



# Attribute Alchemy

Advanced Attribute and  
List Handling



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Start Your Journey

**Please request a virtual machine:**

**HTTP**

**User: Administrator**

**Pass: FMEearnings#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:\FMEData2022\Resources\FMEUC22\Advanced Attribute and List Handling
- These slides
- Tutorial: [Getting Started with List Attributes](#)
  - Creating Lists Using Transformers
  -
- [Document Your Workspace](#) (condensed)
- [Design Workspaces for Advanced Reading and Writing](#)
- [Visually Compare and Merge Workflows](#)





# *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[.nnnnnnnn]` (*SQL Server 'datetime2' value*)
- **`YYYYMMDDHHMMSS.SS` (*FME*)**

## Calculations?

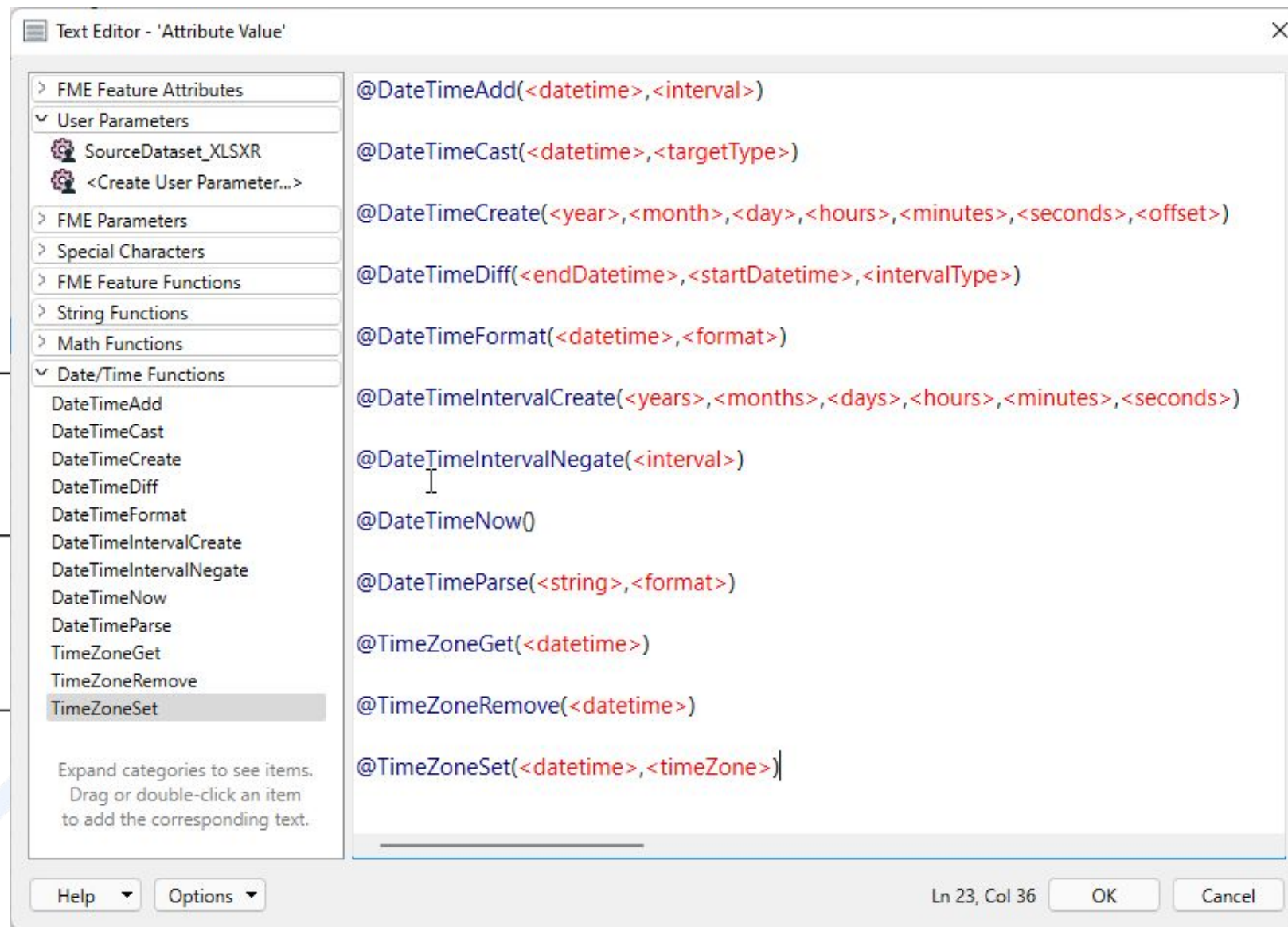
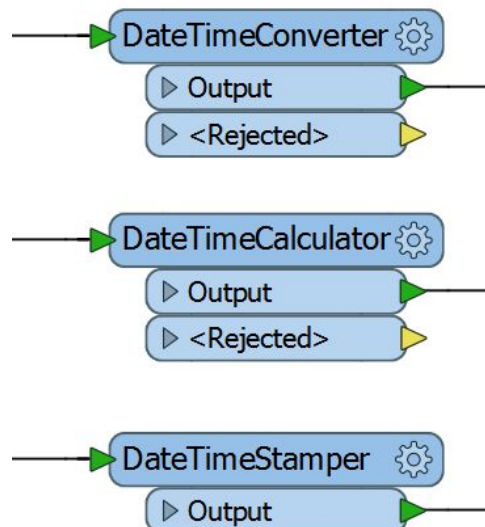
- FME Date / Time functions
  - `Date2-Date1` = How many days?





# Date Time Tools

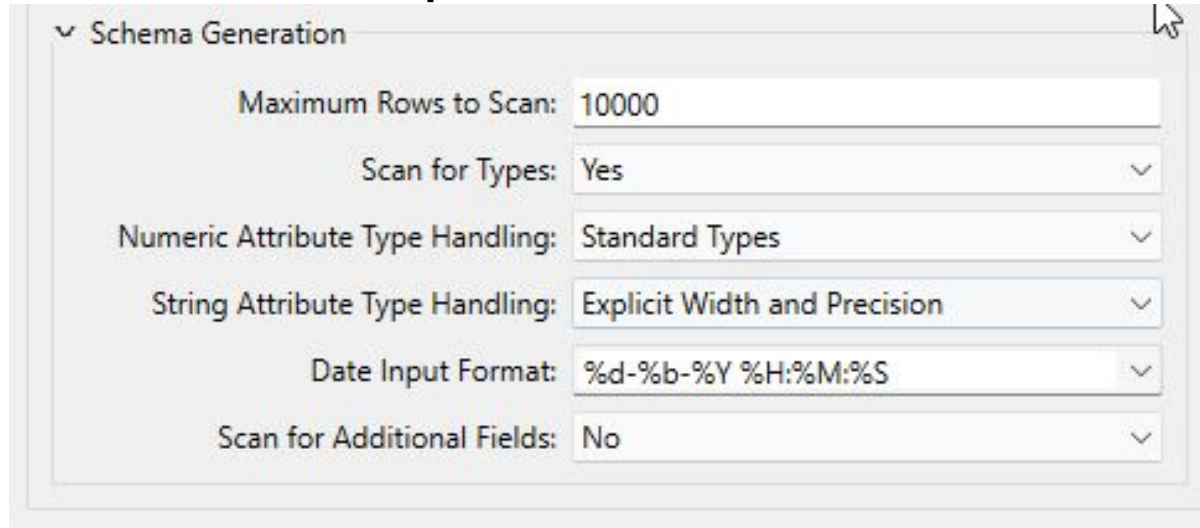
## Transformers & Functions





# Date Time in CSV

CSV Reader can parse dates:



... 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 than, 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	<code>@Left(@Value(Code),3)</code>
beta	<code>@Substring(@Value(Code),3,-1)</code>

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	feature[-1].Measure	Set Value
	endMeasure	Measure	

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-

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↔

Filter:

Help

Defaults

Attribute Value

Measure

feature[-1].Measure

feature[-1].Measure

Measure

feature[+1].Measure

Where to find it:  
AttributeManager  
AttributeCreator

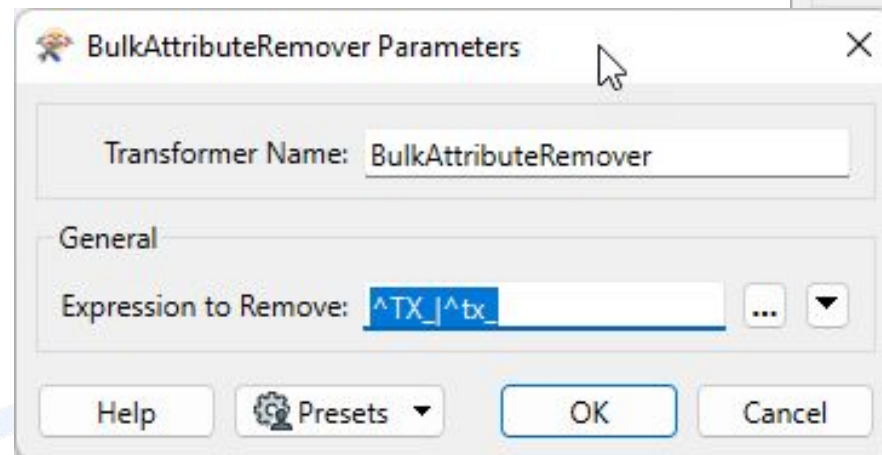
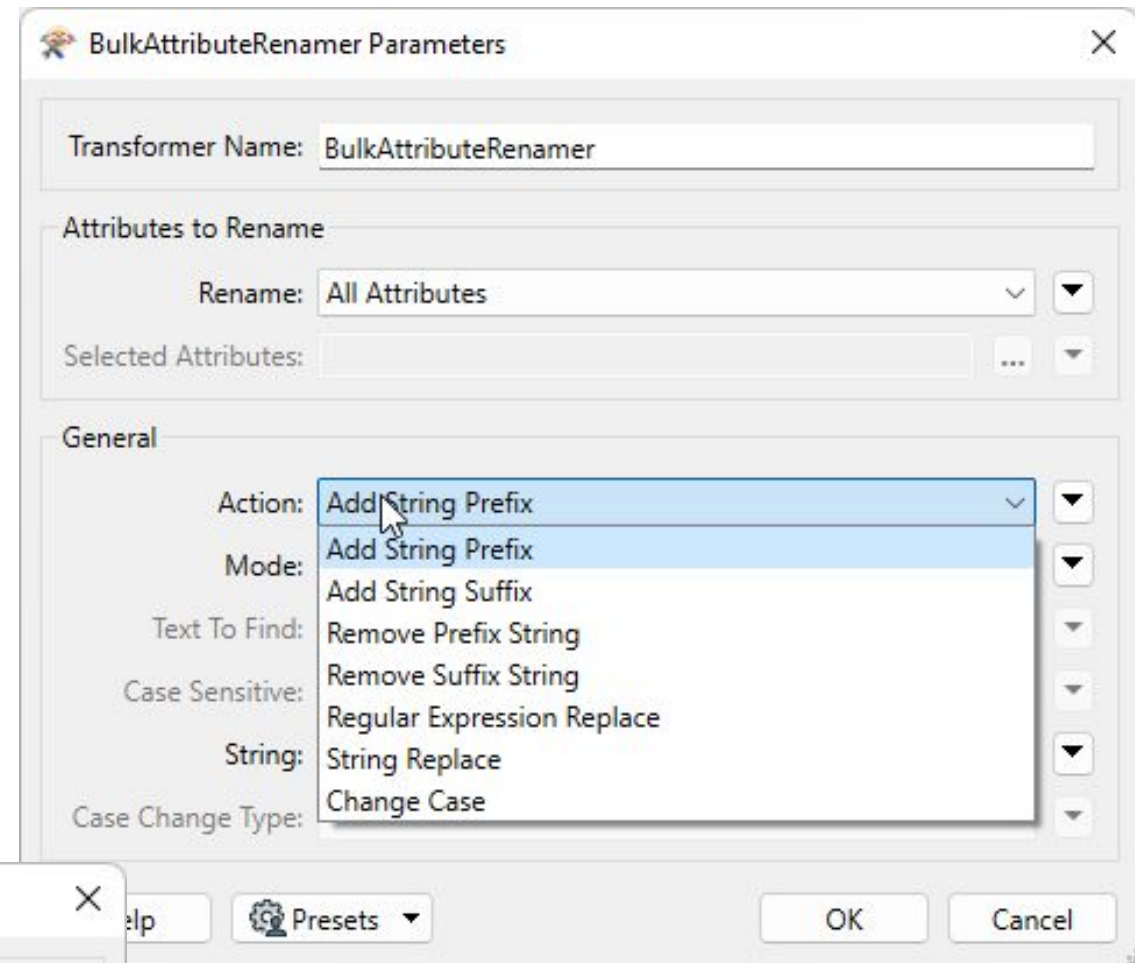




# Bulk-up

## Manipulate Attribute Names

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



# AttributeManager

AttributeManager can reorder attributes

The image shows two instances of the 'AttributeManager Parameters' dialog box, illustrating how attributes can be reordered. The left dialog shows the initial state, and the right dialog shows the result after reordering. An orange arrow points from the 'recordid' input attribute in the left dialog to the 'recordid' output attribute in the right dialog. Another orange arrow points from the 'new\_account' input attribute in the left dialog to the 'account' output attribute in the right dialog. A green arrow points to the 'old\_account' input attribute in the left dialog. The right dialog also shows a list of attributes for the 'CellTowers' dataset, including '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', and 'bw\_emission'.

Transformer Name: AttributeManager

Advanced: Attribute Value Handling

Attribute Actions

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

Transformer Name: AttributeManager

Advanced: Attribute Value Handling

Attribute Actions

Input Attribute	Output Attribute	Attribute Value
recordid	recordid	<Enter value (optional)>
new_account	account	<Enter value (optional)>
new_licno	licenceno	<Enter value (optional)>
licensee	licensee	<Enter value (optional)>
location	location	<Enter value (optional)>
prov	prov	<Enter value (optional)>
old_account	old_account	<Enter value (optional)>
old_licno	old_licno	<Enter value (optional)>

CellTowers

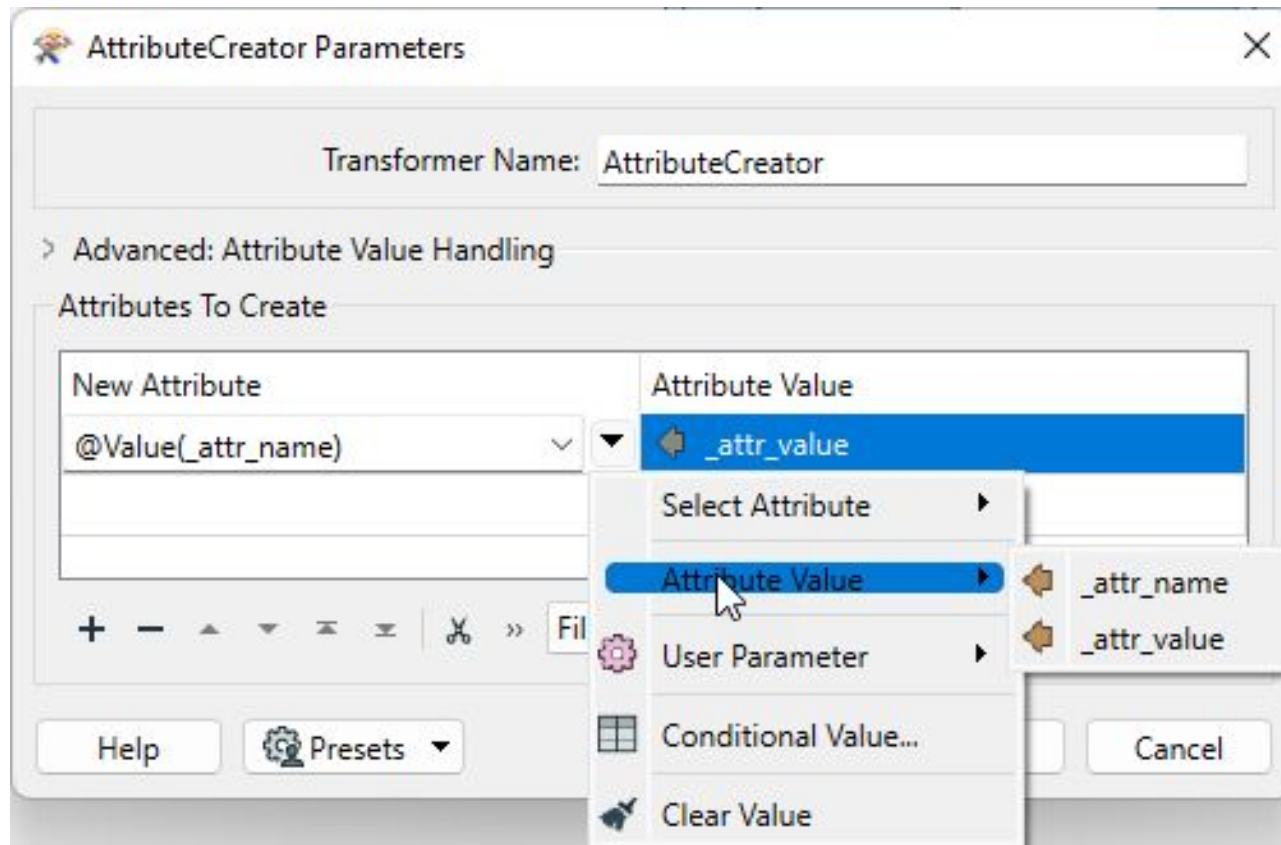
- recordid
- account
- licenceno
- licensee
- location
- prov
- old\_account
- old\_licno
- service
- transmit\_freq
- receive\_freq
- transmit\_lower
- transmit\_upper
- transmit\_bw
- latitude
- longitude
- site\_elev
- stuct\_ht
- bw\_emission



# Attribute Value

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

```
attribute_name = UserName
```



- often used after AttributeExploder





A person wearing a red backpack and dark clothing stands on the peak of a rugged mountain, arms raised in a 'V' shape in celebration. The background features a vast, hazy mountain range under a soft, golden sky, suggesting a sunrise or sunset. The overall mood is one of achievement and triumph.

# 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

We covered two broad topics:

- Advanced Attribute Manipulation
  - Date/Time in FME
  - Finding Patterns with Regex
  - Comparing Adjacent Features
  - Name / Value Pairs
  - The Hidden String Functions
  - 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
- 





# Thank You!

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