FME Training

for Esri Utility Network Migration

Safe Software training team:
Ryan Cragg
Trent Kading
Mark Stoakes

GOALS

- Give attendees a **good understanding of the Esri UN migration workspaces** so that you can modify them for your datasets that need to be migrated into the UN Asset Packages

- Introduce the key aspects of FME Workbench for newer FME users
- Review the primary transformation tools used in the migration workspaces
- Deep dive into Water migration workspace (Simple migration)
- Deeper dive into Electric migration workspace (Basic migration)

By the end of the training you should be able to edit the water, gas & electric migration workspaces to suit your source data. Understand the resources available to you if you need assistance.

NOT THE GOAL

We will NOT be covering:

- ArcPro and editing UN data
- Nuances of UN data model schemas
- Esri Data Reviewer - Validating ArcGIS

AGENDA

Schedule is 8:00 – 11:00 PST with breaks

Day 1 (Monday) Ryan

- Introduction to FME Desktop Workbench

Day 2 (Tuesday) Ryan

- Dive into transformation tools and other workbench functionality used in the Esri UN migration workspaces

Day 3 (Wednesday) Trent n' Mark

- Getting started with Utility Network migrations and deep dive into water migration and the **schema mapping**

Day 4 (Thursday) Mark n' Trent

- Deeper dive into electric migration and the schema mapping

RESOURCES

Day 1:

- Introduction to FME Desktop Workbench tutorial

Day 2:

- Continued from Day 1

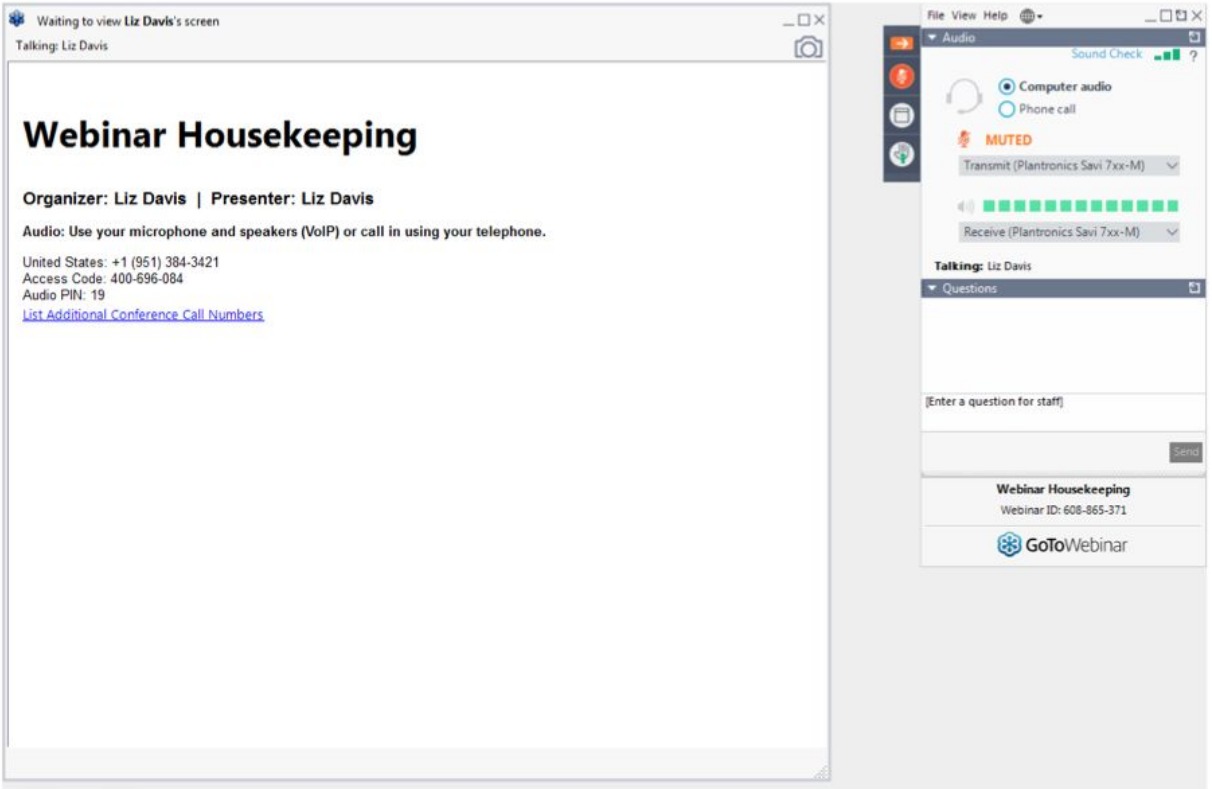
Day 3:

- Migration Tools PDF located under the following directory:
  C:\FMEData2019\Resources\EsriUN

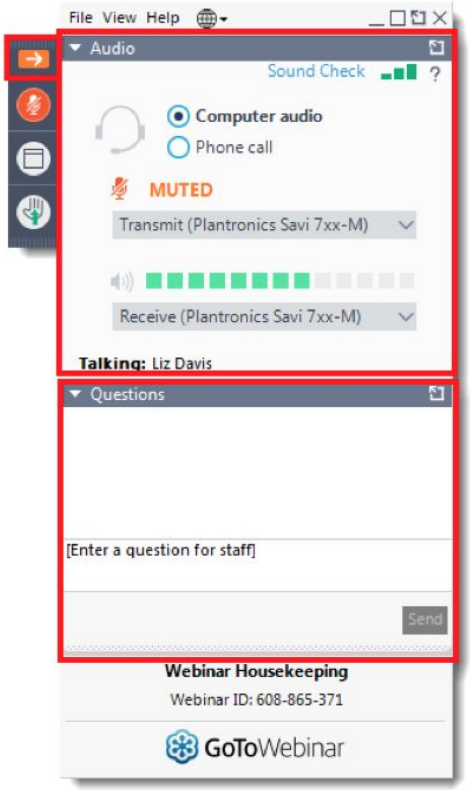
Day 4:

- Electric Documentation located in:
  C:\FMEData2019\Resources\EsriUN

GOTOWEBINAR HOUSEKEEPING



AUDIENCE PARTICIPATION



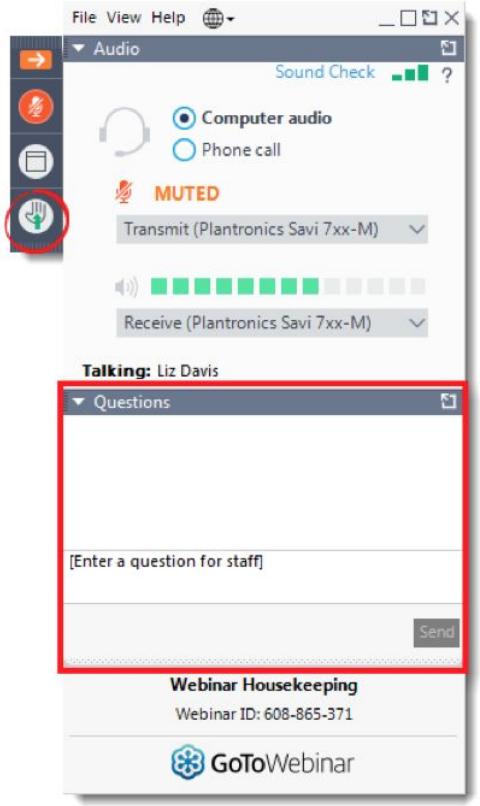
Open and hide your control panel.

Join audio:

- Choose “Mic & Speakers” to use VoIP
- Choose “Telephone” and dial using the information provided.

Submit questions and comments via the Questions panel.

TIME FOR QUESTIONS



Please continue to submit your text questions and comments using the Questions Panel.

Raising your hand is reserved for impromptu polls.

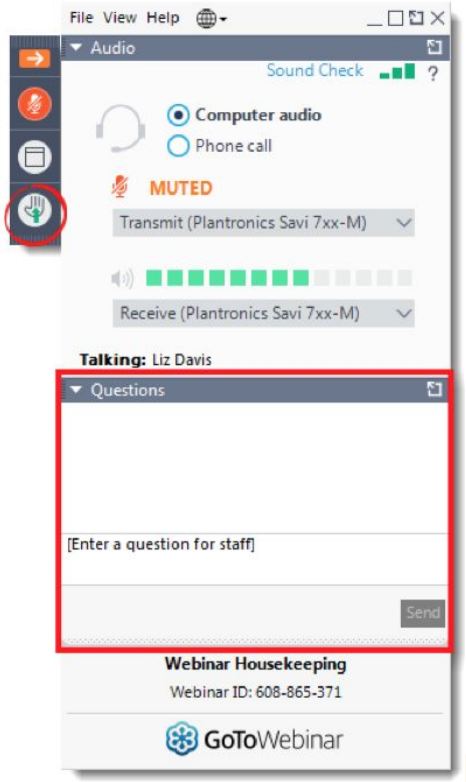
We'll use the Chat panel to pass links to resources and any other tips we might have.

JARGON

- **Feature** - The smallest piece of data.
- **Feature Type** - A collection of features. Usually called a layer, level, table, feature class, etc.
- **Dataset** - Where your data is stored. A file, folder, server, etc.
- **Inspector** - A tool for viewing your data.
- **Workbench** - A tool for transforming your data, using a data flow diagram.
- **Canvas** - Where you create your data flow diagram.
- **Transformers** - Tools in a data flow diagram that filter features, change attributes, or change geometry.
- **Feature Connector** - Lines used to connect feature types and transformers.

Virtual Machines

- Please ensure you are logged into your **FME virtual machine**
- If you have, please join us at **8:20**
- If you have not, please go to **fme.ly/fmevm** and request one
- If you have requested one, but cannot access it, please ask for help in the **GoToWebinar Questions** panel now




That’s all folks!
Let’s begin :)

ArcGIS Licensing using ArcPro

ESU590151892 ArcGIS Pro Advanced Single Use

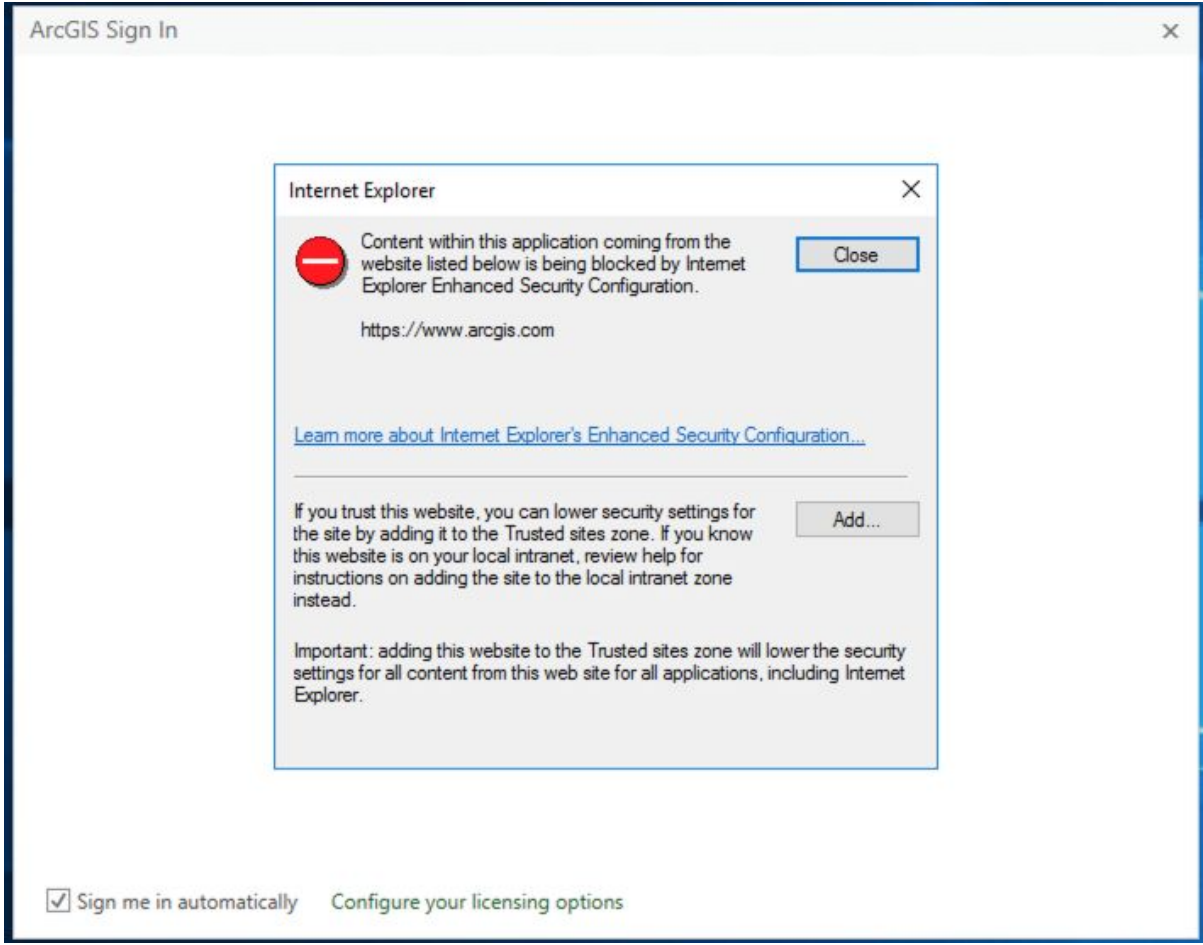
And run C:\temp\FMEDataDownloadInstall.bat from the command line

Thanks to Esri for supplying the training licenses

Open ArcGIS Pro

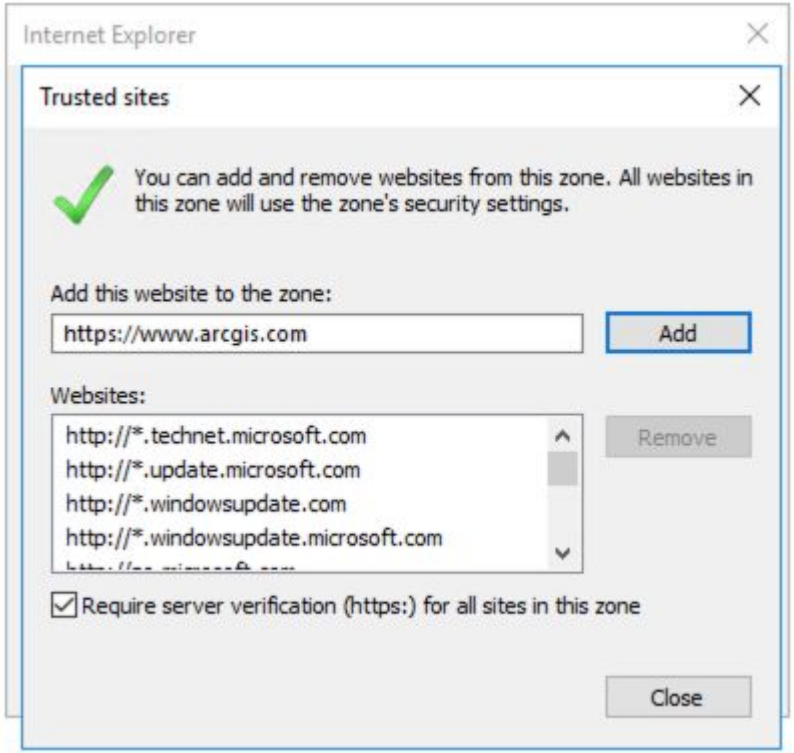
Wait...wait...wait...

Click Add...


ArcGIS Sign In
Internet Explorer
Content within this application coming from the website listed below is being blocked by Internet Explorer Enhanced Security Configuration.
Close
https://www.arcgis.com
Learn more about Internet Explorer's Enhanced Security Configuration...
If you trust this website, you can lower security settings for the site by adding it to the Trusted sites zone. If you know this website is on your local intranet, review help for instructions on adding the site to the local intranet zone instead.
Add...
Important: adding this website to the Trusted sites zone will lower the security settings for all content from this web site for all applications, including Internet Explorer.
Sign me in automatically
Configure your licensing options

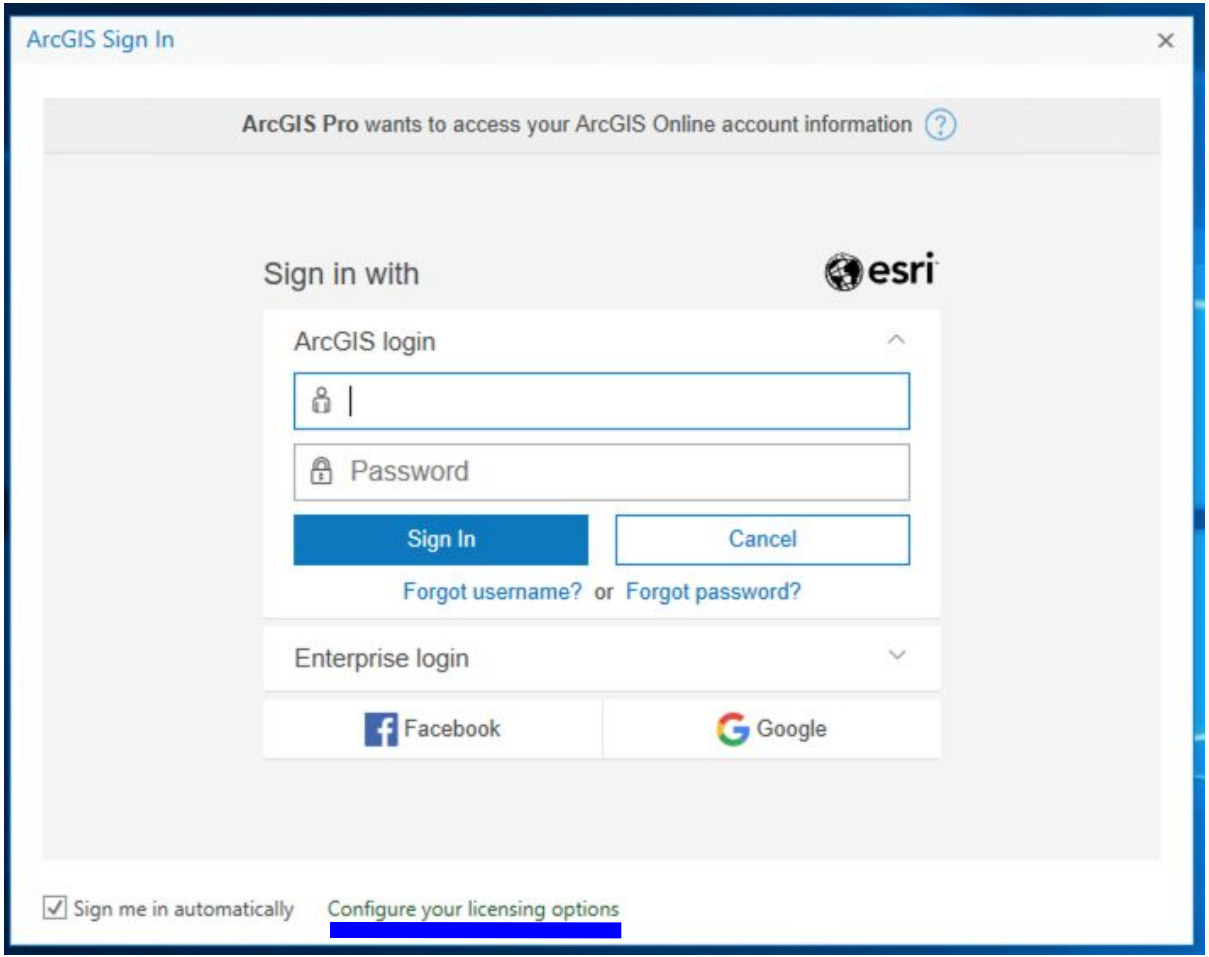
Click Add again

Then click Close



Configure your licensing options

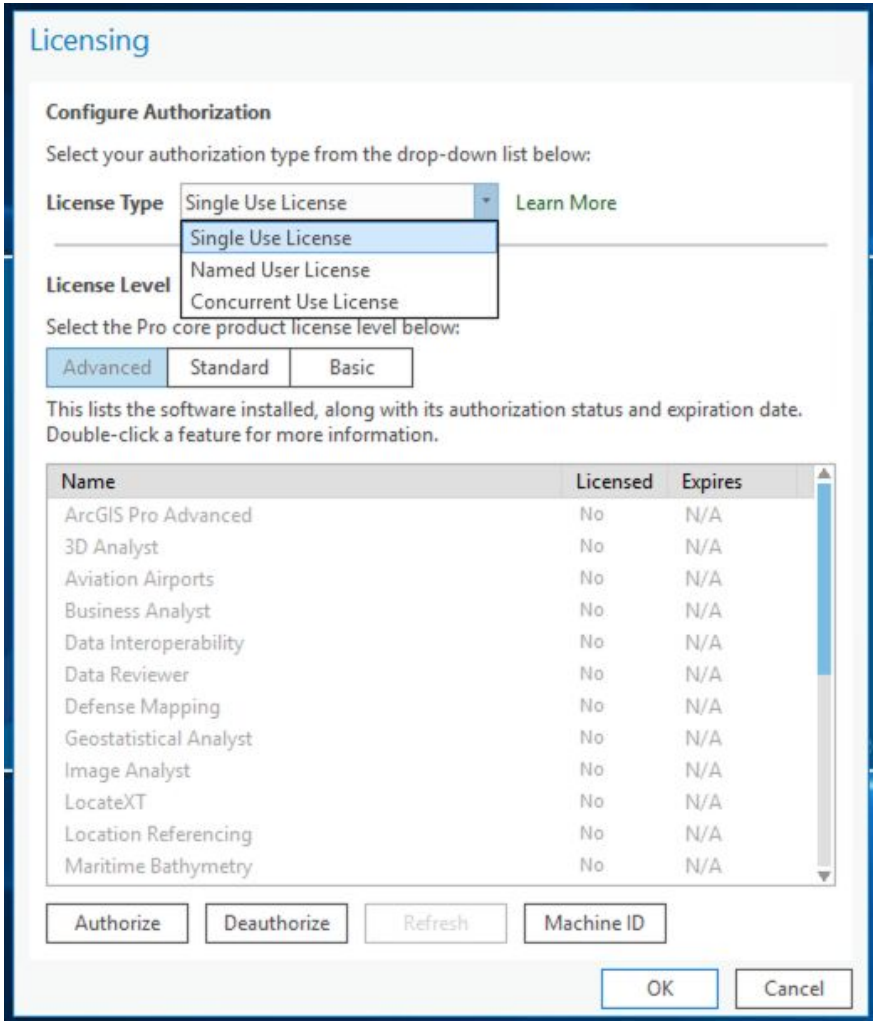
It's the tiny link, way at the bottom



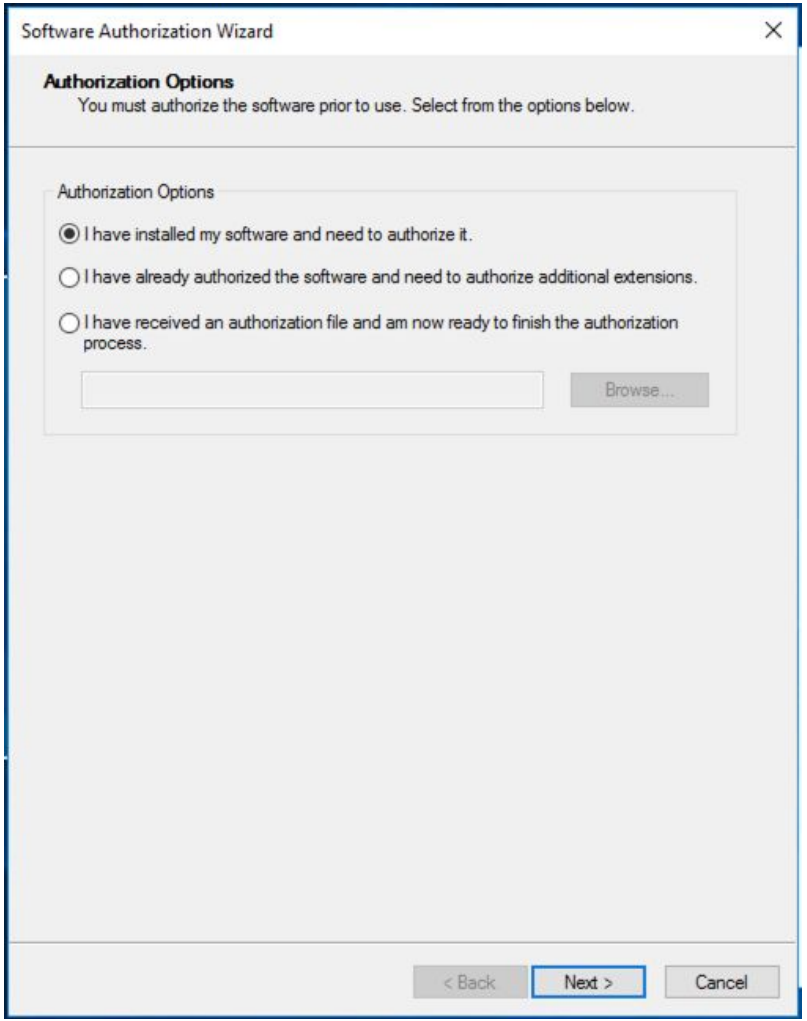
Single Use License

Advanced

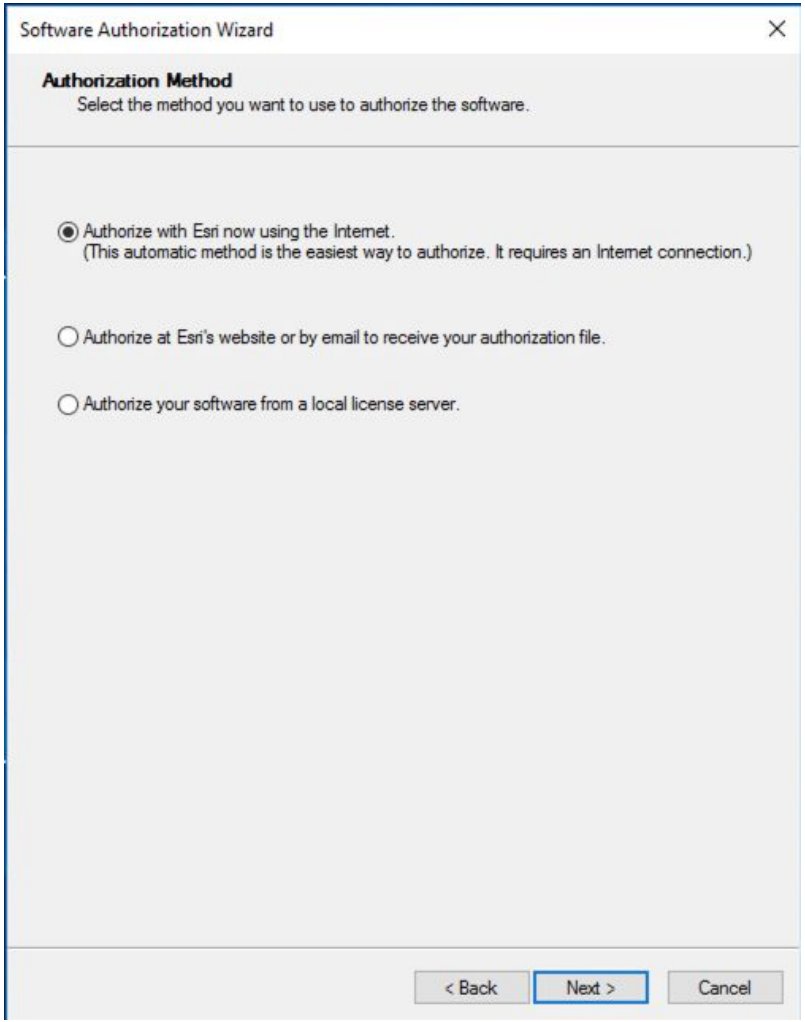
Click Authorize



Click Next


Software Authorization Wizard
Authorization Options
You must authorize the software prior to use. Select from the options below.
Authorization Options
I have installed my software and need to authorize it.
I have already authorized the software and need to authorize additional extensions.
I have received an authorization file and am now ready to finish the authorization process.
Browse...
< Back
Next >
Cancel

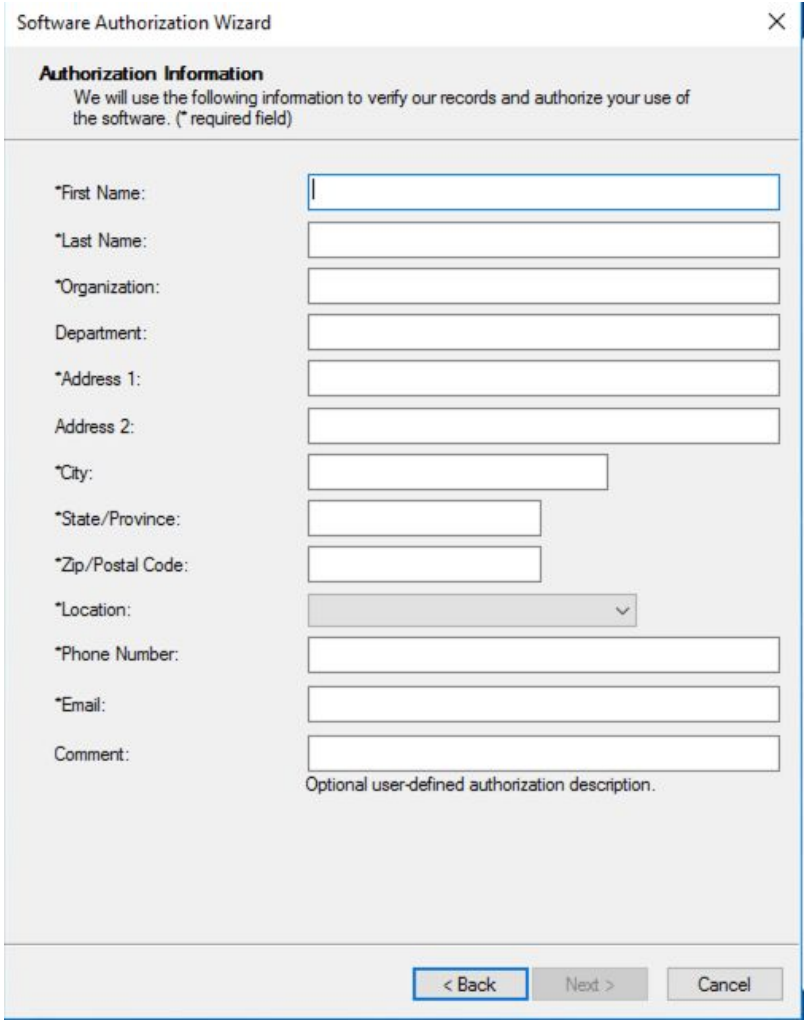
Click Next


Software Authorization Wizard
Authorization Method
Select the method you want to use to authorize the software.
Authorize with Esri now using the Internet.
(This automatic method is the easiest way to authorize. It requires an Internet connection.)
Authorize at Esri's website or by email to receive your authorization file.
Authorize your software from a local license server.
< Back
Next >
Cancel

Fill this out

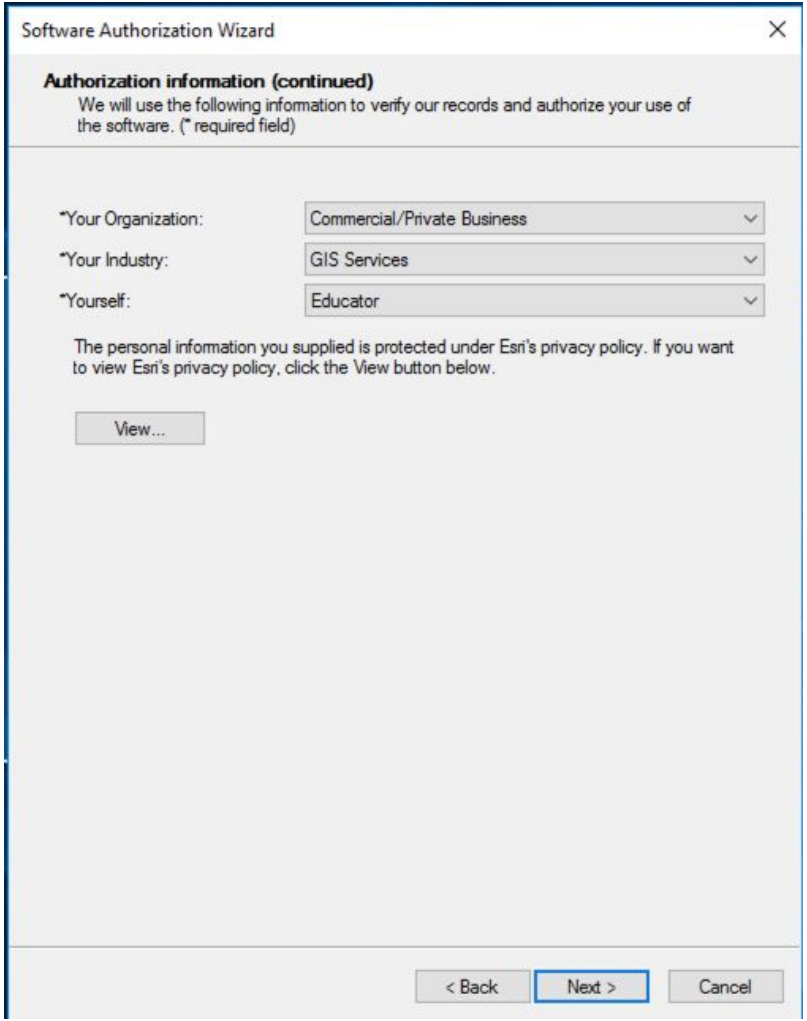
Sorry

Don't skip the fields with *



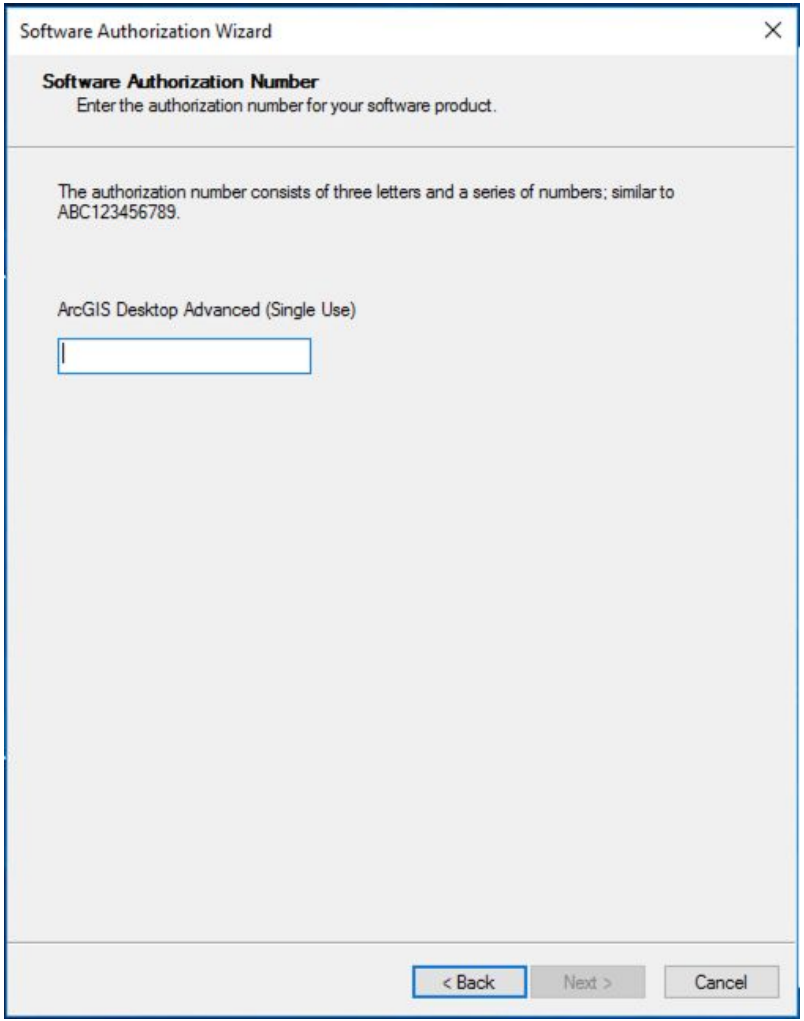
This one too

Sorry



Almost done

ESU590151892

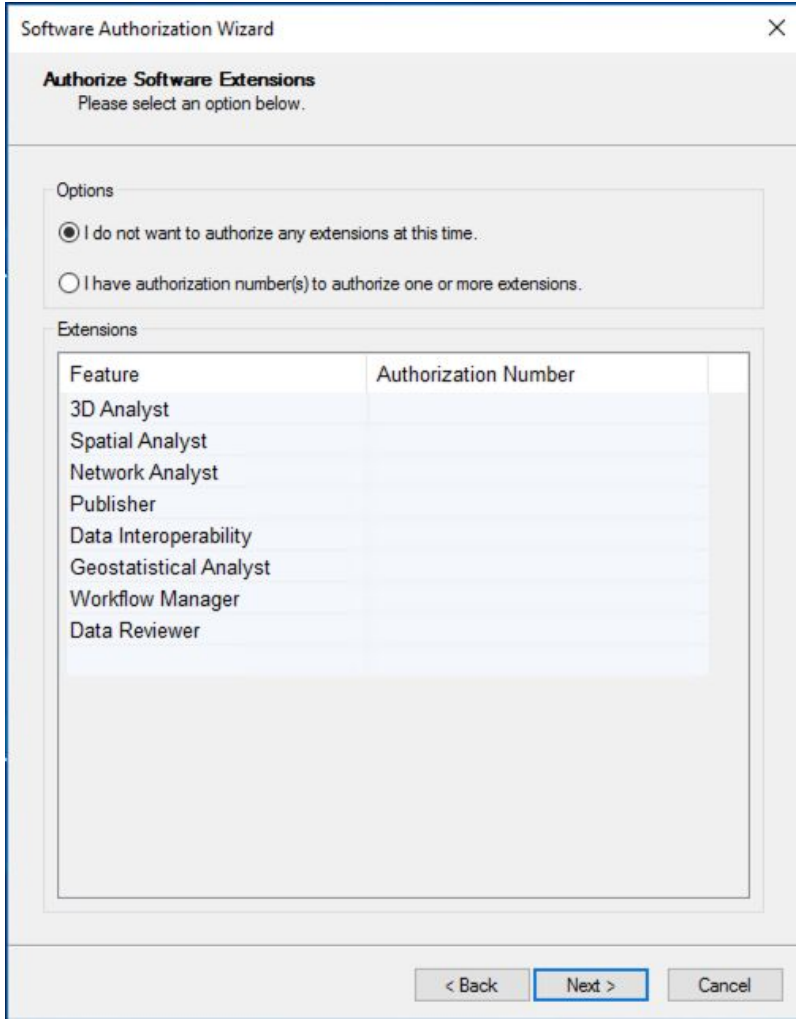


Click Next

We don't need any extensions

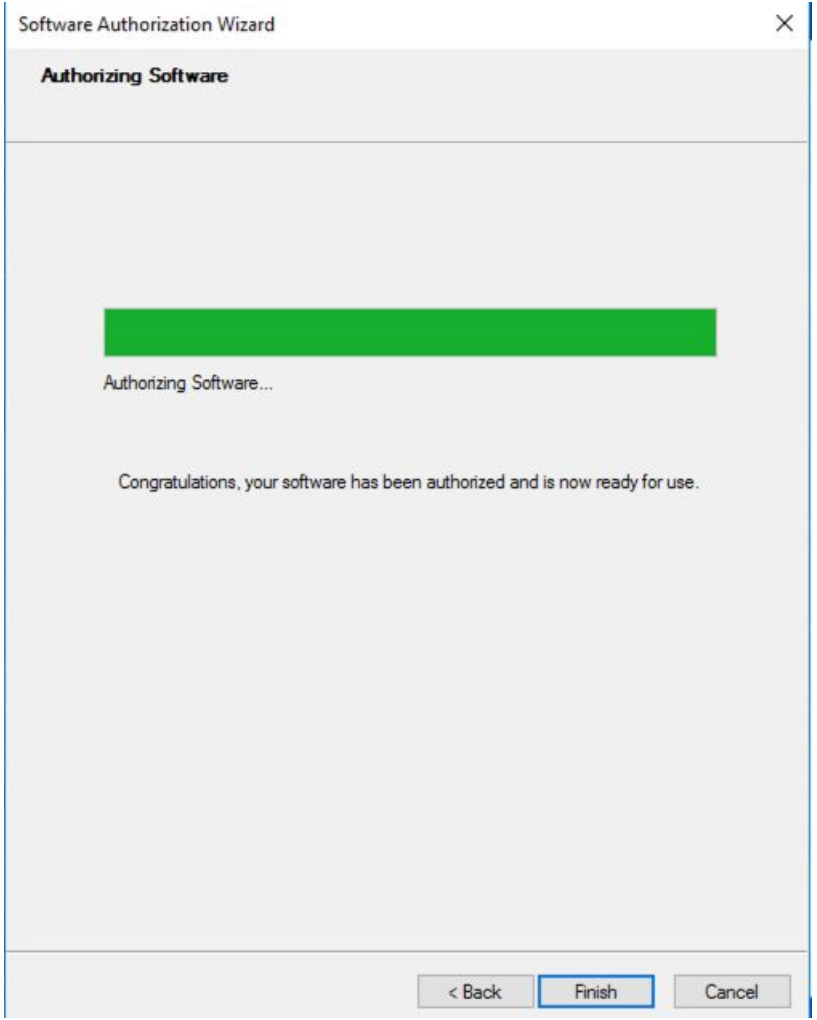
Let's not all hit Next at the same time.

The Esri license server is easily overwhelmed.



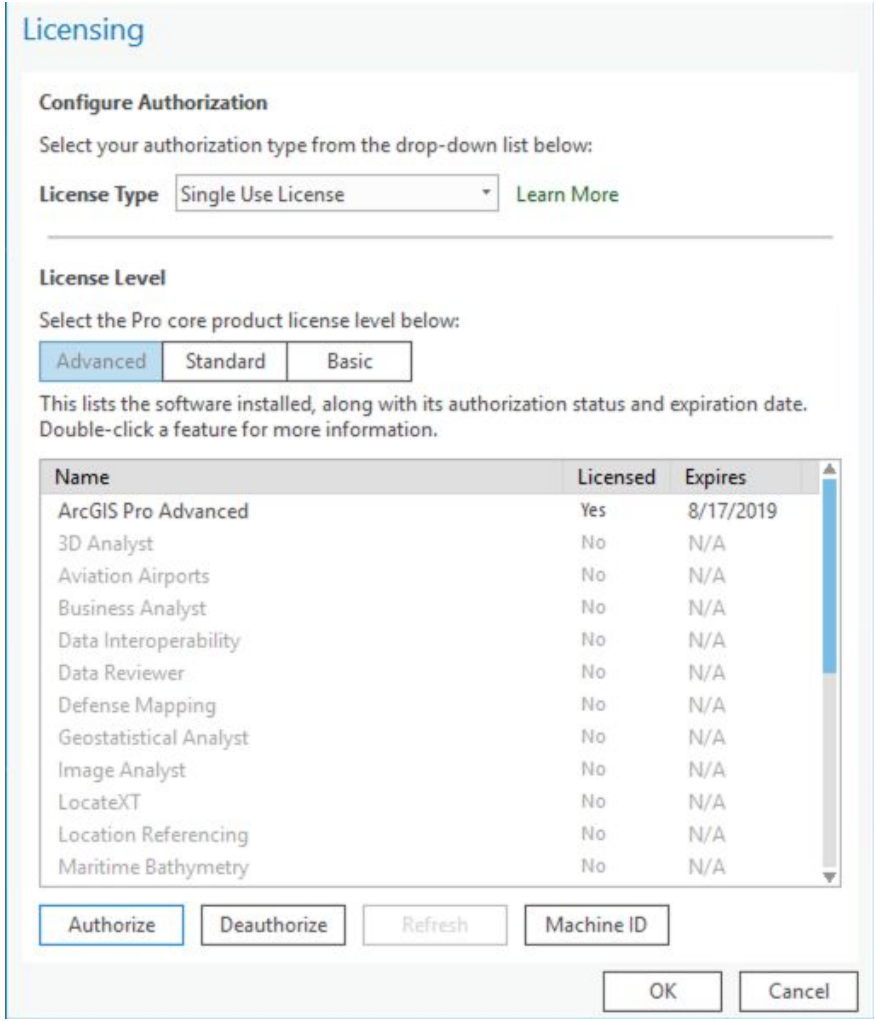
Finished in 3...

Click Finish



2…

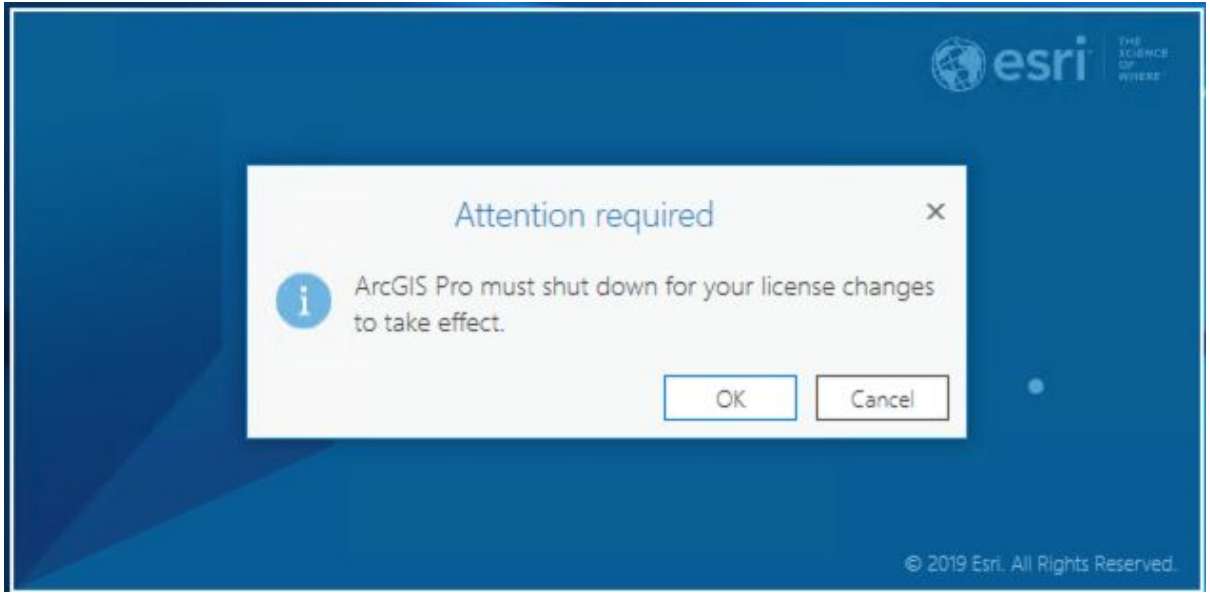
Click OK


Licensing
Configure Authorization
Select your authorization type from the drop-down list below:
License Type
Single Use License
Learn More
License Level
Select the Pro core product license level below:
Advanced
Standard
Basic
This lists the software installed, along with its authorization status and expiration date.
Double-click a feature for more information.
Name
Licensed
Expires
ArcGIS Pro Advanced
Yes
8/17/2019
3D Analyst
No
N/A
Aviation Airports
No
N/A
Business Analyst
No
N/A
Data Interoperability
No
N/A
Data Reviewer
No
N/A
Defense Mapping
No
N/A
Geostatistical Analyst
No
N/A
Image Analyst
No
N/A
LocateXT
No
N/A
Location Referencing
No
N/A
Maritime Bathymetry
No
N/A
Authorize
Deauthorize
Refresh
Machine ID
OK
Cancel

1…

Click OK

The open ArcGIS Pro again



FME Training

for Esri Utility Network Migration

Water Migration Workspace

ArcGIS Licensing using ArcPro (or ArcGIS Administrator for ArcGIS)

ESU590151892 ArcGIS Pro Advanced

Thanks to Esri for supplying the training licenses for this course

AGENDA

Schedule is 8:00 – 11:00 PST with a break

Day 1 (Monday) Ryan

- Introduction to FME Desktop Workbench

Day 2 (Tuesday) Ryan

- Dive into transformation tools and other workbench functionality used in the Esri UN migration workspaces

Day 3 (Wednesday) Trent n' Mark

- Getting started with Utility Network migrations and deep dive into simple migration and the **schema mapping**

Day 4 (Thursday) Mark n' Trent

- Deeper dive into electric migration and the schema mapping

TODAY'S GOALS

- Introduce the key aspects of FME Workbench
- Review the primary transformation tools used in the migration workspaces
- Deep dive into Water migration workspace (Simple migration)
  - Getting Started with Asset Packages
  - Schema Mapping using spreadsheet
  - Validating Asset Package
  - Applying/Staging Asset Package
- Deeper dive into Electric migration workspace (Basic migration)

By the end of today you should have a good understanding of how to get started with the migration workflows including using the water migration workspace and the resulting Asset Package. You should be able to edit the key components of the workspace.

RESOURCES

Day 1:

- Introduction to FME Desktop tutorial

Day 2:

- Continued from Day 1

Day 3:

- Migration Tools PDF located under the following directory: C:\FMEData2019\Resources\EsriUN\Simple\Documentation

Day 4:

- Electric Documentation located in: C:\FMEData2019\Resources\EsriUN\TrainingDocs
- Examples: C:\FMEData2019\Resources\EsriUN\Basic

Asset Packages 101

- Asset Packages deployed through ArcGIS Pro Projects via: https://community.esri.com/message/769190-esri-utility-network-configuration-and-migration-tool-status

- Water Asset Package found here: http://solutions.arcgis.com/water/help/water-distribution-utility-network-foundation/

- Asset Package version tied to ArcGIS Pro release(important to remember)

- Pre-processing Asset Package - changing the Spatial Reference of the provided Asset Package

Getting started with a Utility Network

- Create Utility Network Tool - creates a Utility Network class inside a Feature Dataset in your Enterprise Geodatabase with a Service Territory

- Stage Utility Network *automates the Creation tool highlighted above*

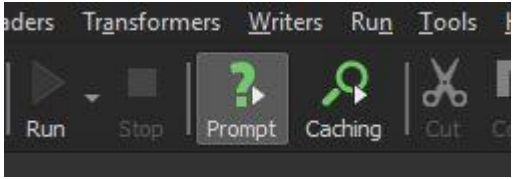
View the data in FME Data Inspector

View Source Data

- Open FME Inspector Data
- Format: Esri Geodatabase (File Geodb)
- Find the folder:
  `C:\FMEData2019\Resources\EsriUN\Simple\SourceData\SimpleUN_Training.gdb`
- Select Feature Classes to display:
  WaterUtilityDistrict wControlValve wFitting wHydrant wLateralLine wMain wServiceConnection

Run the Water Migration workspace

- Find the folder:
  `C:\FMEData2019\Resources\EsriUN\Simple`
- Open the workspace:
  `WaterMigration.fmw`
- Set Enable Feature Caching: **Off**



View Source Data

Water Migration Pattern

Simple Migration

Schema Mapping

- Prepare spreadsheet

- Plug and play Schema Mapping

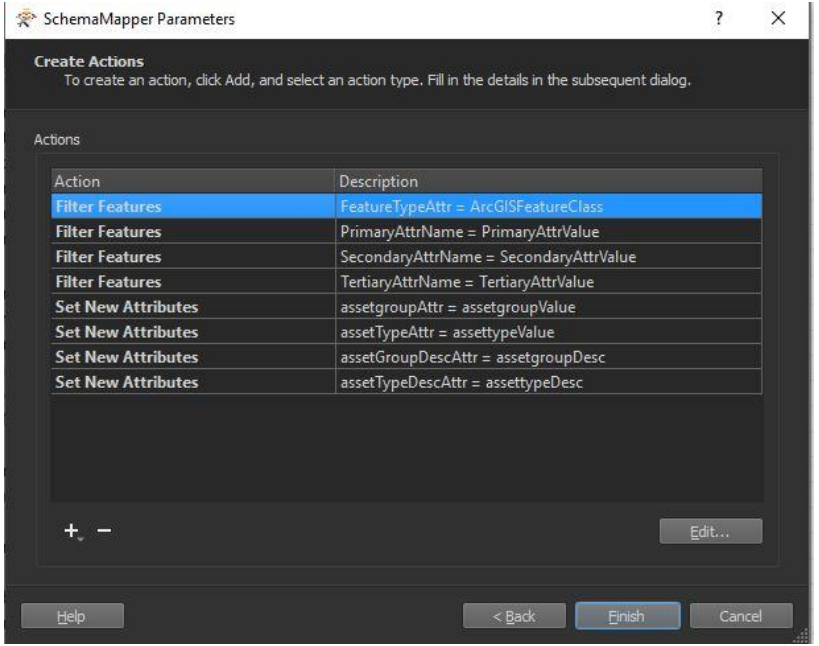
Network topology

- Geometric Network (lines & junctions)
  - Handled by default(especially if source is a valid Geometric Network)
- Explicit network (associations between Assemblies, junctions & devices)
  - Few scenarios of this in Simple models
    - Pump Stations and Pumps

Schema Mapping: Setting Asset Group & Asset Type

Spreadsheet

	UNFeatureClass	assetgroupValue	assetgroupDesc	assettypeValue
66	WaterDevice	9	Flushing and Blow Of	0
67	WaterDevice	9	Flushing and Blow Of	361
68	WaterDevice	9	Flushing and Blow Of	362
69	WaterDevice	9	Flushing and Blow Of	363
70	WaterDevice	9	Flushing and Blow Of	364
71	WaterDevice	9	Flushing and Blow Of	365
72	WaterDevice	19	Injection Facility	0
73	WaterDevice	19	Injection Facility	401
74	WaterDevice	19	Injection Facility	402
75	WaterDevice	50	Anode	0
76	WaterDevice	50	Anode	0
77	WaterDevice	51	Rectifier	0
78	WaterDevice	51	Rectifier	941
79	WaterDevice	52	Test Point	0
80	WaterDevice	52	Test Point	981

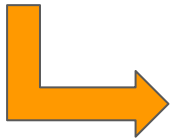


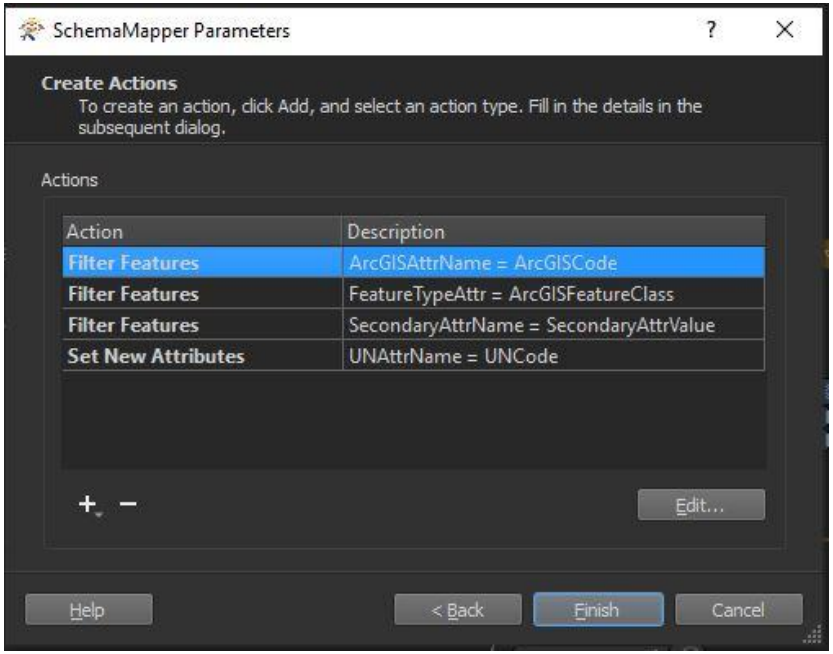
Tip: Accurate mapping to asset group & asset type for both device (assembly) and unit tables (devices) really helps

Schema Mapping: Mapping Domains

Spreadsheet

ArcGISFeatureClass	ArcGISAttrName	UNAttrName	ArcGISDesc	ArcGISCode	UNDesc	UNCode
	DIAMETER	DIAMETER	Unknown	0	Unknown	0
	DIAMETER	DIAMETER	3/4"	0.75	3/4"	0.75
	DIAMETER	DIAMETER	1"	1	1"	1
	DIAMETER	DIAMETER	1 1/4"	1.25	1 1/4"	1.25
	DIAMETER	DIAMETER	1 1/2"	1.5	1 1/2"	1.5
	DIAMETER	DIAMETER	2"	2	2"	2
	DIAMETER	DIAMETER	2 1/2"	2.5	2 1/2"	2.5
	DIAMETER	DIAMETER	3"	3	3"	3
	DIAMETER	DIAMETER	4"	4	4"	4
	DIAMETER	DIAMETER	6"	6	6"	6
	DIAMETER	DIAMETER	8"	8	8"	8
	DIAMETER	DIAMETER	10"	10	10"	10
	DIAMETER	DIAMETER	12"	12	12"	12





Tip: Domain mappings can be applied to single source feature classes or across all feature classes at once.

Schema Mapping Results

What we want.

What we don’t want

Validate Asset Package

Import untools

ap= ‘*Path to gdb*’

untools.gptools.tools.AssetPackageToScript.run(ap)

Can also be found via: https://community.esri.com/docs/DOC-13155-validate-asset-package

Validate Asset Package

Valid Asset Package?

- Apply Asset Package Tool
  - Choose which Domains to apply
  - Choose Utility Network name and whether you want to load the data in while applying the schema/rules

ın(ap)

Can

13155-validate-asset-package

Wrap-up

Thanks for attending...

Editing the migration workspaces

- If you make ***changes***, please share them with us
- ***Need help*** - feel free to contact us

Tomorrow:

- Deep dive into Electric migration

Set-up for Electric

Start Arc Pro and show the data

FME Training

for Esri Utility Network Migration

Electric Migration Workspace

Safe Software training team:
Ryan Cragg
Trent Kading
Mark Stoakes

Thanks also to John Long and John Alsup from Esri

Asset Packages 101

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- Electric Asset Package found here: https://solutions.arcgis.com/electric/help/electric-utility-network-foundation/

FME Geodatabase reader/writer licensing using ArcPro

ESU590151892 ArcGIS Pro Advanced Single Use

Thanks to Esri for supplying the training licenses

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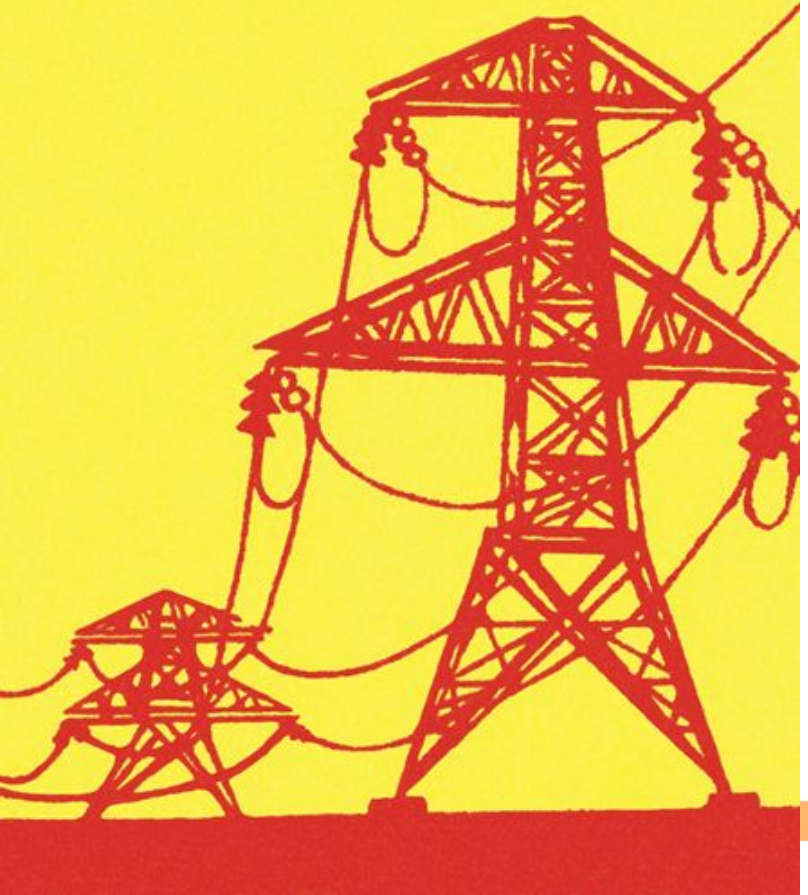


- Introduce the key aspects of FME Workbench
- Review the primary transformation tools used in the migration workspaces
- Deep dive into Water migration workspace (Simple migration)
- Deeper dive into Electric migration workspace (Basic migration)
  - Schema mapping specific to Electric Migration
  - Topology issues
  - Creating Assemblies
  - Assembly definition XML
  - Exercises

By the end of today you should have a good understanding of the electric migration workspace. You should be able to edit the key parts of the electric migration workspace.

RESOURCES

Day 1:

- Introduction to FME Workbench tutorial

Day 2:

- Continued from Day 1

Day 3:

- Migration Tools PDF located under the following directory: C:\UNTraining\WaterMigration\Documentation\

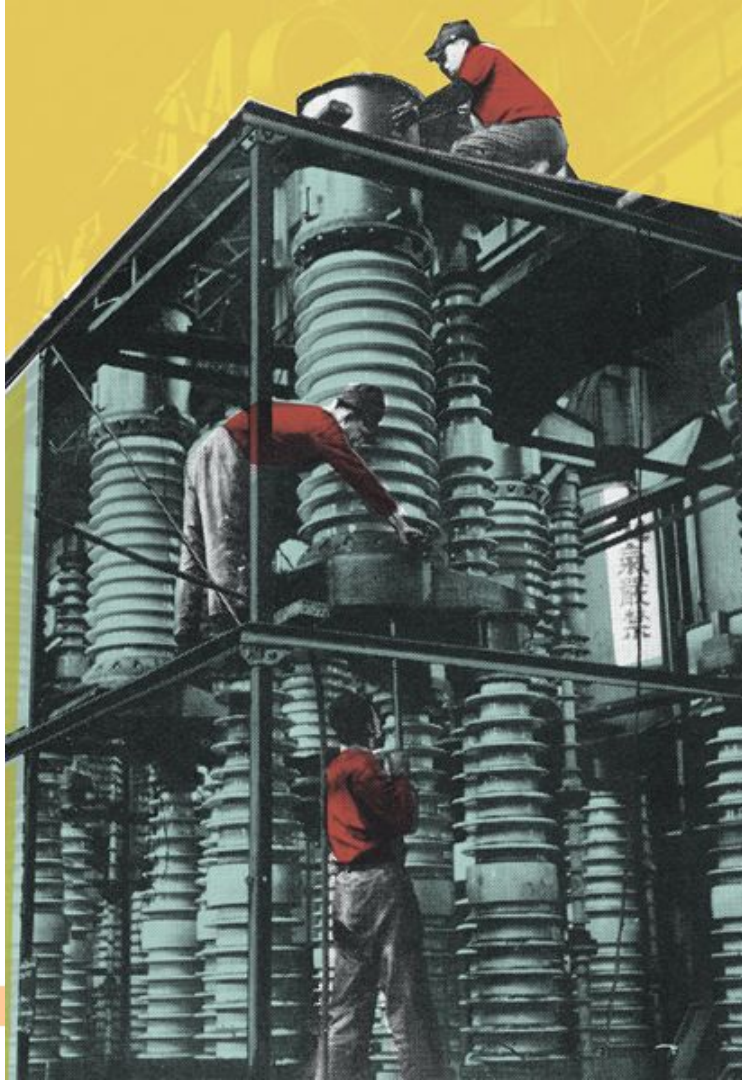
Day 4:

- Working Folder:
  C:\FMEData2019\Resources\EsriUN\BasicV3

- Documentation located in:
  C:\FMEData2019\Resources\EsriUN\BasicV3\Documentation
-

Resources

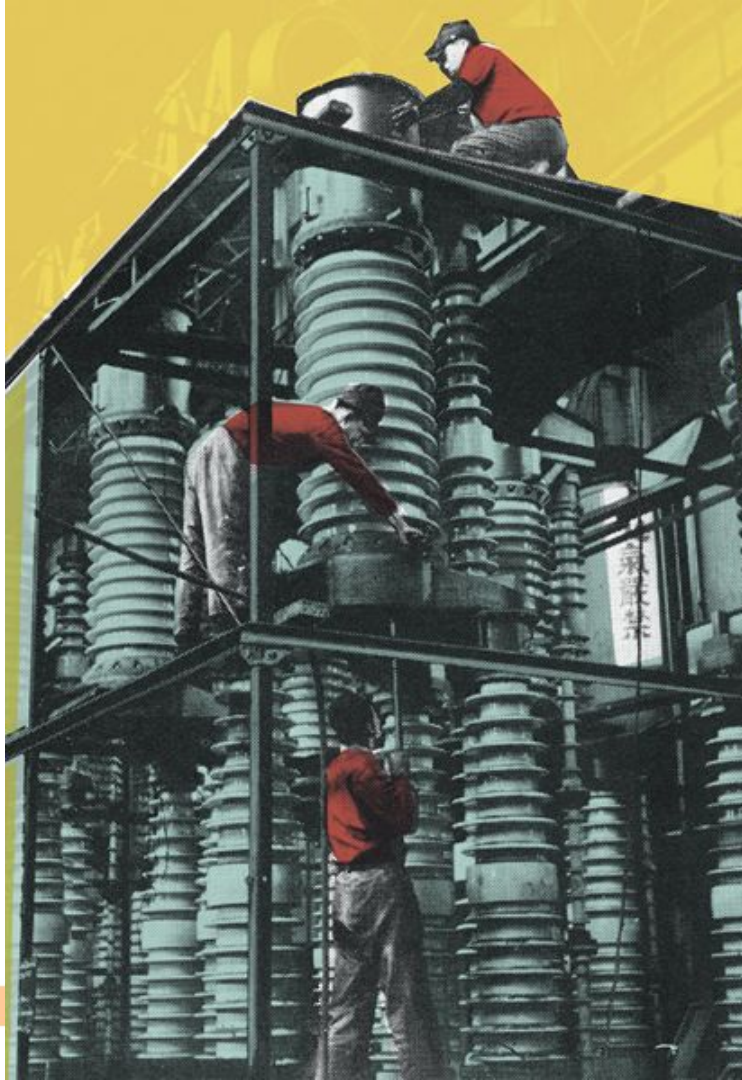
- **FME Training for Utility Networks**
  https://knowledge.safe.com/articles/72048/utility-network-migration-tools.html
- **Esri ArcGIS Pro Utility Network Migration Tools**
  https://knowledge.safe.com/articles/72048/utility-network-migration-tools.html
- **Esri GeoNet - Utility Network Migration Status Page**
  https://community.esri.com/thread/214206-esri-utility-network-configuration-and-migration-tool-status
- **What is Esri Utility Network**
  http://pro.arcgis.com/en/pro-app/help/data/utility-network/what-is-a-utility-network-.htm
- **Introduction to Esri Asset Package**
  http://solutions.arcgis.com/utilities/help/utility-network-automation/asset-package-reference/an-overview-of-the-asset-package.htm
- **Documentation**
  Electric Distribution Utility Network Migration Tools Documentation.pdf
  Esri Utility Network_ Assembly XML Doc.pdf



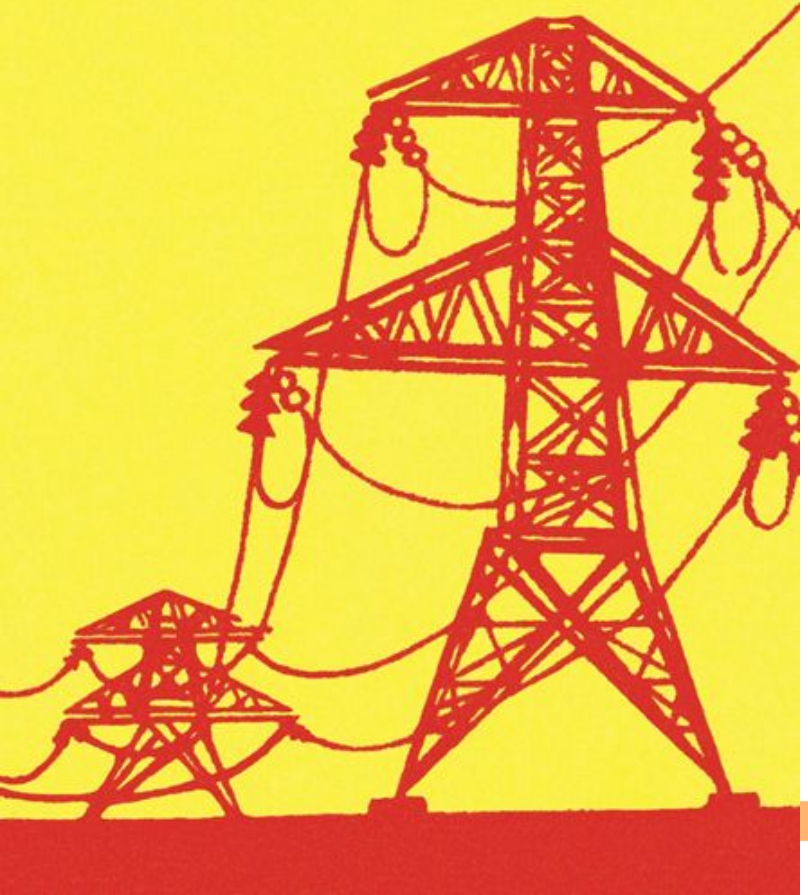
Even More Resources

- Find the folder:
  `C:\FMEData2019\Resources\EsriUN\BasicV3`
- Workspaces
  - `B Rules Additions.fmw`
  - `Electric Migration V3.fmw`
  - `ElectricAssetPackageValidation v3.2.fmw`
- Sub-Folders
  - AssemblyBuilder
  - AssetPackageTemplate
  - Documentation
  - Results
  - SampleData
  - SchemaMapper

  - \+ exercise folders 1-4



Which Version?



Electric Migration

It’s very important to ensure you have the correct versions aligned, otherwise you might blow a fuse...:

- ArcPro
  - 2.4

- Data Interop extension (with ArcPro 2.4)

OR

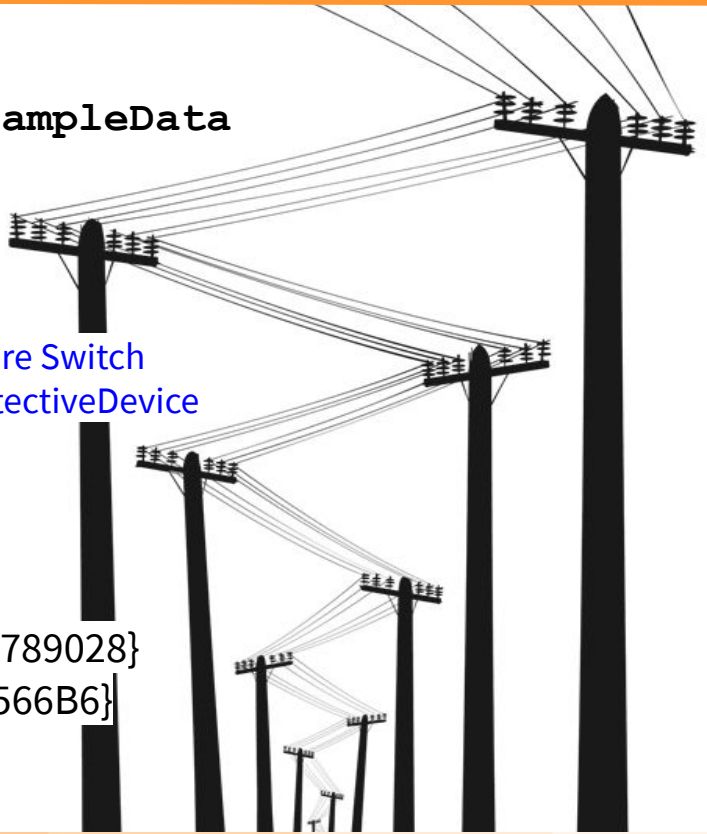
- FME
  - 2019.0.2.0 - Build 19260 or higher
  - WIN64 recommended

- Asset Package
  - Electric Asset Package 3.2

View the data in FME Data Inspector

View Source Data

- Open FME Inspector Data
- Format: Esri Geodatabase (File Geodb)
- Find the folder:
  `C:\FMEData2019\Resources\EsriUN\BasicV3\`**`SampleData`**
  `(geodb is a ZIP file!)`
- Select Feature Classes to display:
  BusBar Fuse PriOHElectricLineSegment PriUGElectricLineSegment SecOHElectricLineSegment SecUGElectricLineSegment SecUGElectricLineSegment_Duct SupportStructure SurfaceStructure Switch SwitchingFacility Transformer UndergroundStructure DynamicProtectiveDevice FuseUnit
- Save table List using: Save as My Defaults
- Find an object in Data Inspector
  Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
  Switch Facility: {0FE54F47-E32D-441A-ADBB-01167E789028}
  Transformer: {5B14398A-49FB-4E0A-A861-D25BD63566B6}
- Change Display Settings

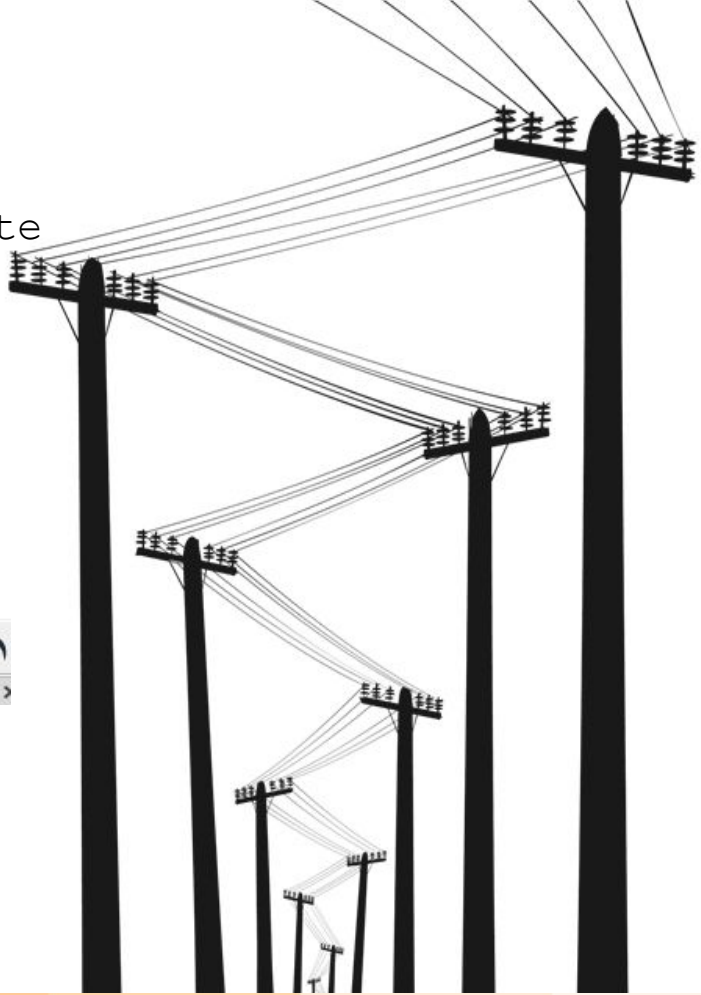


Exercise: Update Asset Package B_Rules

- Find the folder:
  `C:\...\EsriUN\BasicV3\AssetPackageTemplate`
- New rules: `Rules 2019-11-13.csv`

- Open the workspace:
  `B_Rules Additions.fmw`
- Set Enable Feature Caching: **Off**
  Add toolbar icons...

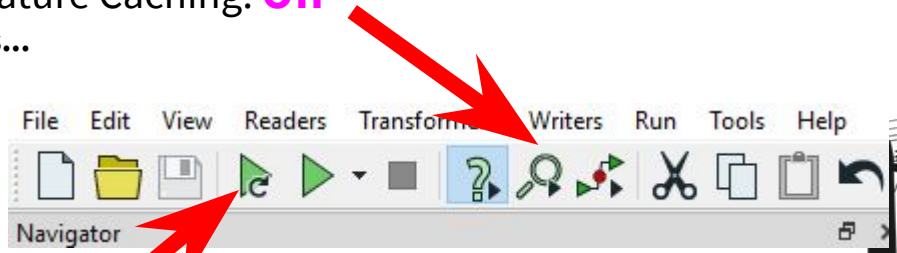
- Run the workspace & check the parameters



Run the Electric Migration

Step 1: Run a Migration

- Find the folder:
  `C:\FMEData2019\Resources\EsriUN\BasicV3`
- Open the workspace:
  `Electric MigrationV3.fmw`
- Set Enable Feature Caching: **Off**
  Add toolbar icons...



- Run the workspace & check the parameters
- Check the results in Data Inspector
  Find Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
- Isolate the data with Test Data & Feature Caching : **On**
  Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
  Switch Facility: {0FE54F47-E32D-441A-ADBB-01167E789028}
  Transformer: {5B14398A-49FB-4E0A-A861-D25BD63566B6}

Electric Migration Pattern

Basic Migration

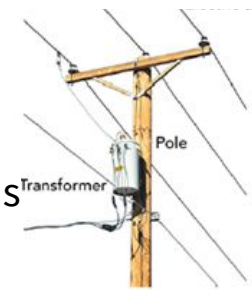
Schema Mapping

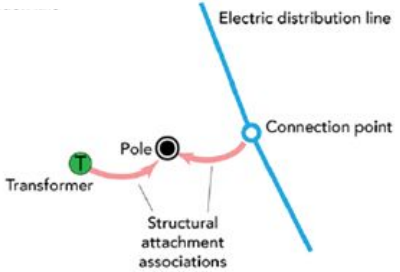
Network topology

- Geometric Network (lines & junctions)
- Explicit network (associations between junctions & devices)

Devices

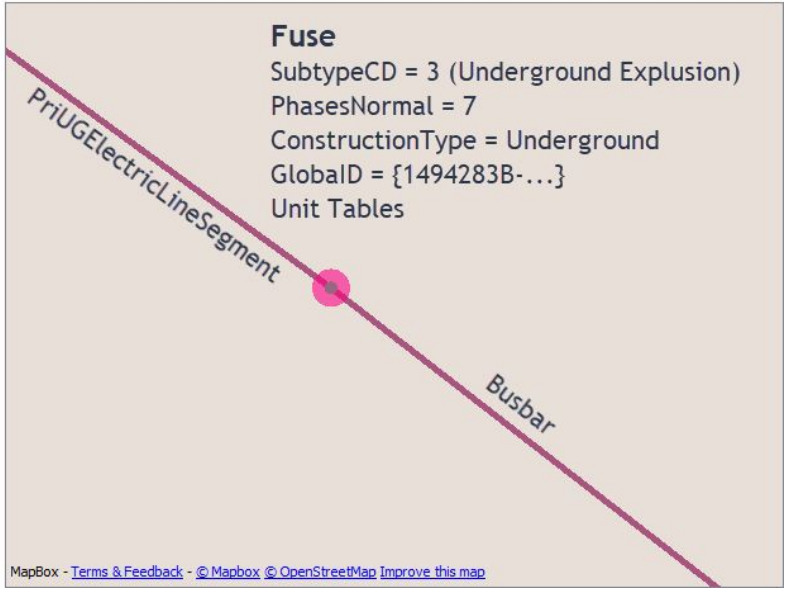
- More complex objects (devices). An ArcGIS device (point geometry) becomes multiple assets:
  - Assembly
  - Device
  - Junction
  - Associations
  - Terminals
  - Structures



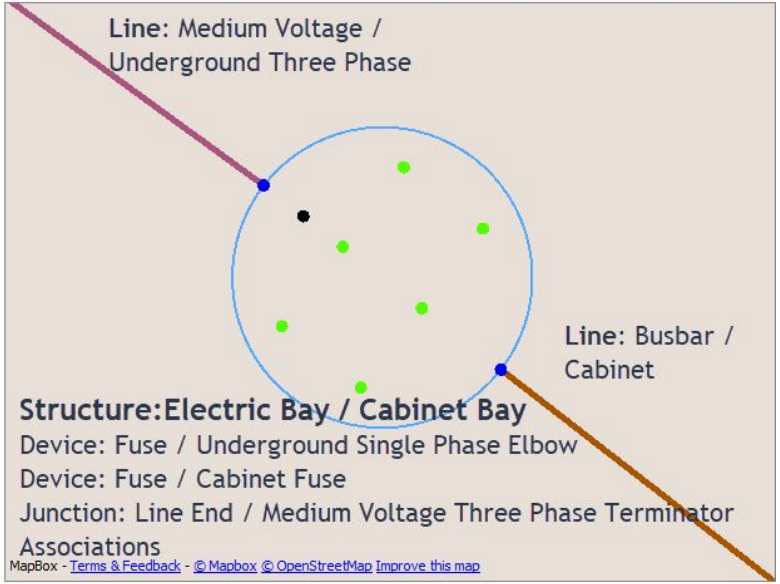


Electric Migration

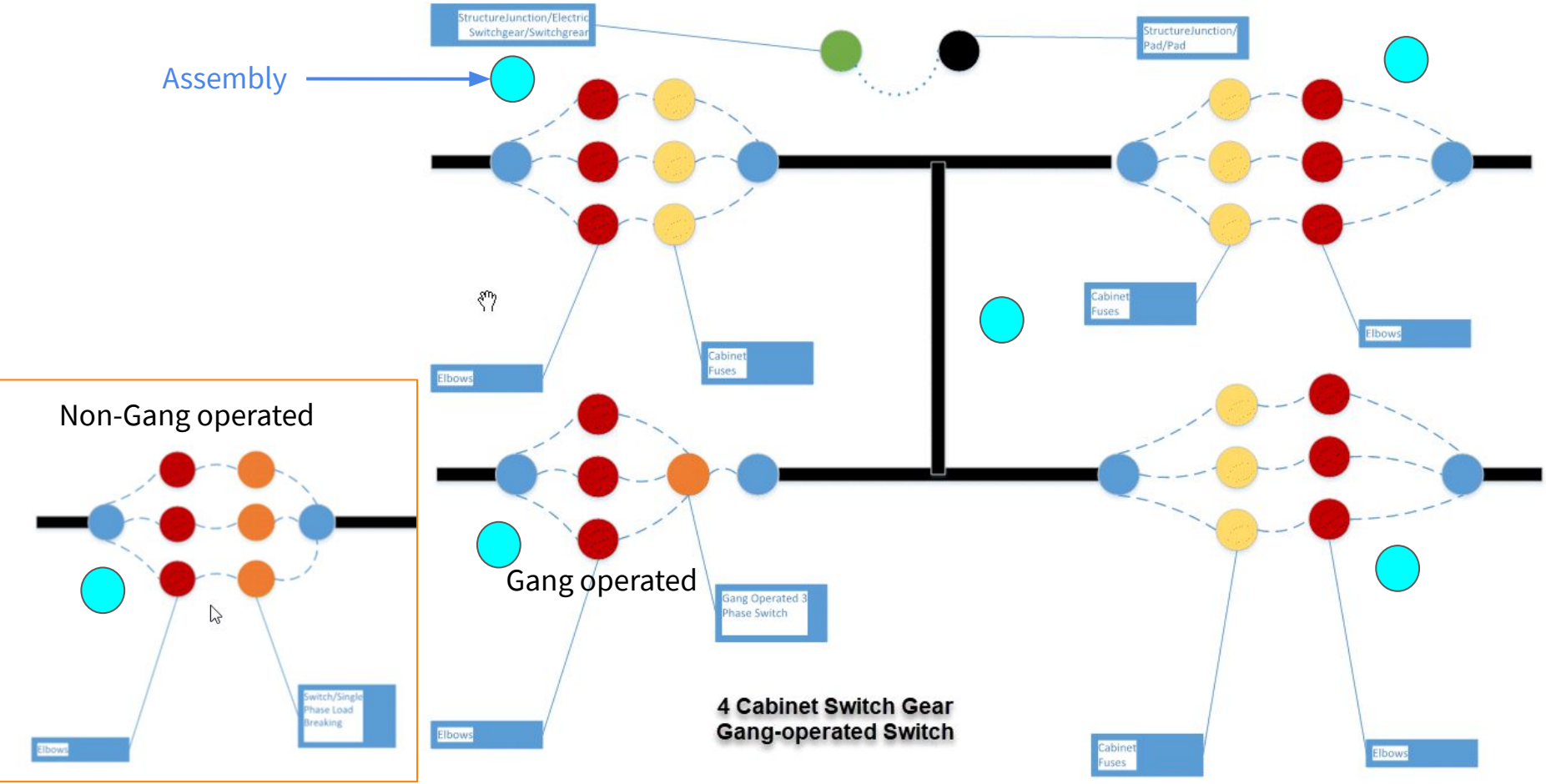
ArcGIS Device



UN Assembly / Support Structure



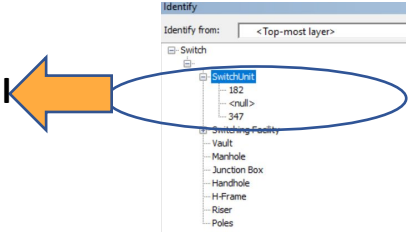
More complex devices

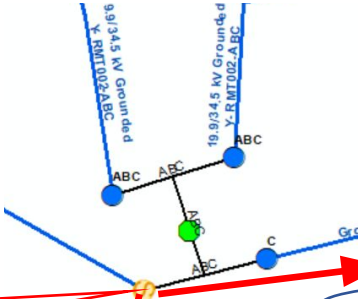


Creating Devices for Switch Gears

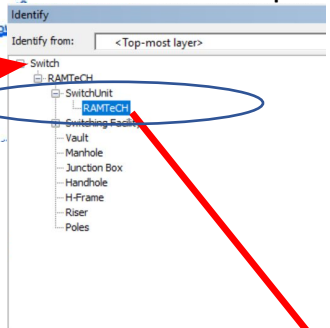
Three Unit Records for each phases

Defines number of devices and individual attributes of devices

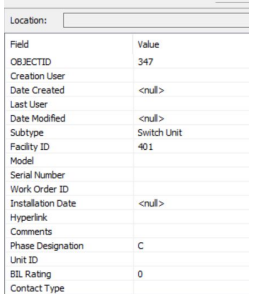




One Unit Record for all 3 phases



Or



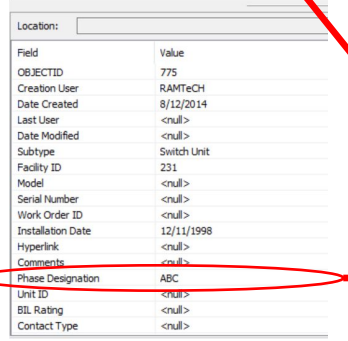
StructureJunction/Electric Bay/Cabinet Bay

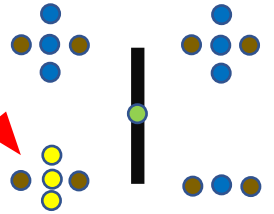
Switch Feature Class

Code	Description
1	Overhead Disconnect
2	Overhead Load Break
3	Underground Disconnect
4	Underground Load Break
5	SCADA Controlled Switch

Defines Device Asset Group / Type

ElectricDevice/Switch/Overhead Medium Voltage Three Phase Load Breaking



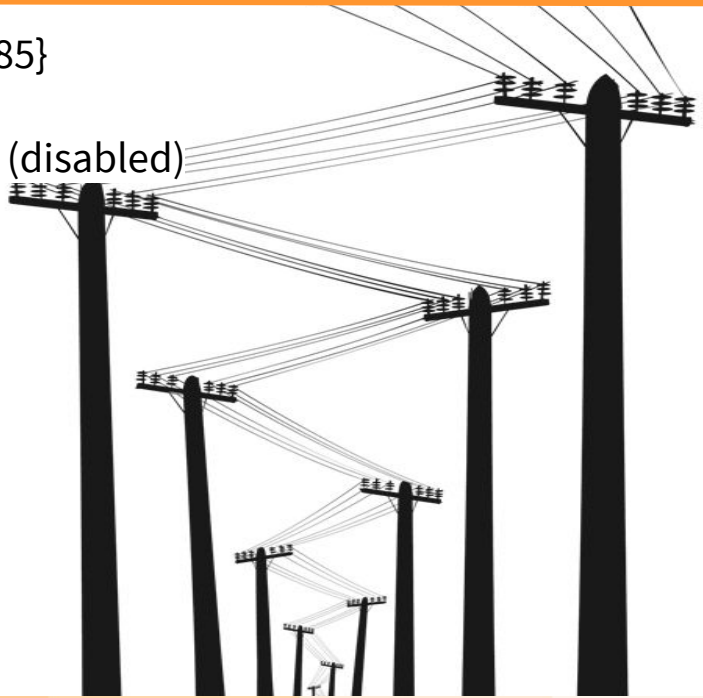


Electric Migration Results and Testing

Step 2: Results & Testing

- Check the results in Data Inspector
  Find Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}

- Check the Data Errors Excel Spreadsheet or Redline Geodb (disabled)



Step 3: Results & Testing

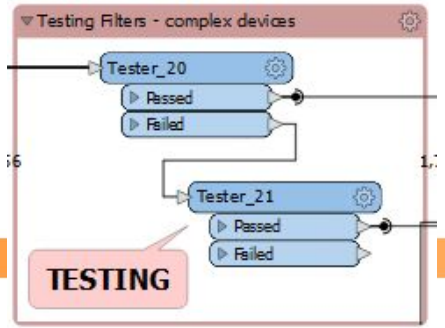
Electric Migration Results and Testing

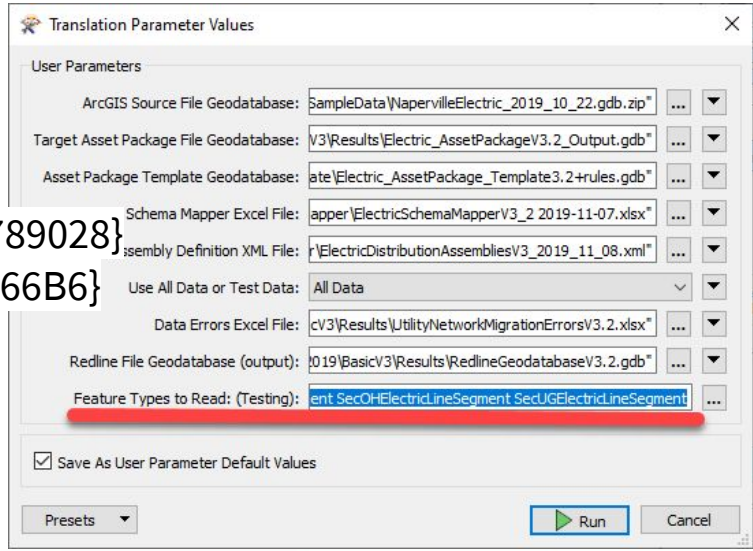
Use Fewer Feature Classes

- Test one Feature Class at a time
  - Feature Types to Read, for example:
    `BusBar` **`Fuse FuseUnit`** `PriOHElectricLineSegment PriUGElectricLineSegment SecOHElectricLineSegment SecUGElectricLineSegment`

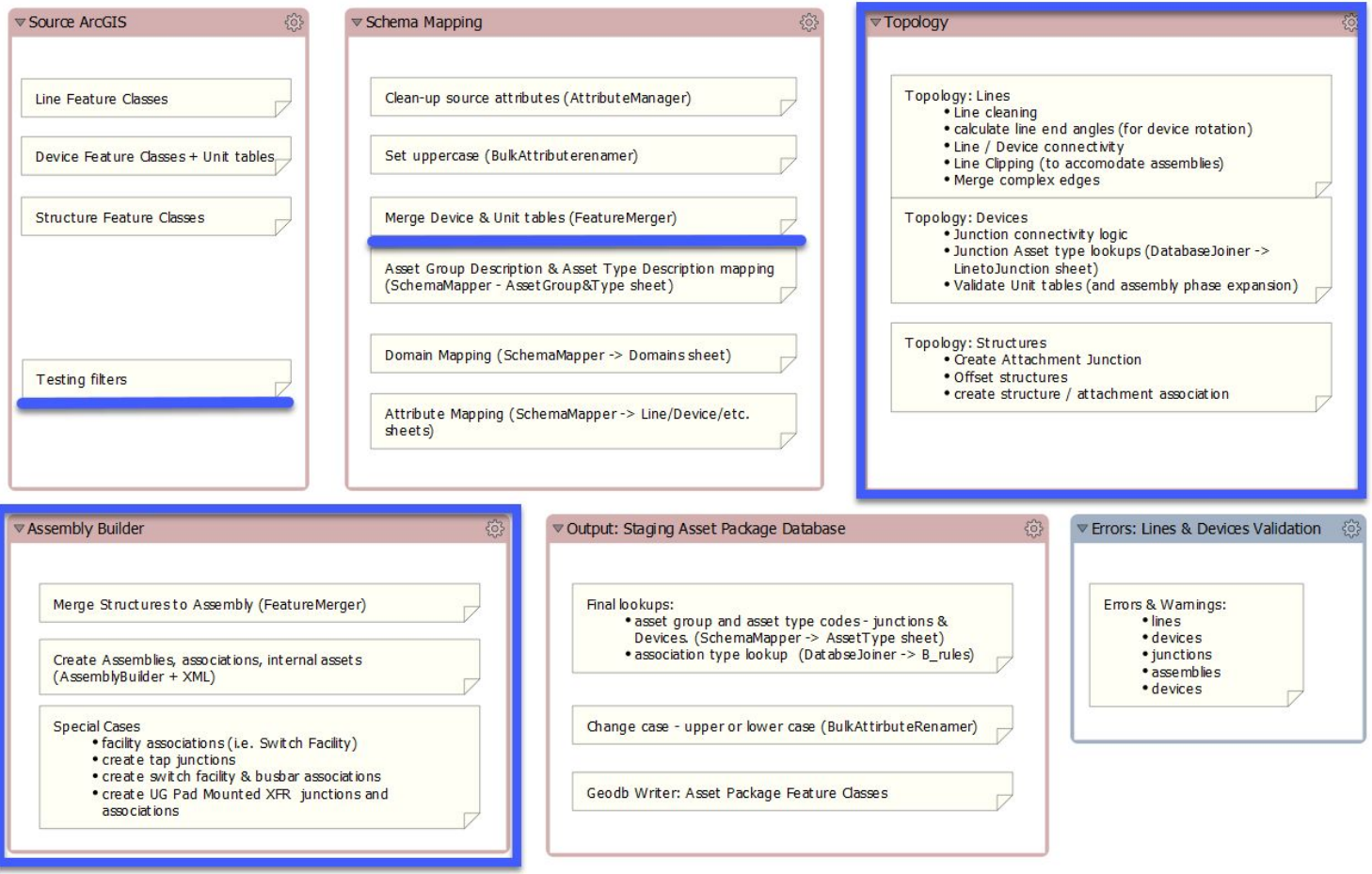
Test Runs & Debugging

- Isolate the data with Test Data & Feature Caching : **On**
  - Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
  - Switch Facility: {0FE54F47-E32D-441A-ADBB-01167E789028}
  - Transformer: {5B14398A-49FB-4E0A-A861-D25BD63566B6}

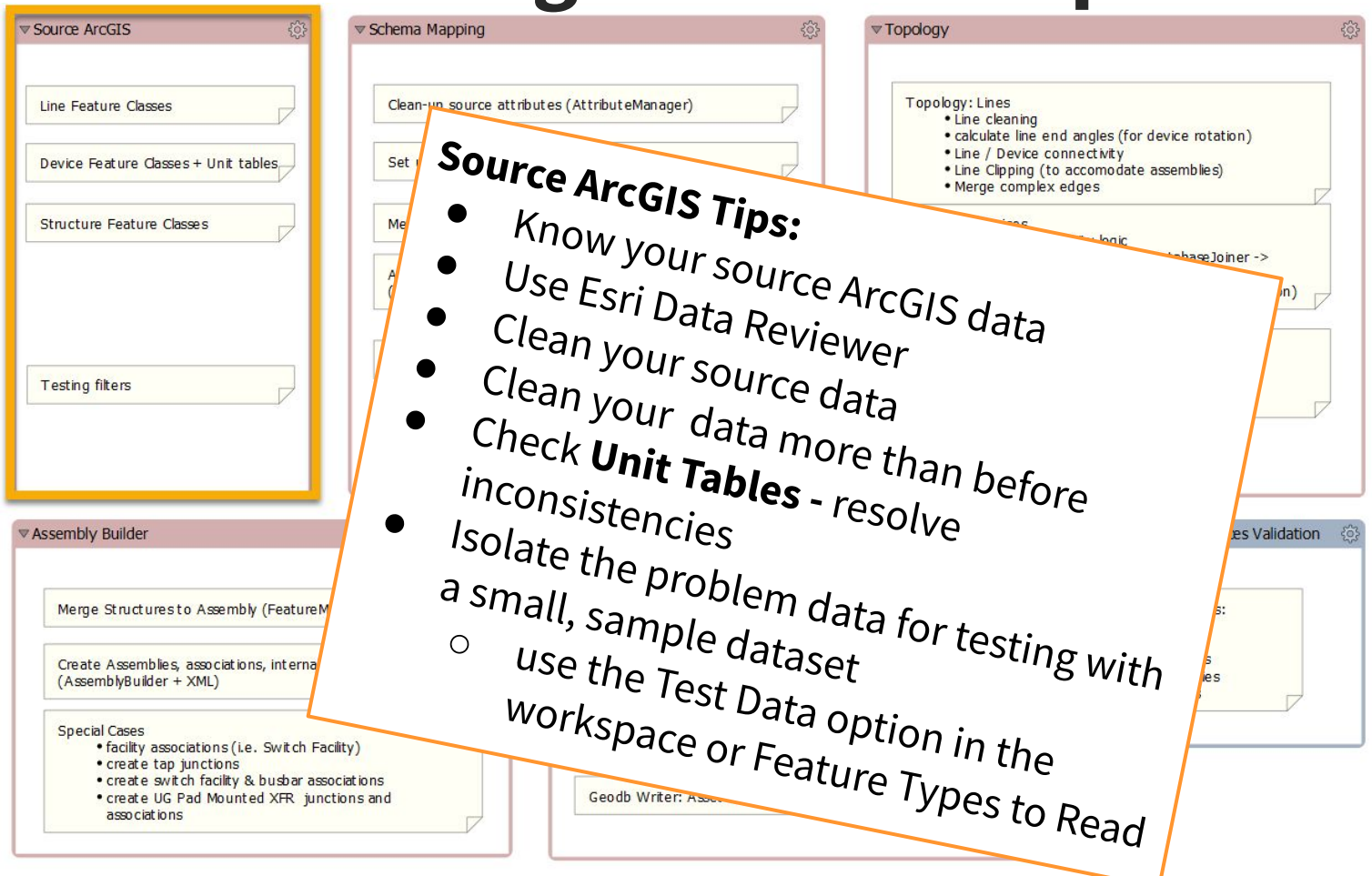




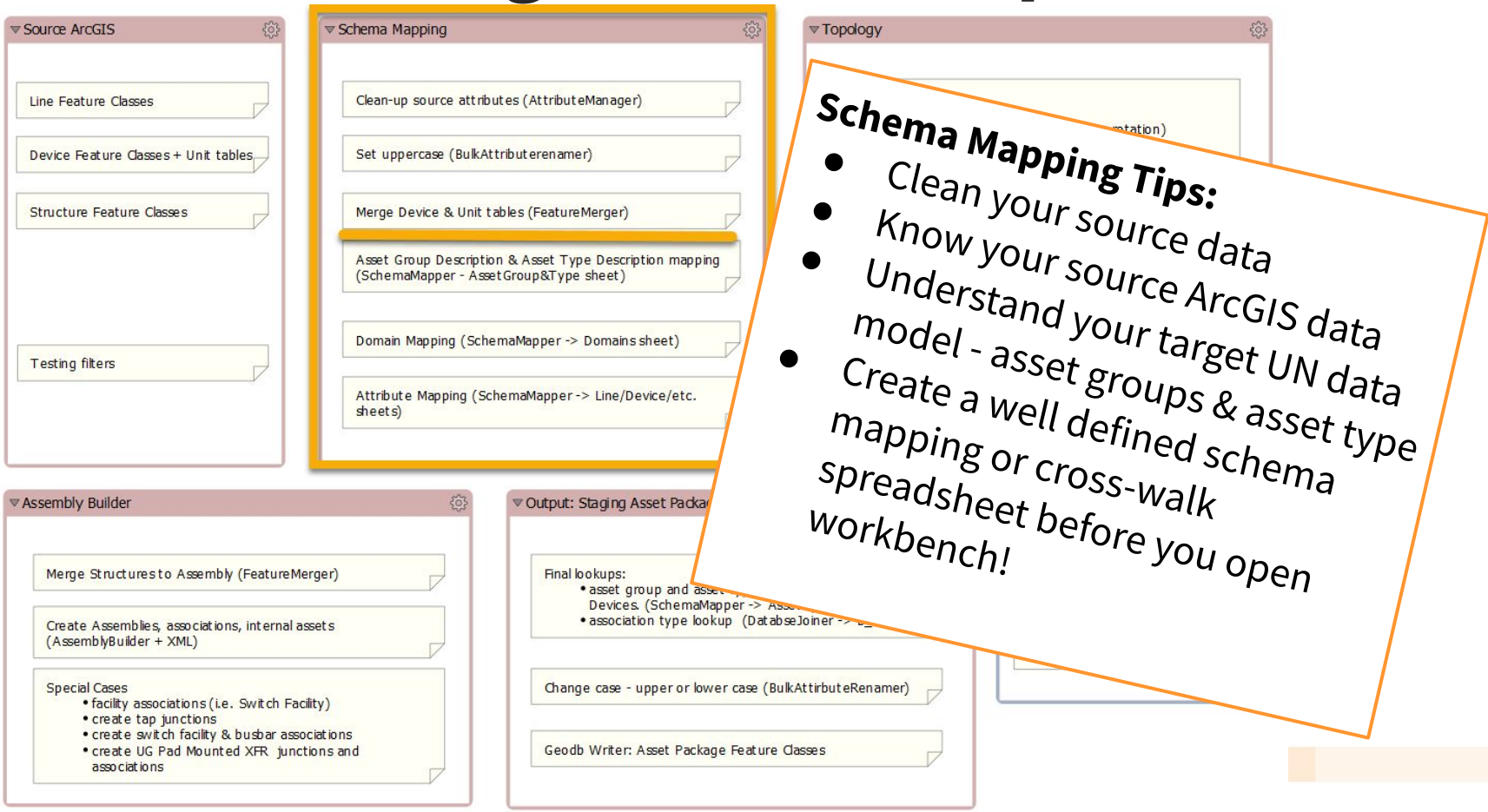
Electric Migration Workspace



Electric Migration Workspace



Electric Migration Workspace



Schema Mapping

Did we mention that schema mapping is:

- Time consuming
- Very detailed
- **It's time consuming**
- **It's very detailed**
- You need to understand your existing ArcGIS data model
  - Did you use a non-standard data model?
- You need to understand the target Utility Network data model
  - Understand the Asset Group (Subtypes) & Asset Type (Domains)
  - Did you modify the standard UN Data model? Import new B-Rules

You need to do the schema mapping whether you use FME or some other migration tool

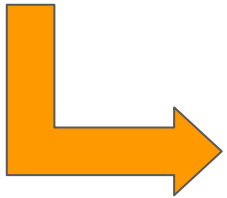
Consider talking to your Esri support experts.

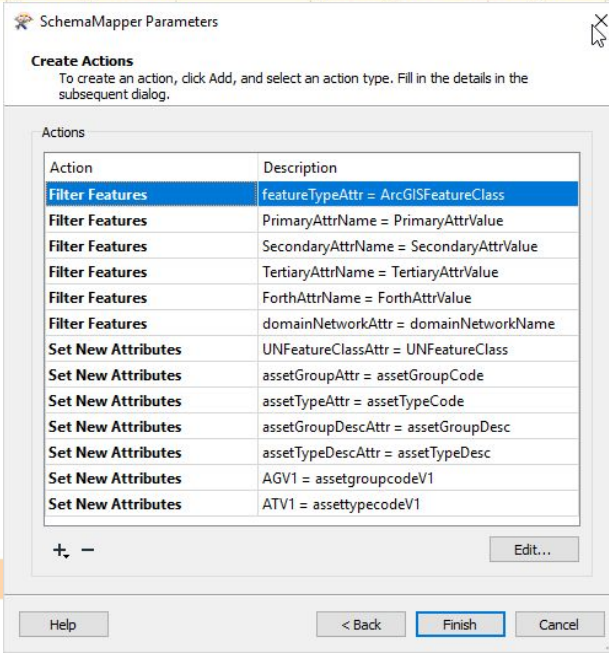
	B	G	H	I	J	L	M	N	O	P	Q	R
1	UNFeatureClass	assetGroupCode	assetGroupDesc	assetTypeCode	assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue	SecondaryAttrName	SecondaryAttrValue	TertiaryAttrName	TertiaryAttrValue
407	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	1		
408	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	2		
409	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	4		
410	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	7		
411	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	1		
412	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	2		
413	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	4		
414	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7		
415	ElectricDevice	37	Medium Voltage Switch	759	Underground Three Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
416	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
417	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	5	_AGDevice_PHASEDESIG	7	_AGDevice_CONSTRUCTIC	Underground

Schema Mapping: Setting Asset Group & Asset

	B	G	H	I	J	L	M	N	O	P	Q	R
1	UNFeatureClass	assetGroupCode	assetGroupDesc	assetTypeCode	assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue	SecondaryAttrName	SecondaryAttrValue	TertiaryAttrName	TertiaryAttrValue
407	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	1		
408	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	2		
409	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	4		
410	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	7		
411	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	1		
412	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	2		
413	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	4		
414	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7		
415	ElectricDevice	37	Medium Voltage Switch	759	Underground Three Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
416	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
417	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	5	_AGDevice_PHASEDESIG	7	_AGDevice_CONSTRUCTIC	Underground

Spreadsheet



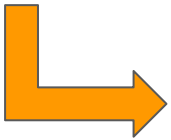


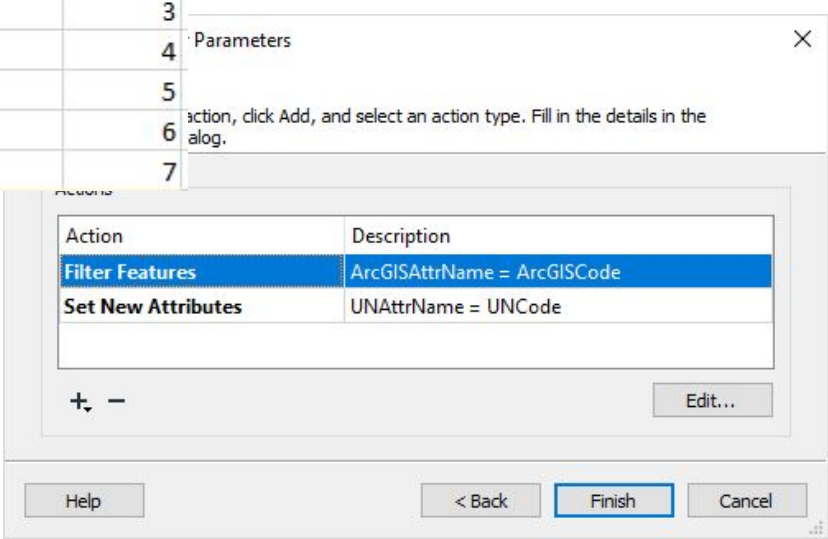
Tip: Accurate mapping to asset group & asset type for both device (assembly) and unit tables (devices) really helps

Schema Mapping: Mapping Domains

Spreadsheet

ArcGISAttrName	UNAttrName	ArcGISDesc	ArcGISCode	UNDesc	UNCode
PHASEDESIGNATION	PHASESNORMAL			DeEnergized	0
PHASEDESIGNATION	PHASESNORMAL	C	1	C	1
PHASEDESIGNATION	PHASESNORMAL	B	2	B	2
PHASEDESIGNATION	PHASESNORMAL	BC	3	BC	3
PHASEDESIGNATION	PHASESNORMAL	A	4	A	4
PHASEDESIGNATION	PHASESNORMAL	AC	5	AC	5
PHASEDESIGNATION	PHASESNORMAL	AB	6	AB	6
PHASEDESIGNATION	PHASESNORMAL	ABC	7	ABC	7



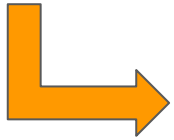


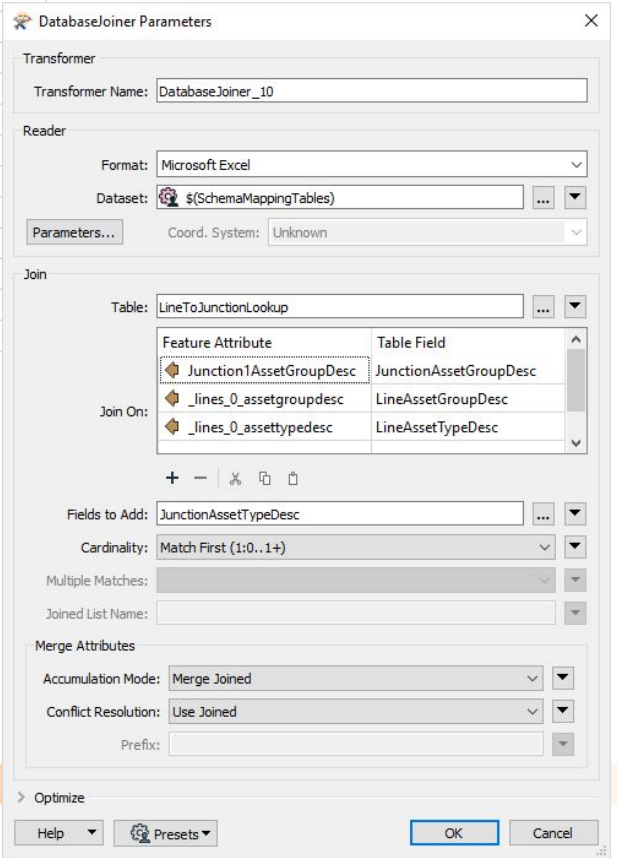
Tip: Domain mappings can be applied to single source feature classes or across all feature classes at once.

Schema Mapping: Line to Junction lookup

	LineAssetGroupDesc	LineAssetTypeDesc	JunctionAssetGroupDesc	JunctionAssetTypeDesc
2	Low Voltage Conductor	Unknown	Low Voltage Line End	Unknown
3	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End
4	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End
5	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End
6	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator
7	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator
8	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator
9	Medium Voltage Conductor	Unknown	Medium Voltage Line End	Unknown
10	Medium Voltage Conductor	Overhead Single Phase	Medium Voltage Line End	Overhead Line End
11	Medium Voltage Conductor	Overhead Three Phase	Medium Voltage Line End	Overhead Line End
12	Medium Voltage Conductor	Overhead Two Phase	Medium Voltage Line End	Overhead Line End
13	Medium Voltage Conductor	Underground Single Phase	Medium Voltage Line End	Underground Terminator
14	Medium Voltage Conductor	Underground Three Phase	Medium Voltage Line End	Underground Terminator

Spreadsheet

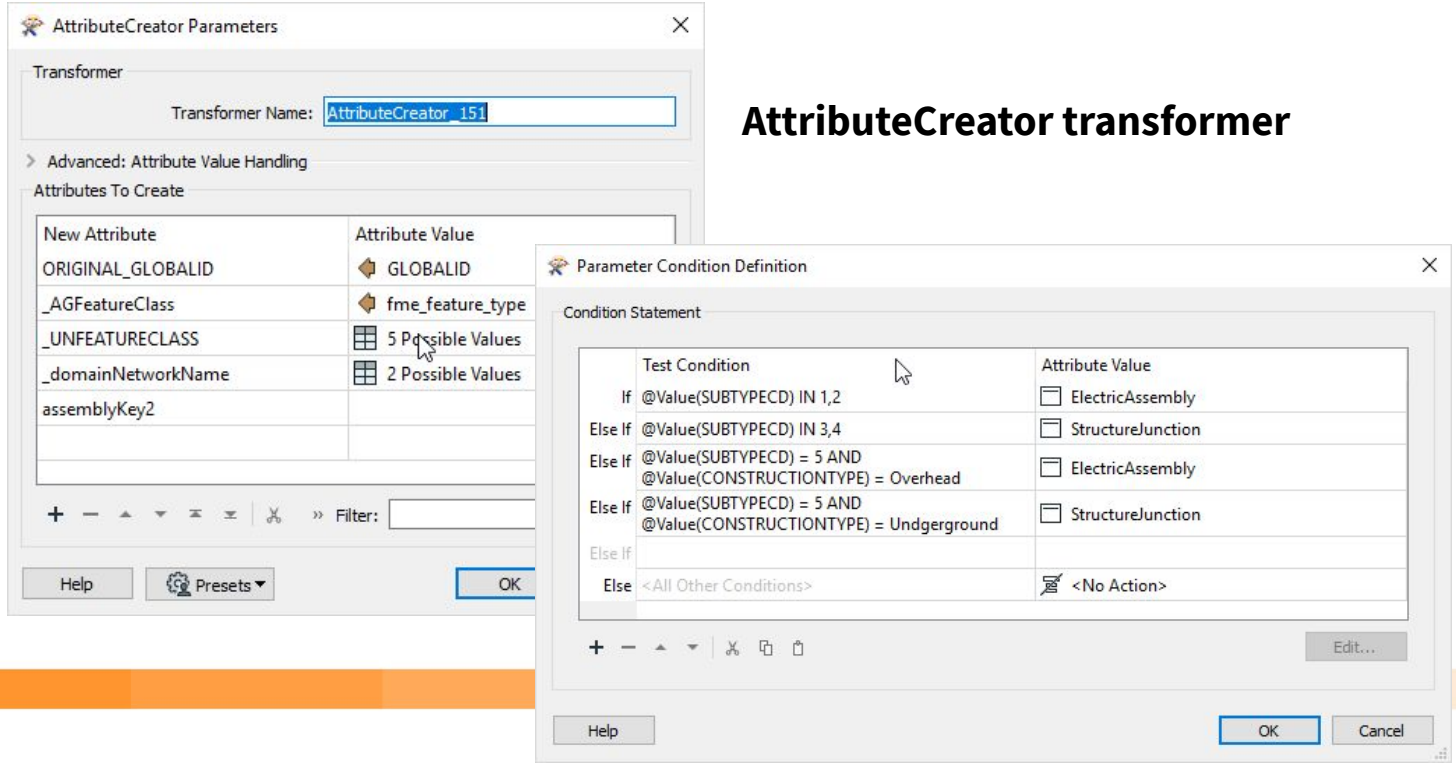




Tip: Determines the type of Junction attached to a conductor Line.

Schema Mapping: UN Feature Class & Domain Network

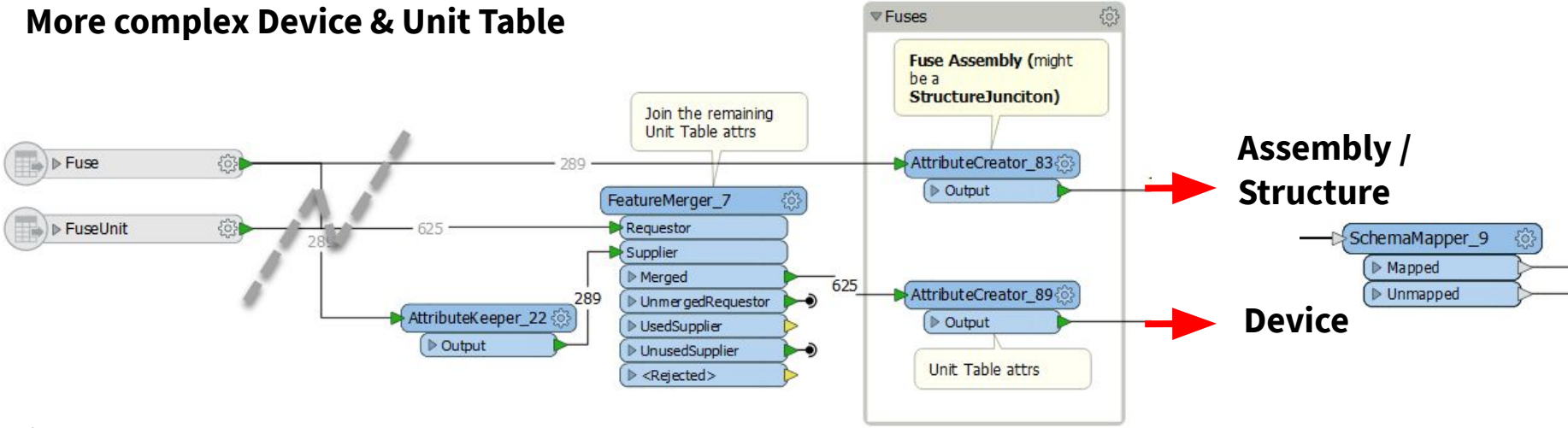
Source Feature Type ⇒ AttributeManager ⇒ BulkAttributeRenamer ⇒ AttributeCreator ⇒ ...



AttributeCreator transformer

Schema Mapping: AG Device & Unit Table

More complex Device & Unit Table



Tip: Unit Tables integrity really really helps

	B	G	H	I	J	L	M	N	O	P	Q	R
1	UNFeatureClass	assetGroupCode	assetGroupDesc	assetTypeCode	assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue	SecondaryAttrName	SecondaryAttrValue	TertiaryAttrName	TertiaryAttrValue
407	ElectricDevice	37	Medium Voltage Switch	755	Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	1		
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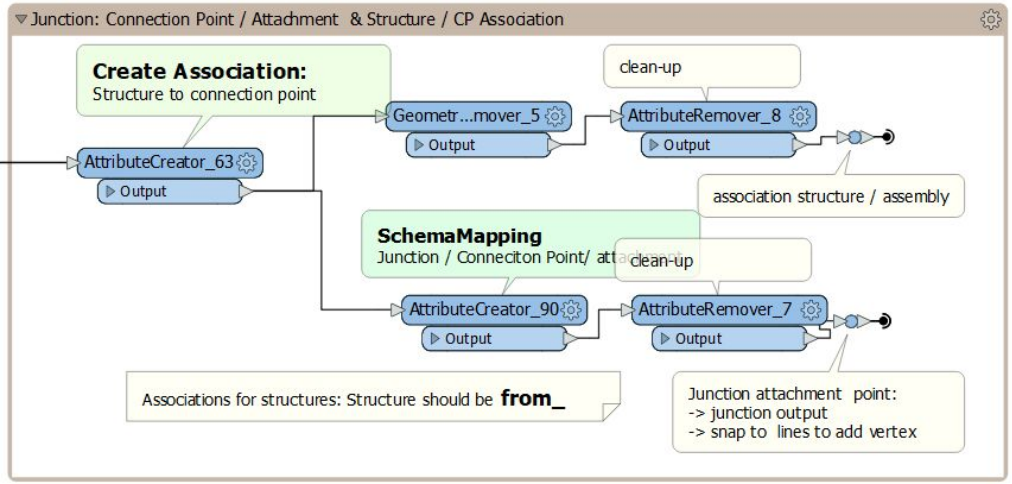
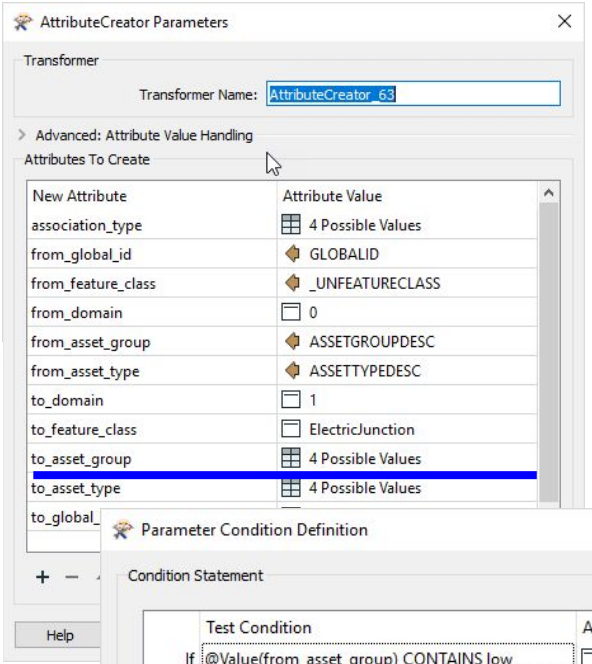
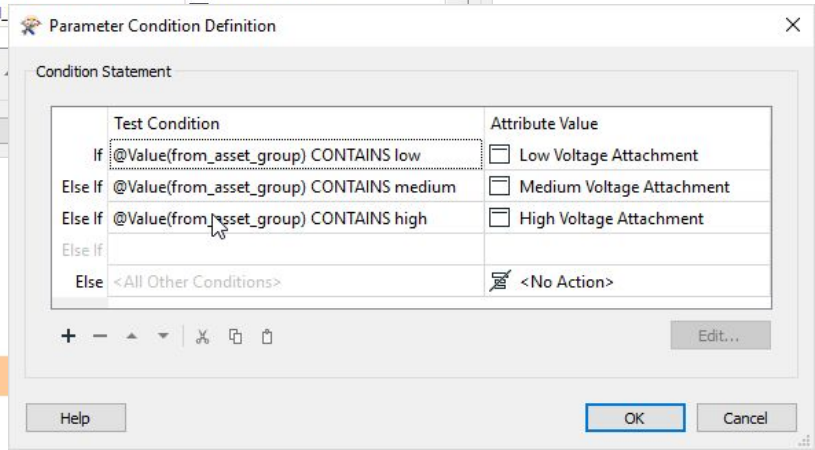
412	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	2		
413	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	4		
414	ElectricDevice	37	Medium Voltage Switch	758	Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7		
415	ElectricDevice	37	Medium Voltage Switch	759	Underground Three Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPEC	3	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
416	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	4	_AGDevice_PHASEDESIG	7	PHASEDESIGNATION	7
417	ElectricDevice	37	Medium Voltage Switch	760	Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPEC	5	_AGDevice_PHASEDESIG	7	_AGDevice_CONSTRUCTIC	Underground

Schema Mapping: Created Objects

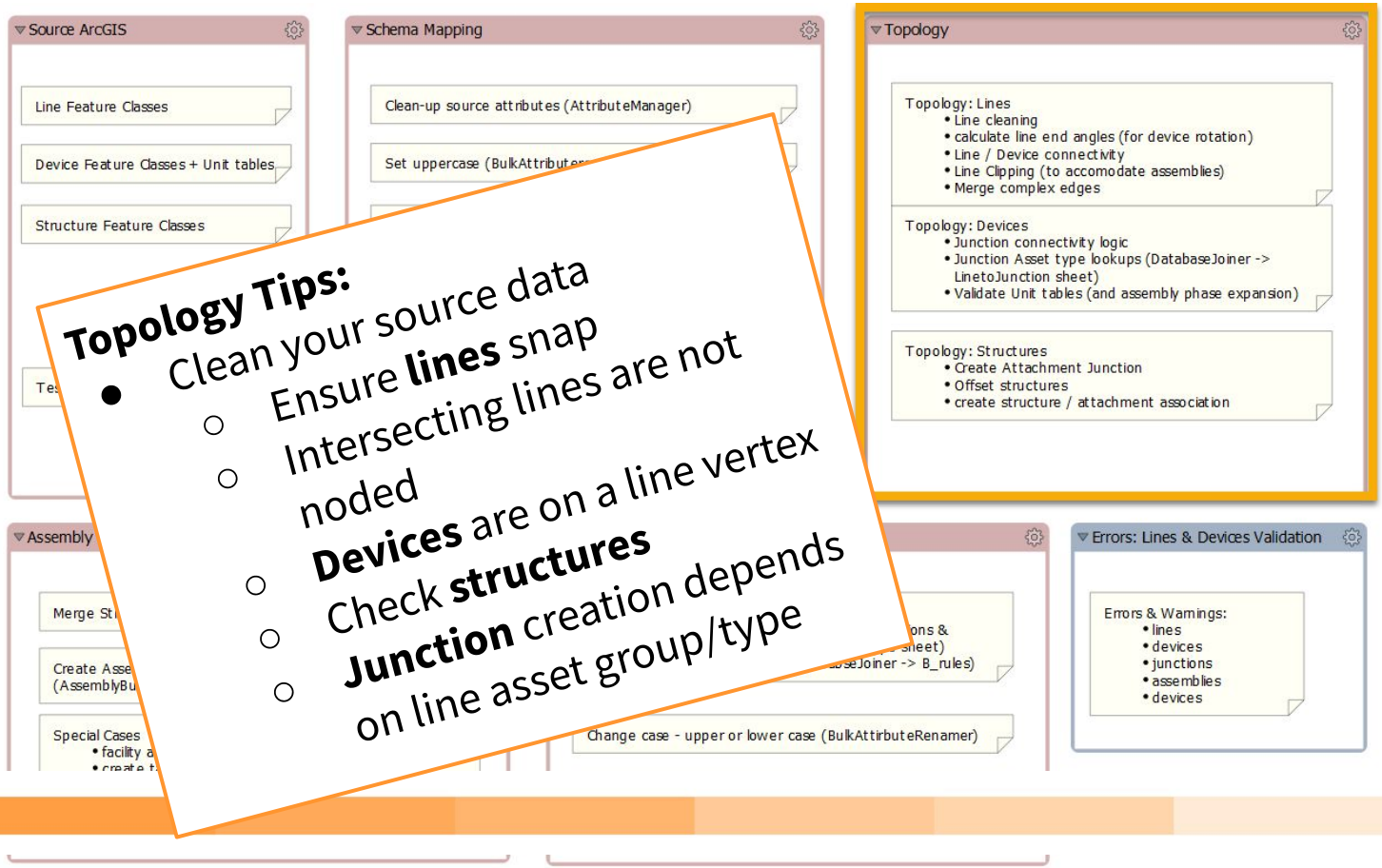
Connection Point / Attachment and Association







Electric Migration Workspace

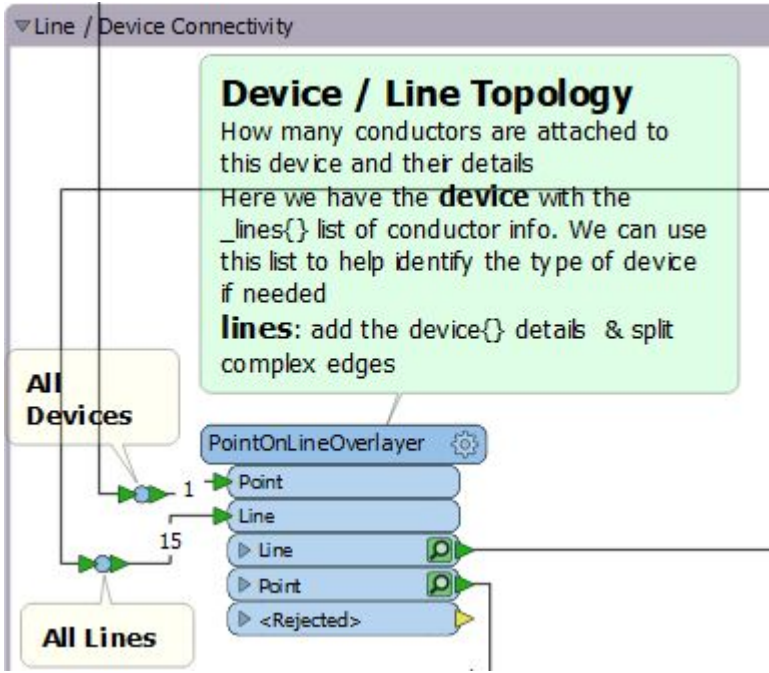


What Topology?

Devices

- Device Attributes
  - AssetGroupDesc / AssetTypeDesc
  - GlobalID
  - _ohug / _voltagelevel
  - _AG<*original attrs*>
  - _unit_table{}.<*attrs*>
  - Junction<n>AssetGroupDesc
  - STRCT_<*attrs*>
- Connected Lines
  - _lines{}.AssetGroupDesc / AssetTypeDesc
  - _lines{}.GlobalID
  - _lines{}._assembly_rotation
  - _lines{}._clip_flag

Topology



What Topology?

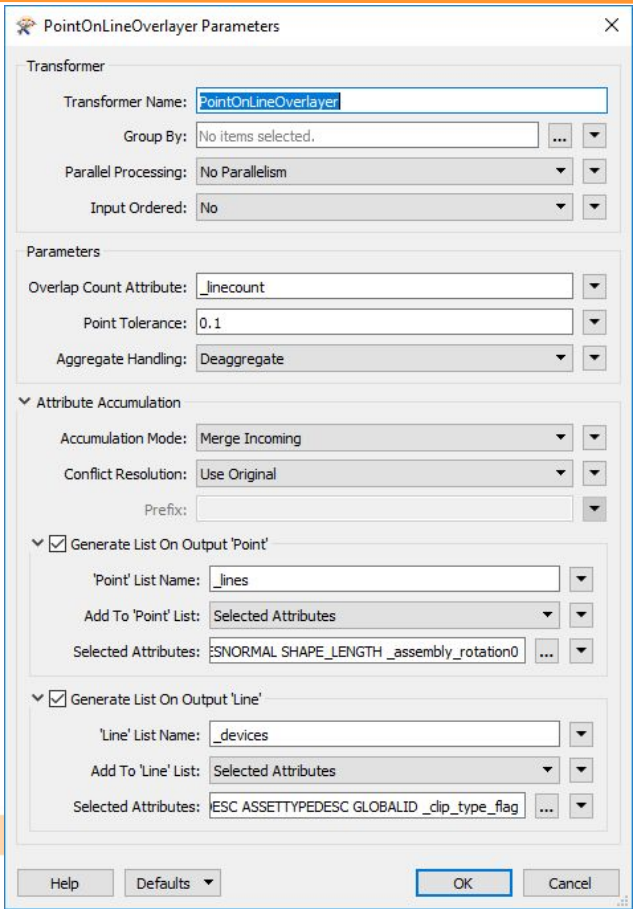
Topology

Lines

- Line Attributes
  - AssetGroupDesc / AssetTypeDesc
  - GlobalID
  - PhasesNormal
  - _ohug / _voltagelevel
- Connected Devices
  - _devices{}.AssetGroupDesc / AssetTypeDesc
  - _devices{}.GlobalID

Line Clipping

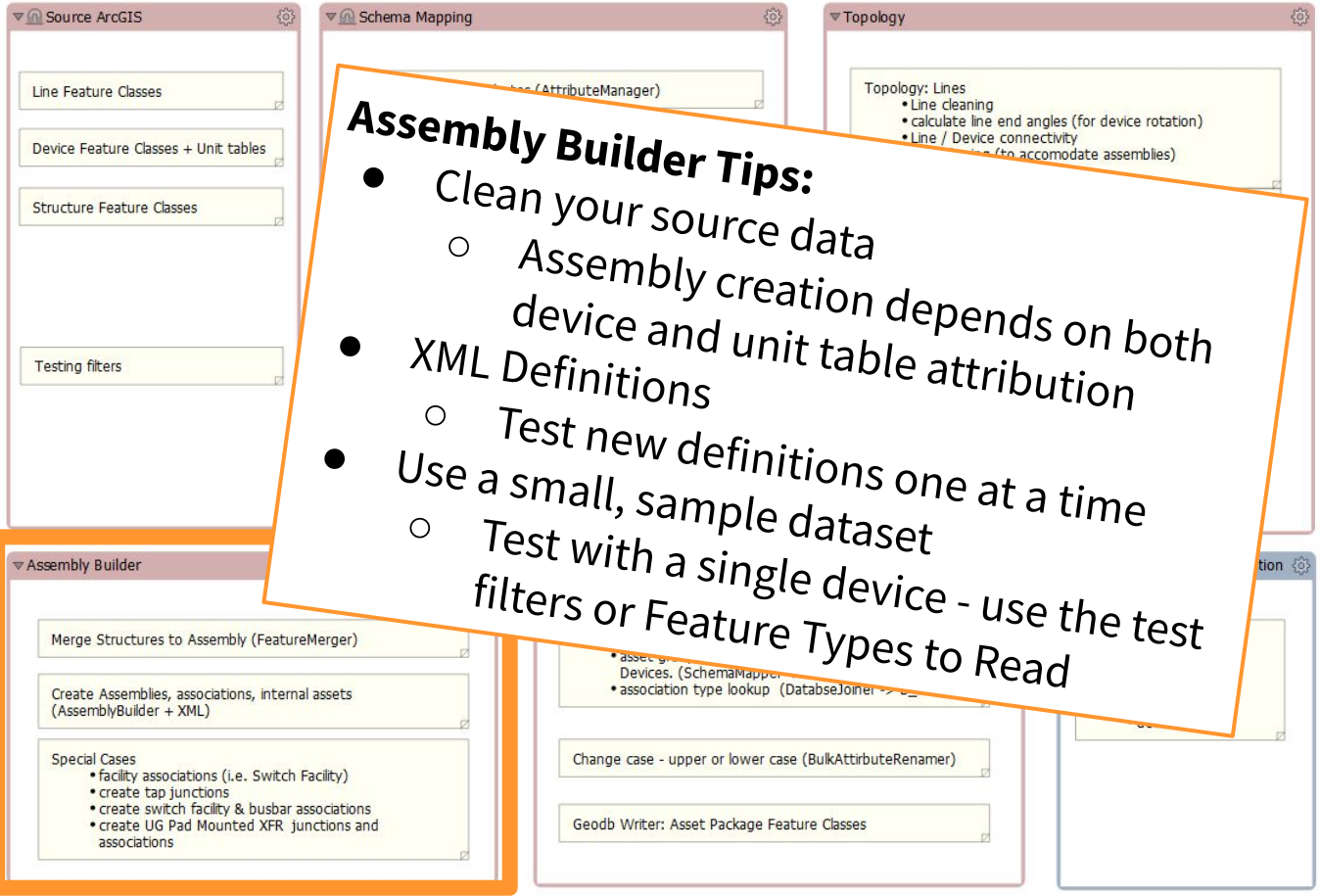
- Clip appropriate lines for assembly
  Warning - very short lines (<0.1 ft) can cause assembly placement errors



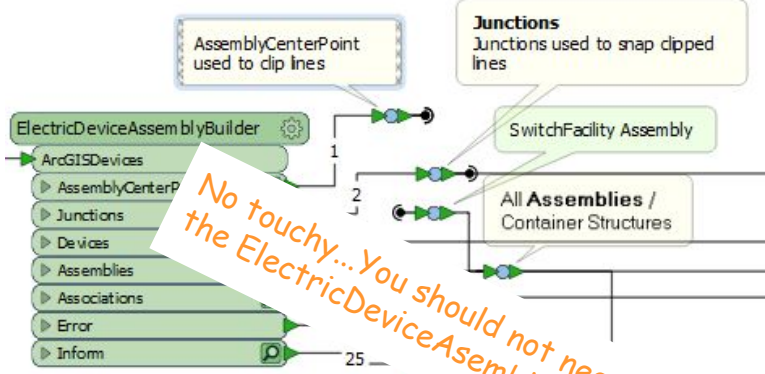
What Topology? Junction Connectivity Logic

- Lines
  - AssetGroupDesc / AssetTypeDesc
  - GlobalID
  - Make a guess at the junction...
- LineToJunctionLookup table (in the schema mapping spreadsheet)
  - LineAssetGroupDesc / LineAssetTypeDesc/JuncitonAssetGroup
  - ⇨ JunctionAssetType

Electric Migration Workspace



Assembly Builder



Merges:

- Device Features
- XML Assembly Definitions

Keys:

ASSETGROUPDESC	<assemblyGroupDesc>
ASSETTYPEDESC	<assemblyTypeDesc>
assemblyKey2	<assemblyKey2>

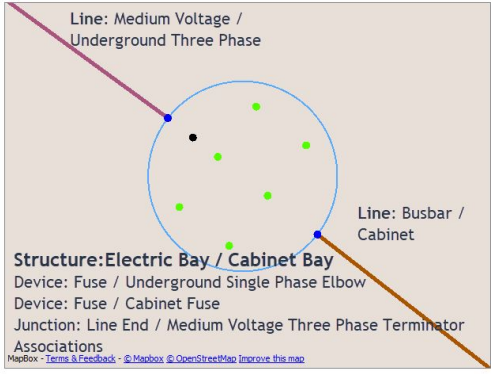
Output:

- Device
- Assembly / StructureJunction
- Associations
- Junctions
- AssemblyCenterPoint
- Error / Inform

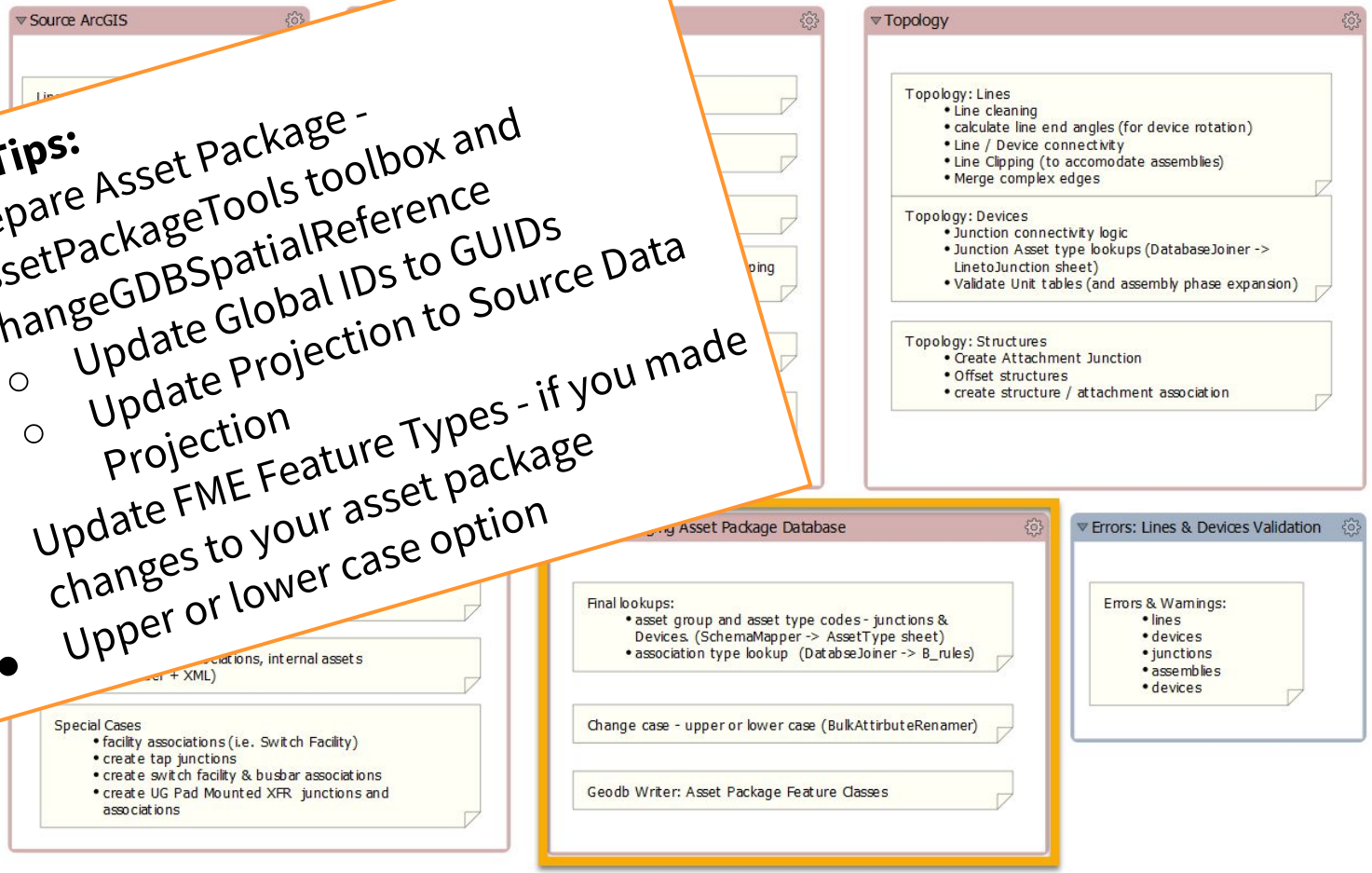
Documentation:

Esri Utility Network_ Assembly XML Doc.pdf

Assembly scale parameter...



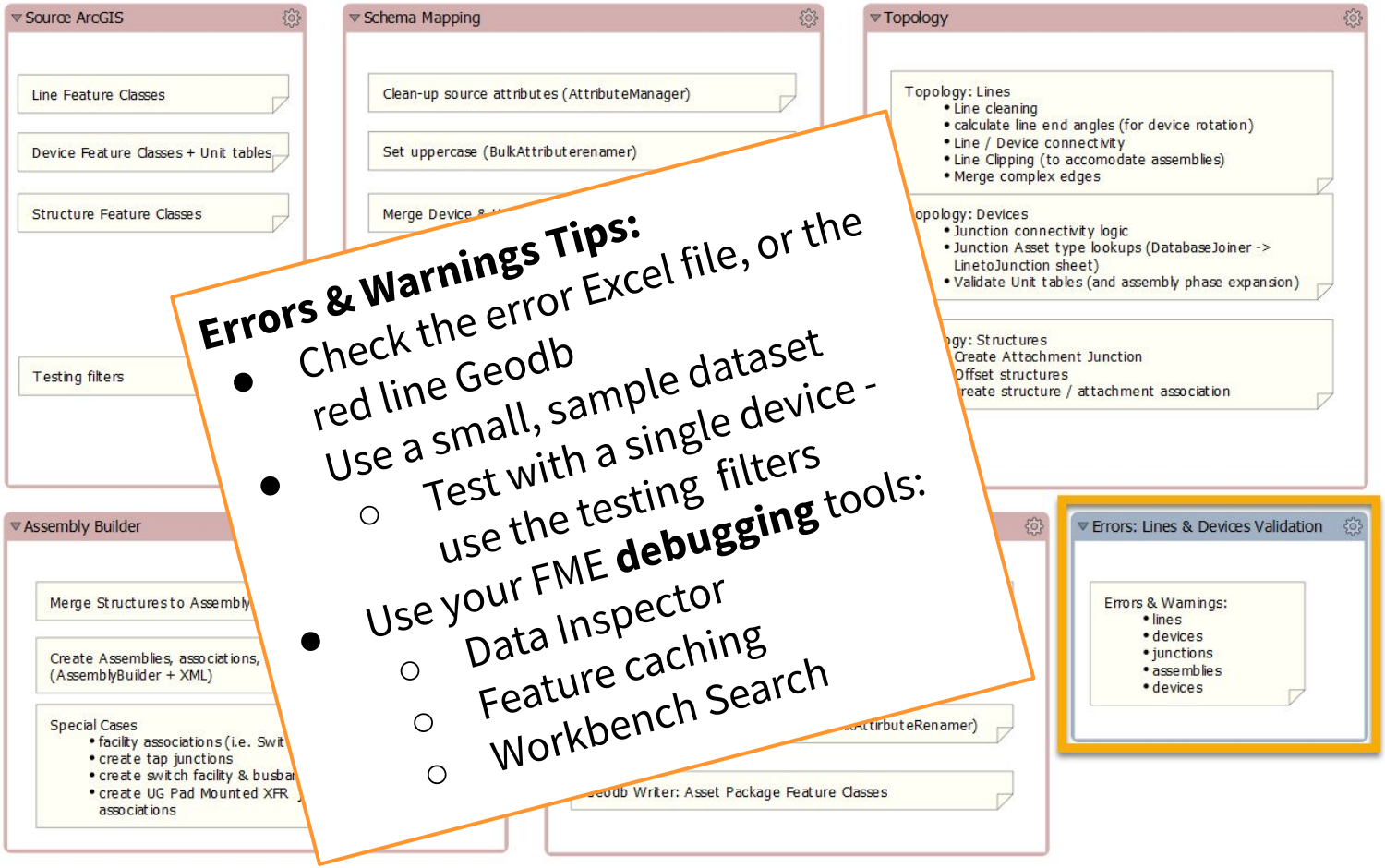
Electric Migration Workspace



Output Tips:

- Prepare Asset Package - AssetPackageTools toolbox and ChangeGDBSpatialReference
  - Update Global IDs to GUIDs
  - Update Projection to Source Data Projection
- Update FME Feature Types - if you made changes to your asset package
- Upper or lower case option

Electric Migration Workspace



migration testing tips...

Create Test Dataset

- Small Sample Dataset
- Test Each Device Type… be patient

Run FME Migration Workspace on Sample Data

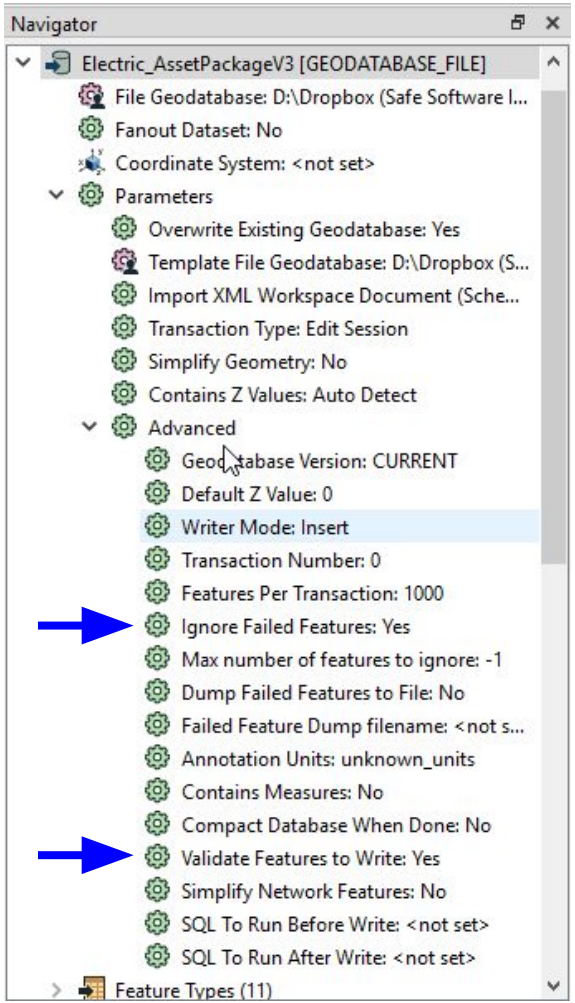
- Check Migration Reports
- Use Feature Types to Read for a single device
- Use the Test Data option

Use Feature Caching

- Only use on sample or ‘test’ data!

Geodatabase writer parameters might help...

- Ignore Failed Features: Yes
- Validate Feature to Write: Yes



migration testing tips...

There are two data models...

- Source ArcGIS Geometric Network Data Model
- Target Utility Network Asset Package Data Model

Source GN: Two Places the Schema is Defined

- Schema Mapping Spreadsheet
- Workspace (labeled SchemaMapping)

Target UN: Four Places the Schema is Defined

- Schema Mapping Spreadsheet
- LineToJunctionLookup
- Assembly XML
- Workspace (labeled SchemaMapping)
  We'll try and keep this schema up-to-date

Exercise - Fuse data error

Open workspace: "..\BasicV3\1.Fuse_Exercise\FuseExample.fmw"

Configure to test a single Fuse:

Fuse GlobalID:	{DA309538-67AA-4CC2-8185-145D75E2DA8E}
Structure GlobalID:	{185A715D-FEEA-4533-A922-D3763DEF224C}

Run workbench with Feature Caching ON + Test Data only
(also using Feature Types to Read)

Check error Excel - InvalidDevices tab
- note error transformer: TestFilter_21

Open `NapervilleElectric_Fuse.gdb` and check the data:

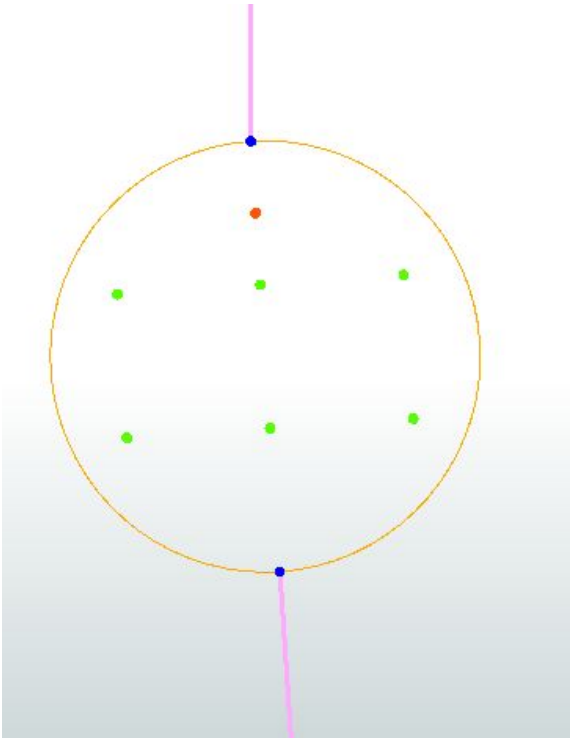
ArcGIS feature class list for easy viewing in Data Inspector:

BusBar **Fuse FuseUnit** PriOHElectricLineSegment PriUGElectricLineSegment SecOHElectricLineSegment SecUGElectricLineSegment

What's wrong with the offending Fuse or FuseUnit?

Re-Run with corrected data: `NapervilleElectric_2019_03_27.gdb.zip`

SubtypeCD: 1
PhaseDesignation: 7
ConstructionType = Overhead



Exercise - new source Feature Class: DynamicProtectiveDevice

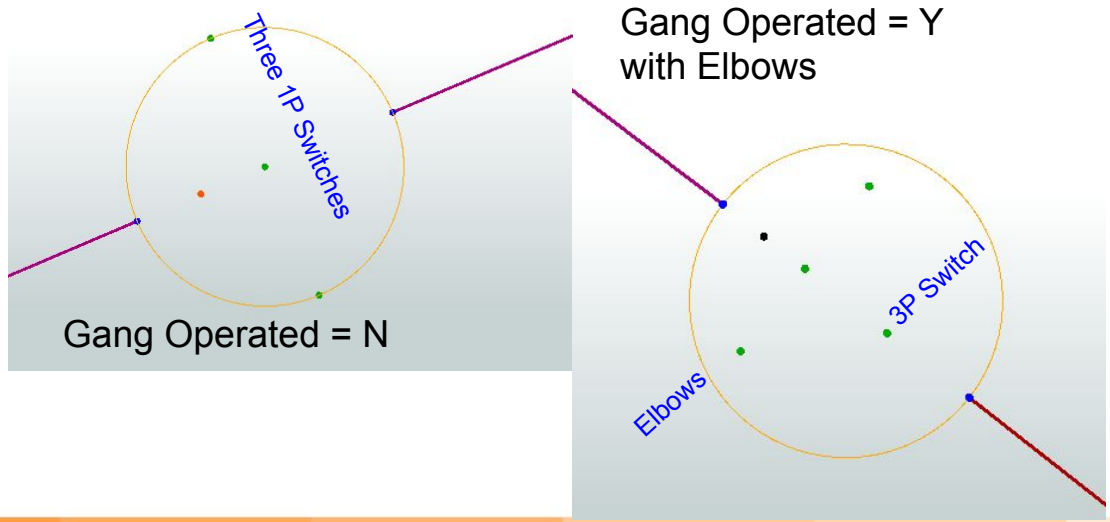
- Update the **Schema Mapping** Spreadsheet - AssetGroup&Type tab, etc.
- Update the Assembly Builder XML <assemblyDefNum>8</assemblyDefNum>
- Open workspace: "..BasicV3\2.DynamicProtectiveDevice_Exercise\DynamicProtectiveDevice - Begin.fmw"
  - Import Feature Types:
    DynamicProtectiveDevice
    RecloserUnit
    SectionalizerUnit
    Connect them. Add `fme_feature_type`
  - Copy transformers from similar objects - switches?

Cont… - new source Feature Class DynamicProtectiveDevice

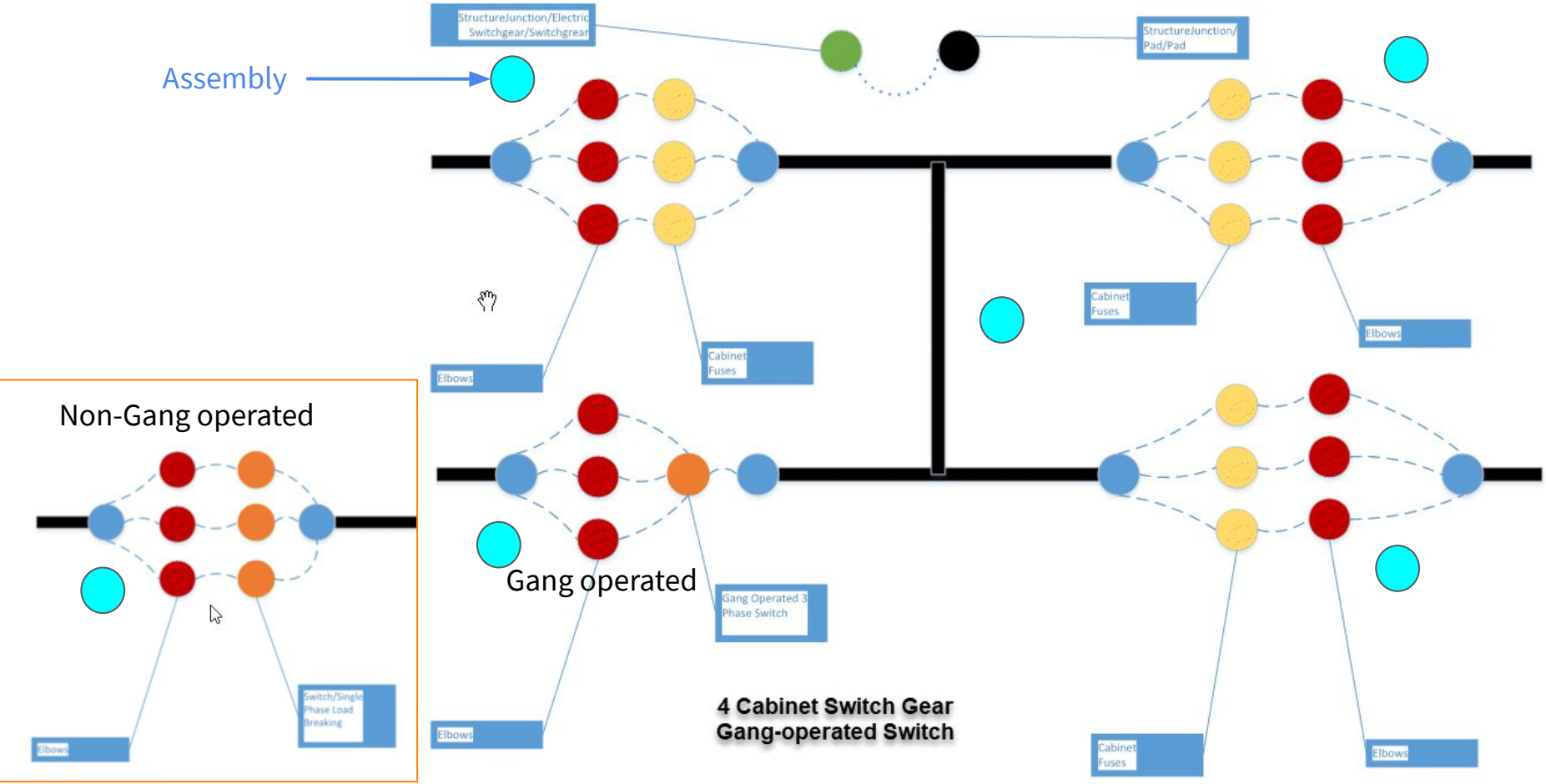
Add tests:

Recloser GlobalID: {CD229437-CEA2-4225-85F6-CBFB0A272C35}

Support Structure: {D406A179-64C5-42F9-B991-AB4390C0CA5F}



Assembly XML Definitions



Exercise - Updating Assembly XML Definitions

Open workspace: "..\EsriUN\BasicV3\3.Recloser_Exercise\Recloser_Example.fmw"

Set-up for testing with the Test Filter

Recloser GlobalID: {320E0040-04E4-4E0D-B5BA-09253A19E3C3}
Switch Gear GlobalID: {B732B5E5-3D7D-478D-A795-774CFF49F32B}

SubtypeCD = 7
PhaseDesignation = 7
Unit tables = 3 i.e. one per phase
GangOperated = NA

Check results and error reports.

Update XML definitions - check documentation

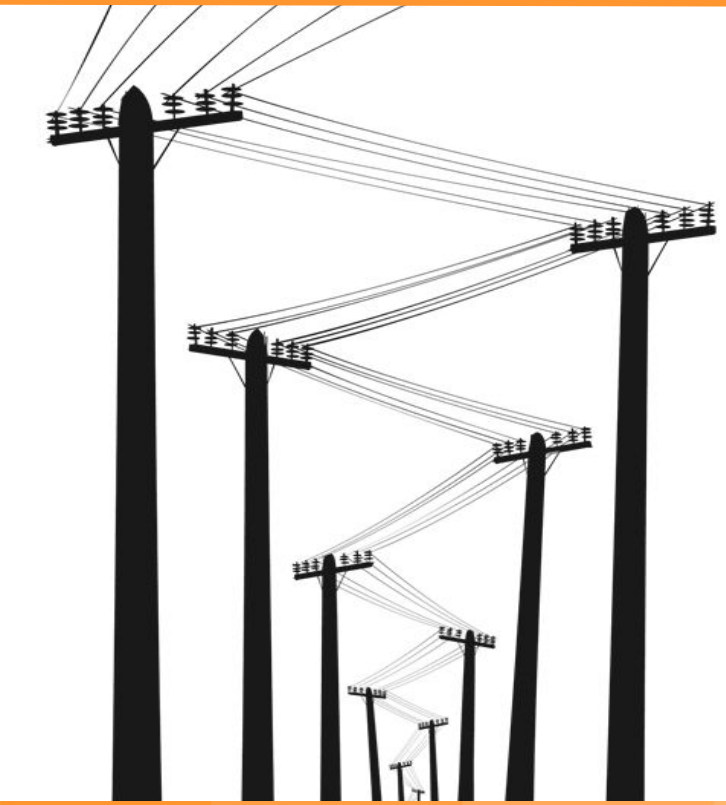
- Open XML definition in NotePad++ & search for “Recloser”
  - PadMountRecloser_definition - Begin.xml
- Create new assembly definition
- Re-run with either fixed XML or PadMountRecloser_definition - End.xml

Exercise - missing target Feature Class

- Update the Schema Mapping Spreadsheet - as needed
- Open workspace: "..BasicV3\2.DynamicProtectiveDevice_Exercise\SubnetController - Begin.fmw"
- Import Feature Types:
  - ElectricDeviceUnit
  - ElectricWireData
  - C_SubnetworkControllers

  Connect them.
- Copy transformers from similar objects - switches?
- Update the Assembly Builder XML - if needed

Wrap-up



Thanks for attending…

Editing the migration workspaces

- If you make ***changes***, please share them with us
- ***Need help*** - feel free to contact us

Next steps:

- Release the Electric migration workspace
- Esri UN Reader/Writer Feature Service
- Validation Workspace

That’s all folks!

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Thanks also to John Long & John Alsup at Esri