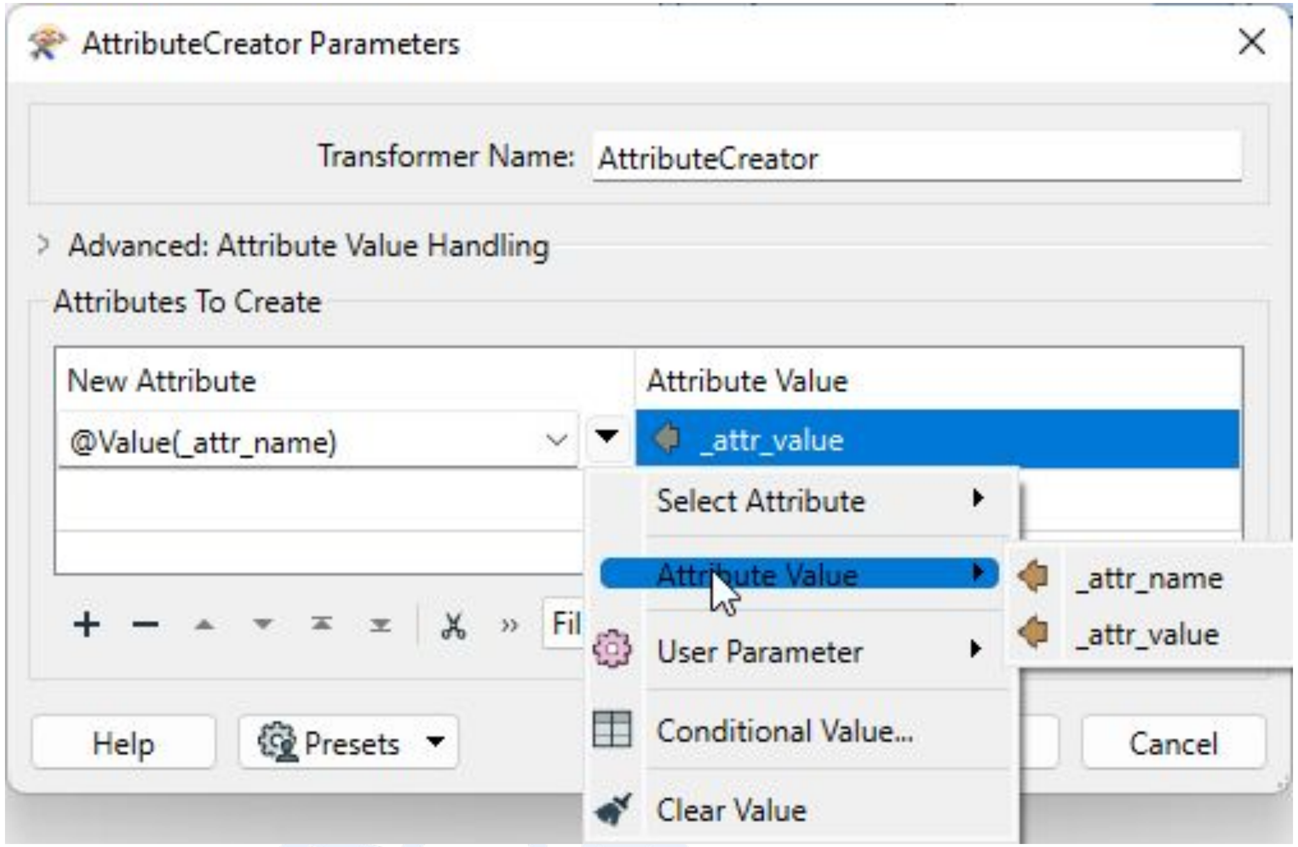
CellTowers

- recordid
- account
- licenceno
- licensee
- location
- prov
- old_account
- old_licno
- service
- transmit_freq
- receive_freq
- transmit_lower
- transmit_upper
- transmit_bw
- latitude
- longitude
- site_elev
- stuct_ht
- bw_emission

Attribute Value

The ***value*** of an attribute has the ***name*** of the attribute you want to reference…

```
    attribute_name = UserName
```



AttributeCreator Parameters

Transformer Name: AttributeCreator

Advanced: Attribute Value Handling

Attributes To Create

New Attribute	Attribute Value
@Value(_attr_name)	_attr_value

- often used after AttributeExploder

EXERCISE

Attribute Handling

Continue along the road of learning

Learning Resources:

- Trailhead: Transform Attributes
- World Tour: Time Machines & Attribute Alchemy
- Performance: Comparative Performance Test
- Tutorial: Advanced Attribute and List Handling

Part II: List Attributes

List Attributes

List attributes allow an attribute to have more than one value.

- `FRUITS = “Apple, Orange, Pear”`

  vs. simple list:

- `Fruits{0} = Apple`

  `Fruits{1} = Orange`

  `Fruits{2} = Pear`

  OR complex list:

- `Fruits{0}.name           = Apple`
- `Fruits{0}.scientificName = Malus domestica`
- `Fruits{1}.name           = Orange`
- `Fruits{1}.scientificName = Citrus X sinensis`

Tutorial: [Getting Started with List Attributes]

List Attributes

Tutorial: Getting Started with List Attributes

- Creating Lists Using Transformers
  - example workspace: **park_trees_final.fmw**
- Transformers for Working with List Attributes
  - example workspace: **ListTransformerExamples.fmw**

EXERCISE

List Handling

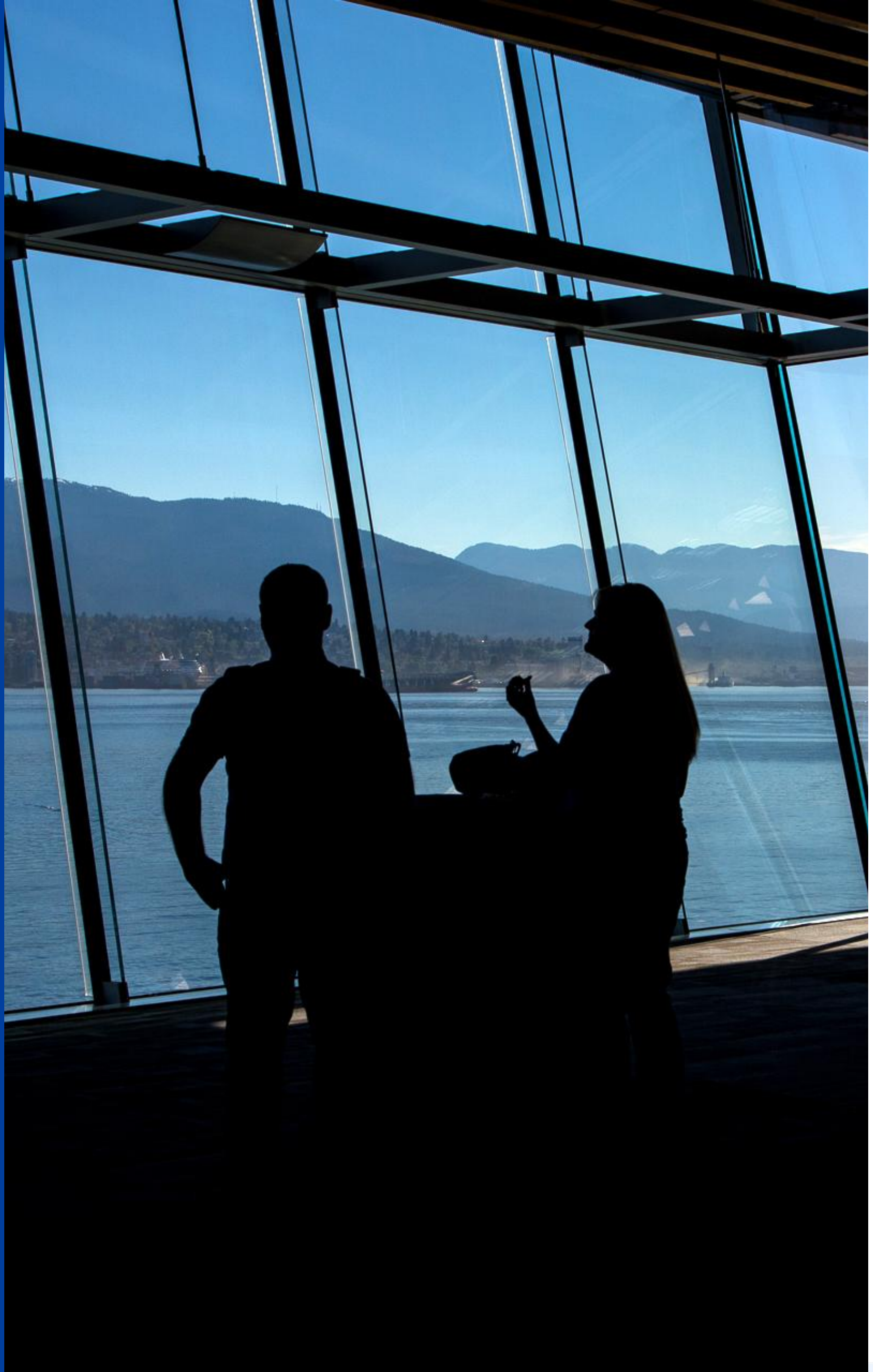
Continue along the road of learning

Learning Resources:

- Tutorial: Getting Started with List Attributes
- Trailhead: Working with Multiple Data Models Using Lists
- Documentation: About List Attributes
- FME UC 2017: List Manipulation in FME

  by Joanna Hobbins, CAE
- Python: Python List Tutorial

Wrap up



Summary

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  - Bulk Transformers
- FME List Attributes
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Next Steps

- Review some of the resources we listed
- Continue to expand you FME knowledge with the Trailhead learning resource

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Thank You!

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