Extracting Differences from an ArcSDE Geodatabase

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Updated 11 months ago · 1 comment

FME Version

FME 2022.0

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Introduction

FME has the capability to extract differences (or deltas) from an Enterprise Geodatabase (ArcSDE). The key functionality is:

- Reading Transactional Version differences
- Reading Historical Archive differences (i.e. Historical Date/Time and Historical Markers)

This tutorial focuses on extracting differences from a transactional versioned Geodatabase. However, the principals are the same for reading differences from historical archives.
If you are not familiar with Esri Geodatabase versions or archiving then the following links will be useful:

- Esri Geodatabase Versioning
- Esri Geodatabase Archives

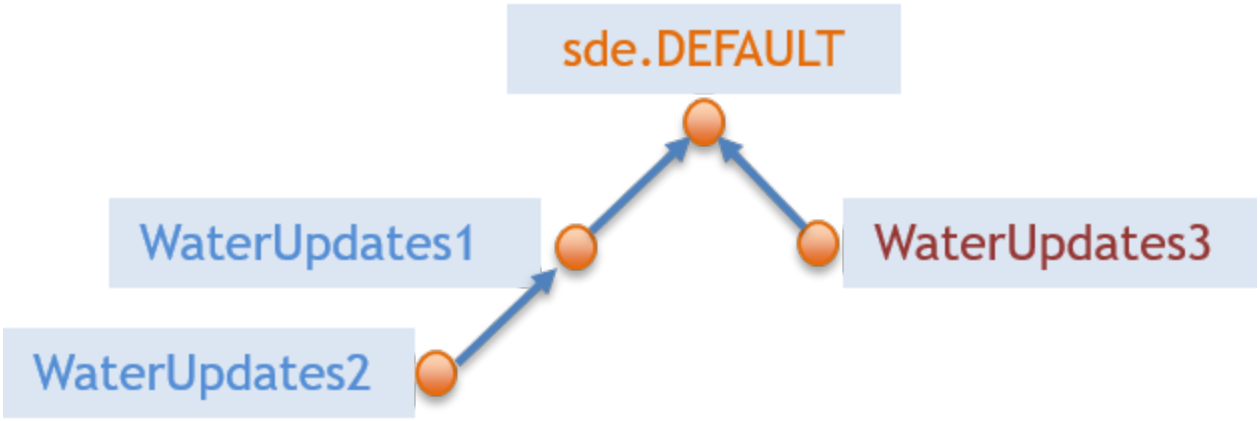
Versioning is only available in the Enterprise Geodatabase (ArcSDE).

Being able to extract differences (or deltas) from a Geodatabase allows you to replicate or synchronize your Geodatabase with other databases in your organization.

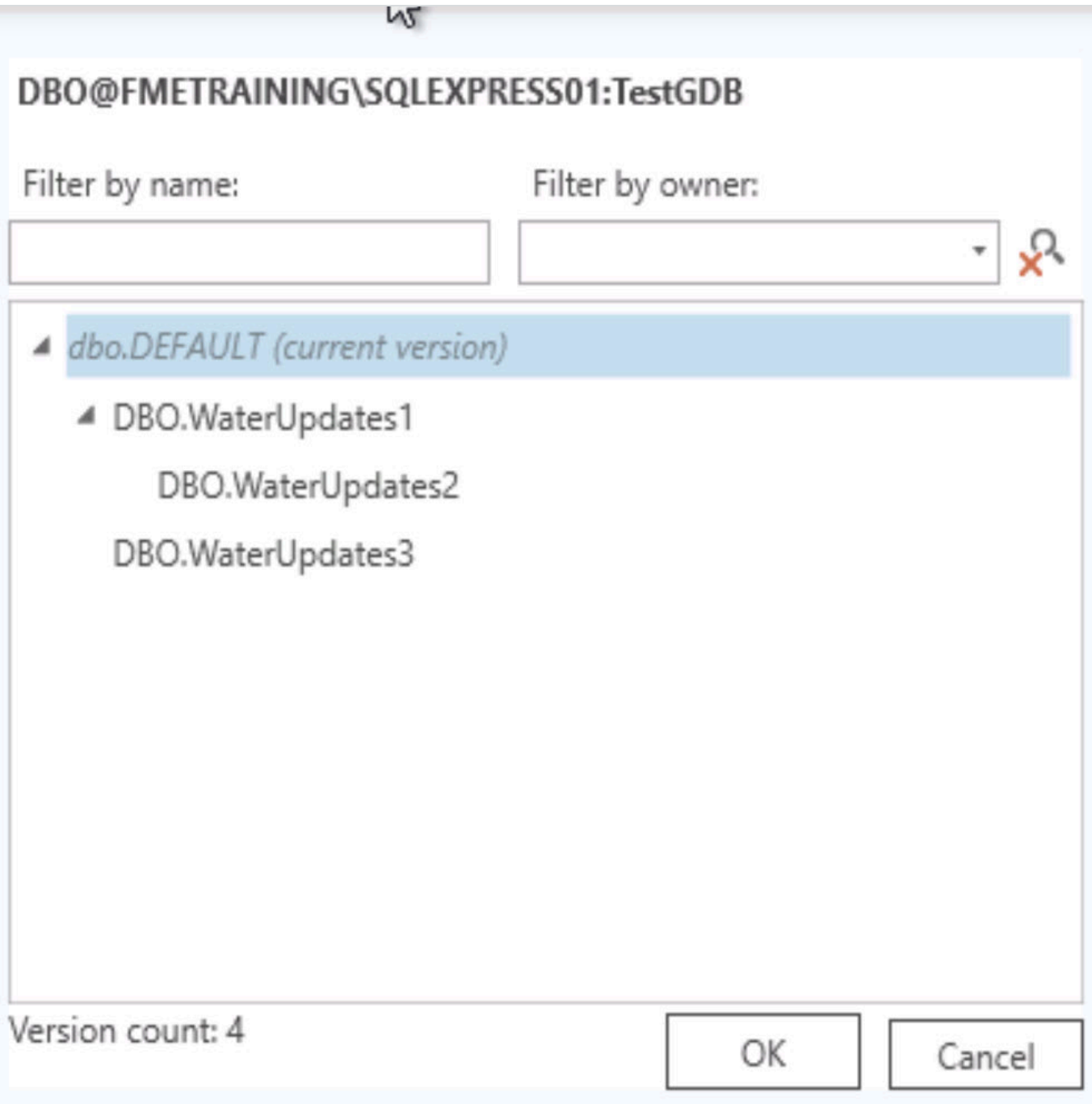
Video

Geodatabase Structure

A versioned Geodatabase will often have a hierarchical structure as show below:



In ArcPro this will look like:

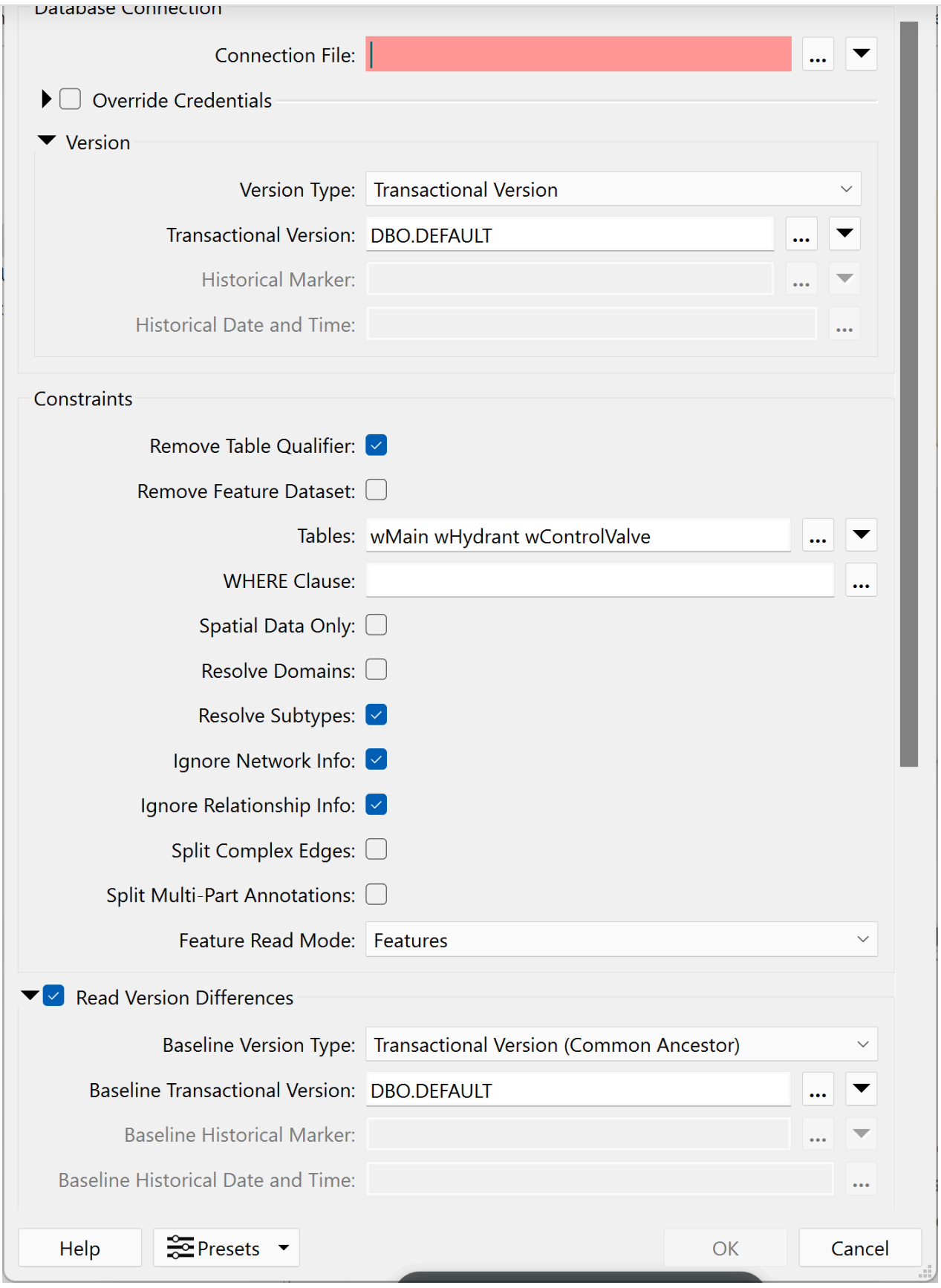


Transactional Version Differences

The Esri Geodatabase (ArcSDE Geodb) reader parameters dialog has several parameters which control the different data you can extract from versions (see the FME User Documentation for more details). Referring to the image of the Geodatabase reader parameters below...

- Under the Version disclosure panel:
  - Transactional Version: the version you want to read

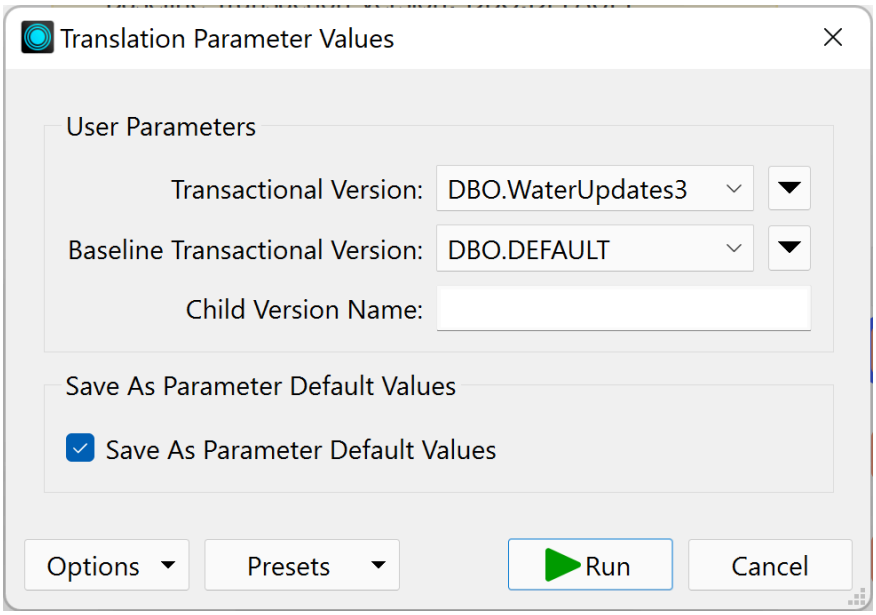
- Baseline Transactional Version: the version you want to compare against



Workspace Example

> **Note**
>
> If you'd like to run the examples discussed in this tutorial, please go to the addendum at the end of the tutorial and follow the example set-up instructions.

FME Workspaces for extracting differences are surprisingly straightforward. This example converts water utility data from Geodatabase (ArcSDE) to PostGIS. The key part of the workflow is based on the published parameters:



In this example, the data is being read from the Transactional Version: DBO.WaterUpdates3 and compared against the Baseline Transactional Version DBO.DEFAULT.

The following three images from FME Data Inspector illustrate the state of the Esri Geodatabase versions:

Image 1: Original data - DBO.DEFAULTS version

Image 2: Edited water mains data - DBO.WaterUpdates3 version

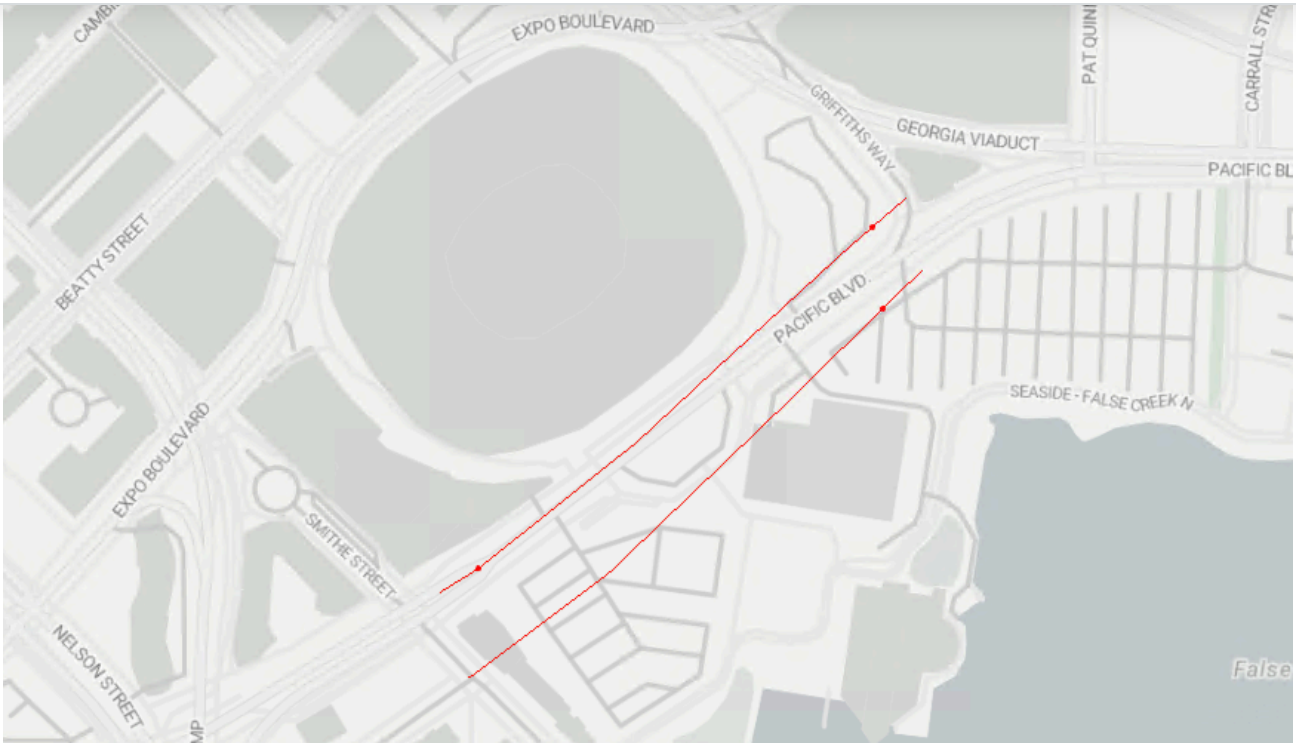
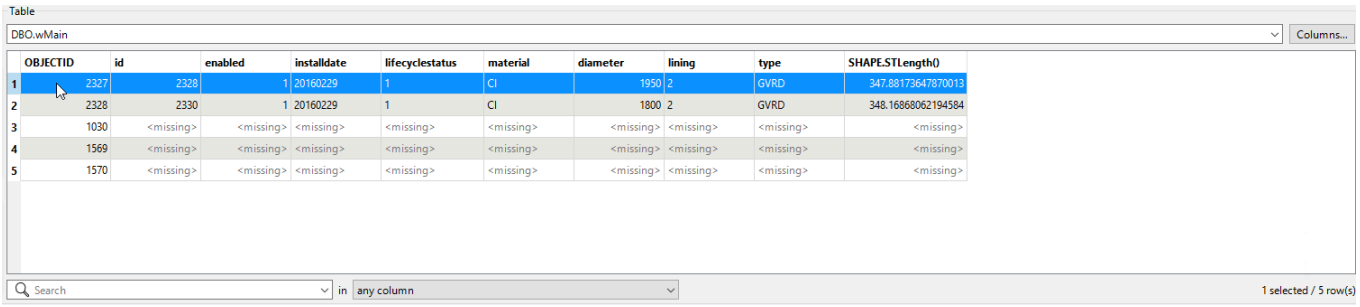
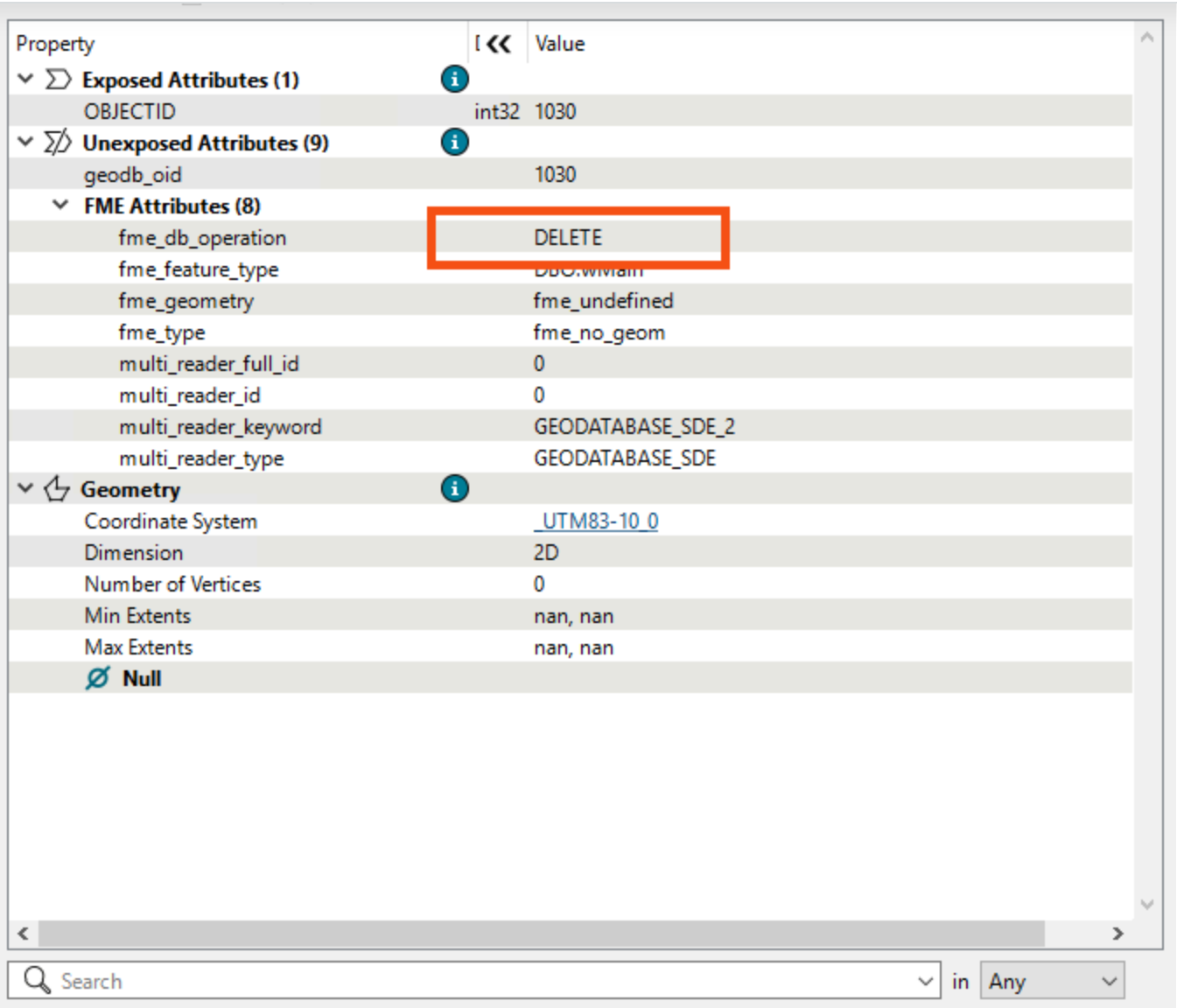


Image 3: Differences between DBO.WaterUpdates3 and DBO.DEFAULTS versions

What you don't see in the images are the deleted objects, because they have no geometry. However, they are logged in the FME Data Inspector Table Viewer and Feature Information windows:



	OBJECTID	id	enabled	installdate	lifecyclestatus	material	diameter	lining	type	SHAPE.STLength()
1	2327	2328	1	20160229	1	CI	1950	2	GVRD	347.88173647870013
2	2328	2330	1	20160229	1	CI	1800	2	GVRD	348.16868062194584
3	1030	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>
4	1569	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>
5	1570	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>	<missing>

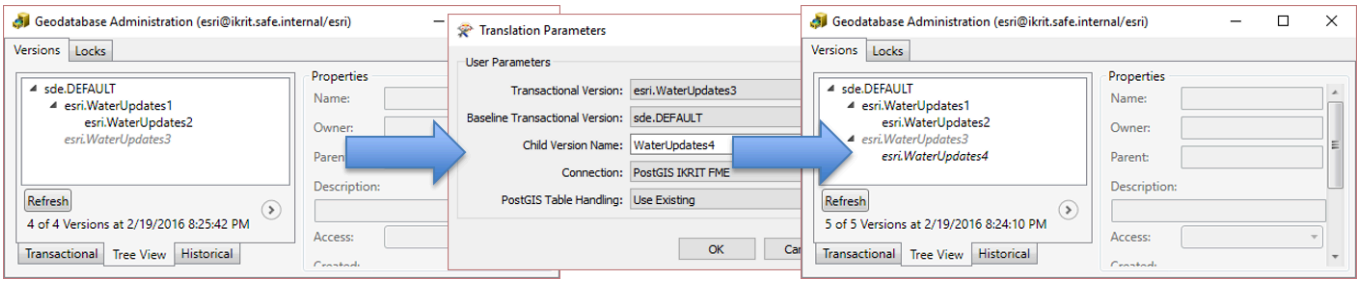


Notice that the fme_db_operation attribute has been set to DELETE.

fme_db_operation

When you extract differences from geodatabase transactional versions or archives, FME automatically sets the fme_db_operation attribute to INSERT, UPDATE or DELETE. Most FME database writers support fme_db_operation for incremental updates to the database. This means that it is straightforward to push the deltas into the target database. For more on how to use fme_db_operation see the article Incremental Database Updates using the FME format attribute fme_db_operation.

The geodatabase reader has a Child Version parameter that can be used to create the next version for editing. In this example, we're reading the differences between DBO.WaterUpates3 and the DBO.DEFAULT versions. If we set the child version to be WaterUpdates4 then FME will create the new version which will then be your starting point for the next round of edits in your geodatabase. This allows you to set up a data replication workflow: extracting differences, creating a new version, undertake edits in the new version, next round of differences, etc.



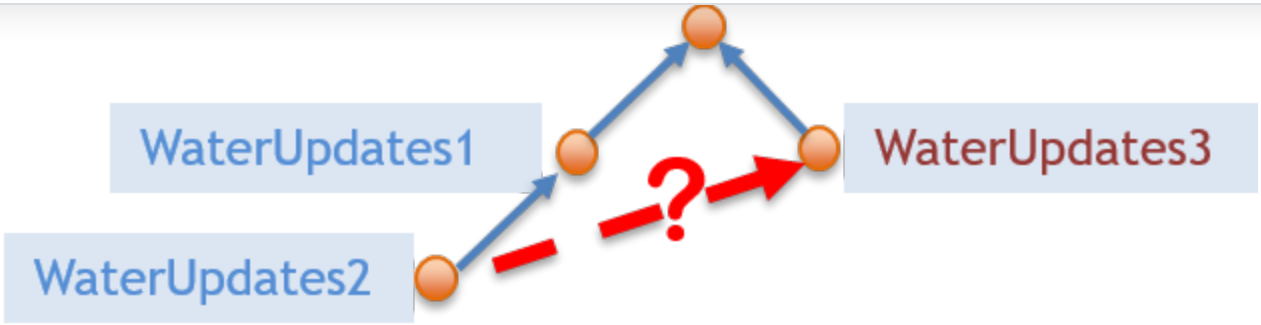
Historical Archive Differences

Working with historical archives is very similar to the transaction version described above. The geodatabase reader parameters dialog has several parameters (marked in the parameters dialog image above) which control the difference data you can extract from archives:

- Under the Version panel:
  - Transactional Version: the version you want to read - typically sde.Defaults
- Under the Read Version Differences panel:
  - Check Read Version Differences
  - Baseline Historical Marker or the Baseline Historical Date and Time

Gotchas

When extracting differences from a versioned geodatabase, FME uses the concept of a common ancestor, so all differences are based on the common ancestor of the two versions you're working with. For this reason, it's not a good idea to extract differences between different branches in your versioned geodatabase as shown below:

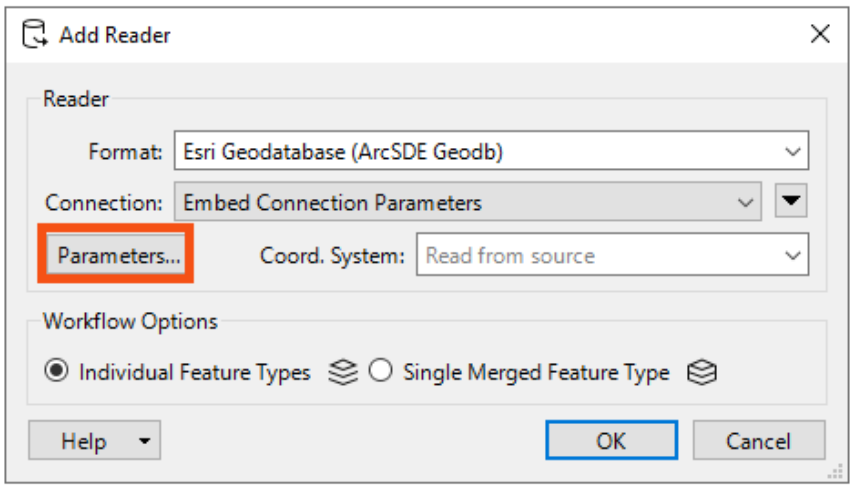


- you're likely to get unpredictable results!

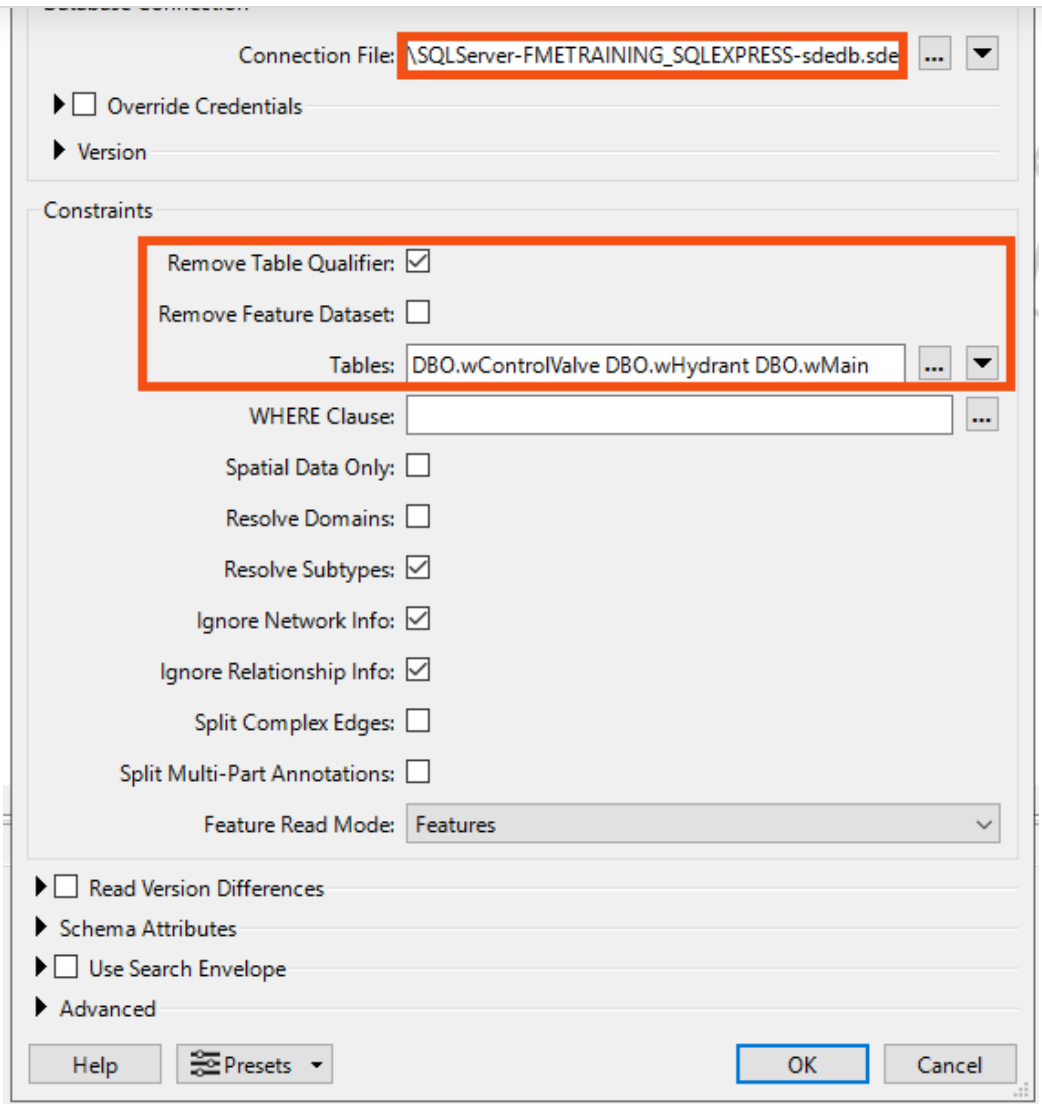
Step-by-step Instructions

The following instructions will walk you through how to create a workspace that will read your ArcSDE versions.

1. Add an Esri Geodatabase(ArcSDE Geodb) Reader
Open FME Workbench and start a blank workspace. Add an Esri Geodatabase (ArcSDE Geodb) reader to the canvas and open the Parameters.

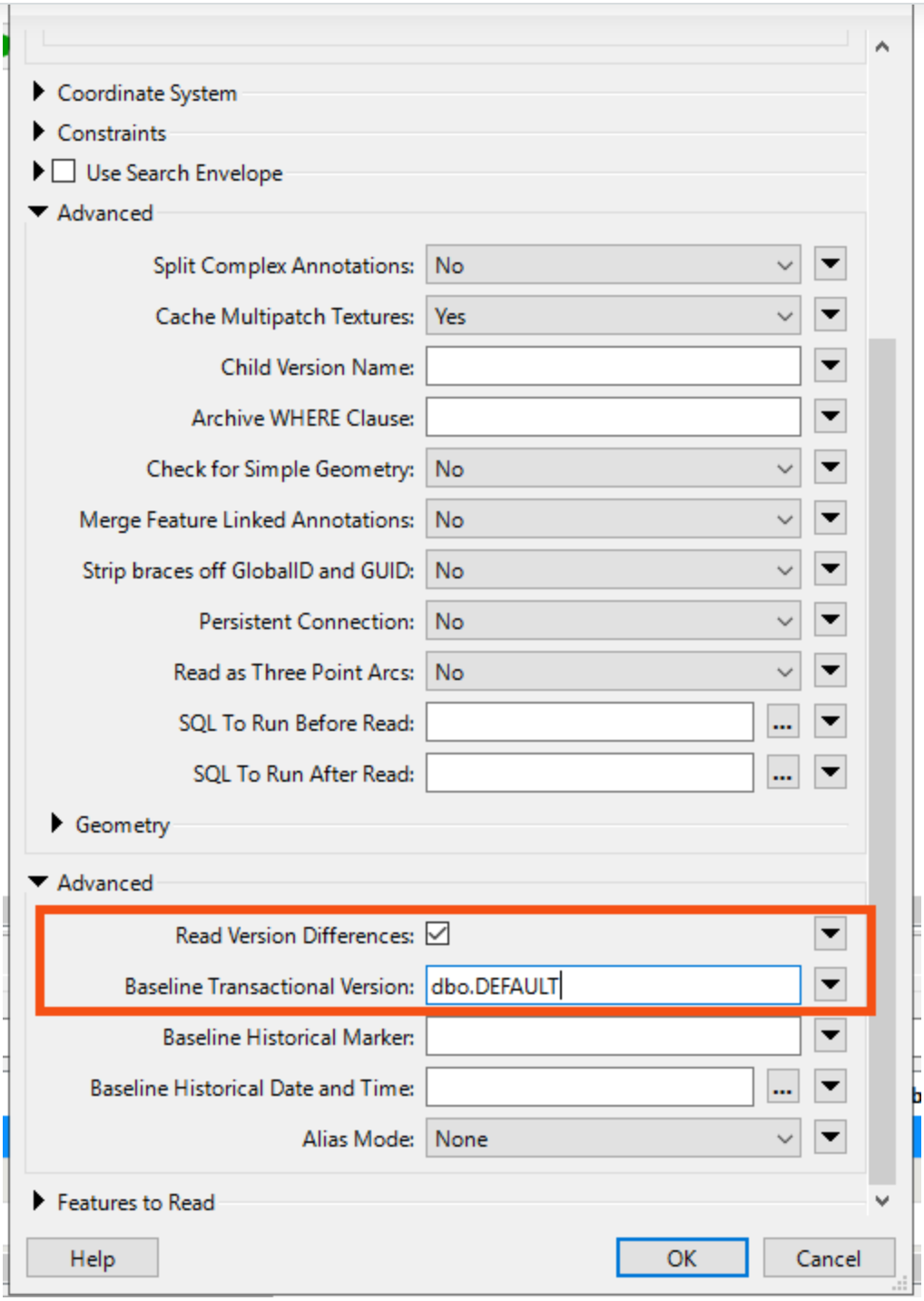


In the Parameters, browse to your SDE Connection File. Next, enable Remove Table Qualifier and select all of the Tables by clicking on the ellipsis and selecting DBO.



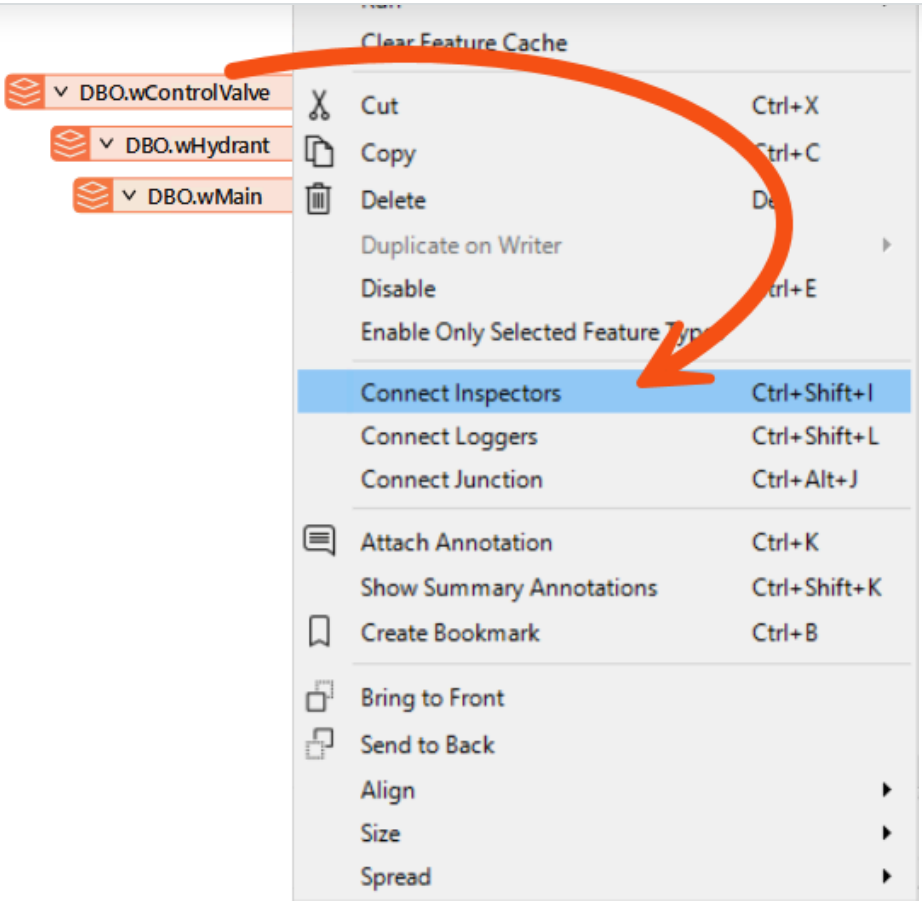
Next, enable Read Version Differences. This will allow us to set a Baseline (either a Transactional Version or Historical time if using Archiving) which will be used as the 'parent' of the comparison version.

In order for the 'child' version to be compared against the Baseline, we need to ensure we set the Version on the Reader otherwise it will default to the version used in the SDE connection file. Most often this is the DEFAULT version. Click on the ellipsis next to Baseline Transactional Version and select dbo.DEFAULT. Click OK twice to add the reader.



2. Add Inspectors

Now that we've added the data, we will want to inspect our versions using either Visual Preview or FME Data Inspector. Select all three reader feature types by clicking and dragging a box around them. Next, right-click on any one of the three and select Connect Inspectors.



Note: Sometimes when setting up the ArcSDE Reader the Version query option will error out with 'Unable to open the Geodatabase reader because the <DATASET> keyword was not found'. If you encounter this, you can work around it by typing in the Version name, for example: DBO.DEFAULT.

3. Create User Parameters

When we run the workspace, we want to select which versions to compare, for that we will use user parameters to quickly switch between versions. In the Navigator window, right-click on User Parameters and select Manage User Parameters (In 2020.2 or older, select Create User Parameter). We will create two parameters, with the following setup:

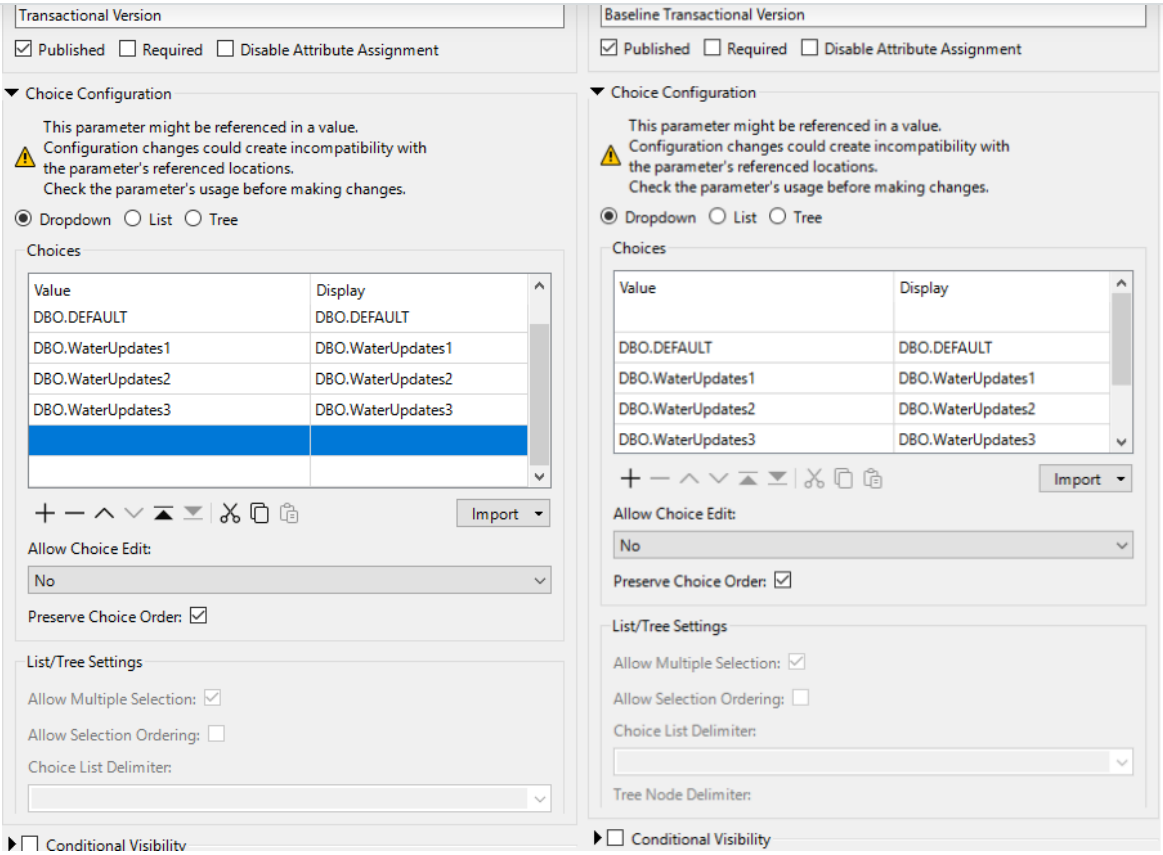
Parameter 1:

- Parameter Type: Choice
- Parameter Identifier: TransactionalVersion
- Prompt: Transactional Version
- Published: Enabled
- Optional: Disabled
- Choice Configuration: Dropdown
- Choice Values:

    - DBO.WaterUpdates2
    - DBO.WaterUpdates3
- Default Value: DBO.DEFAULT

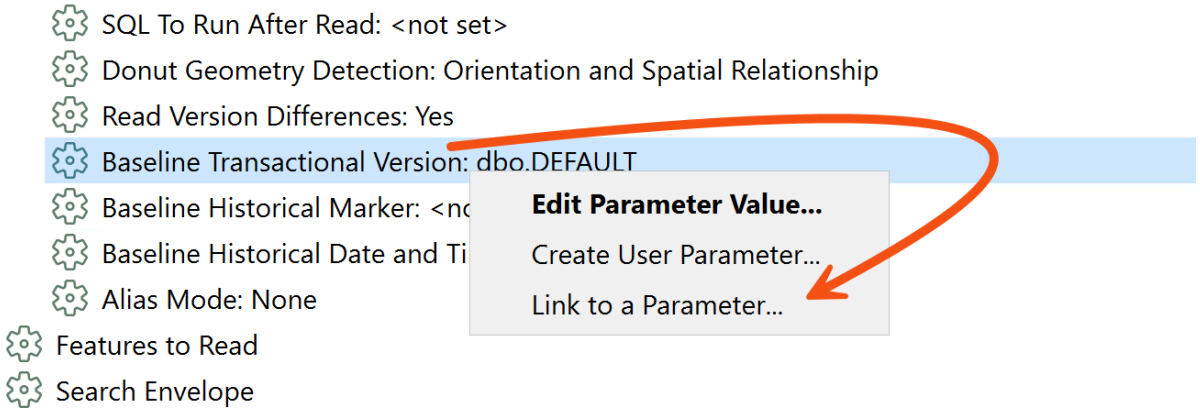
Parameter 2:

- Parameter Type: Choice
- Parameter Identifier: BaselineTransactionalVersion
- Prompt: Baseline Transactional Version
- Published: Enabled
- Optional: Disabled
- Choice Configuration: Drop-down
- Choice Values:
    - DBO.DEFAULT
    - DBO.WaterUpdates1
    - DBO.WaterUpdates2
    - DBO.WaterUpdates3
- Default Value: Leave Blank

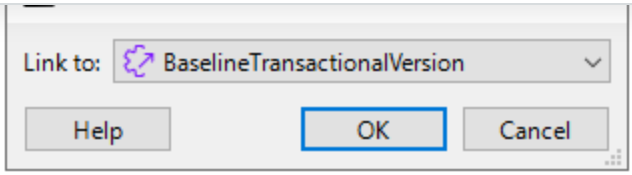


4. Assign User Parameters

Now that we've created our user parameters, we need to assign them to the reader parameters. In the Navigator, expand the [GEODATABASE_SDE] reader and then expand Parameters, and expand Advanced. Right-click on Transactional Version and select Link to User Parameter.



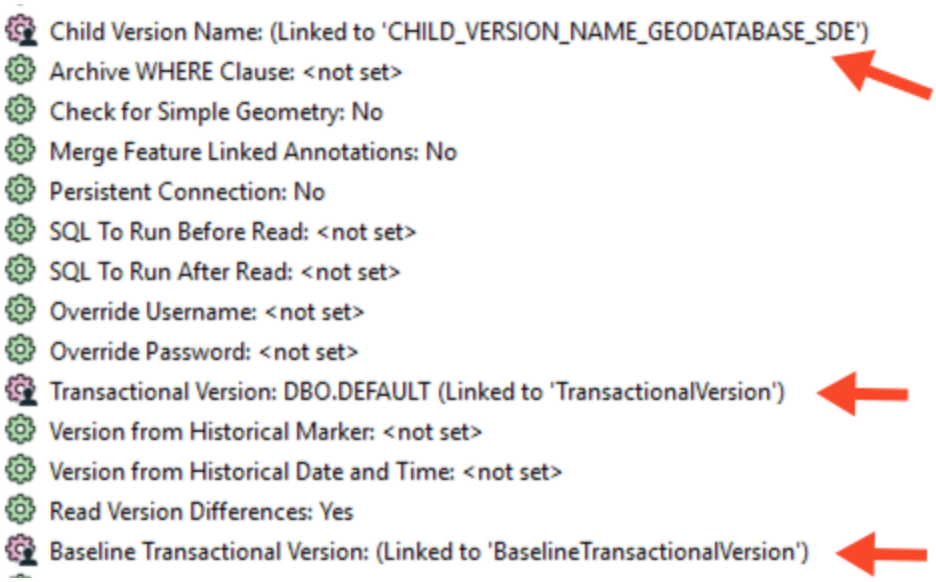
In the Set to User Parameter dialog, select BaselineTransactionalVersion



Repeat this step with Transactional Version, and set it to the TransactionalVersion parameter.

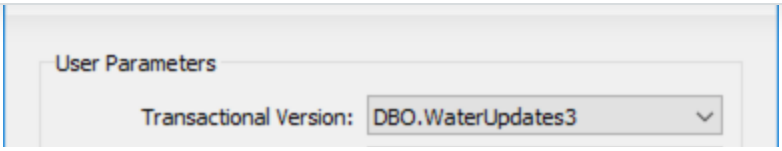
We need to create one more user parameter, but we can do that from the Navigator. Right-click on Child Version Name and select Create User Parameter. In the Add/Edit User Parameter dialog, click OK as we can accept the default parameters.

You should now have three parameters linked for the GEODATABASE_SDE reader.



5. Save and Run Workspace

Save the workspace, then run with Prompt for User Parameters enabled. Now each time you run the workspace, you can select which versions you wish to compare.

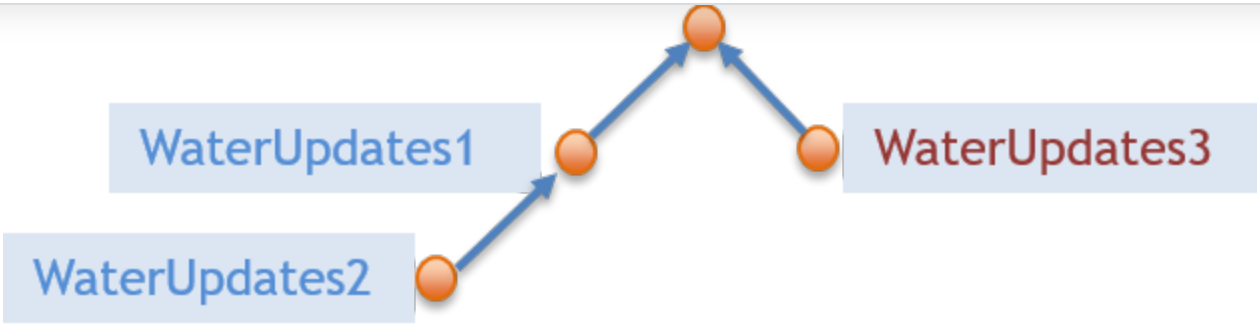


Safe Software respectfully acknowledges that we live, learn and work on the traditional and unceded territories of the Kwantlen, Katzie, and Semiahmoo First Nations.

into your ArcSDE
  - load a.CoV_Water_Default_seed_data.gml into the default version of your geodatabase.

- Version these tables – sde.DEFAULT
  Right-click feature class, Manage -> Register as Versioned
- Using ArcCatalog and FME Workbench to create three new versions and load the sample GML data into each version. Use the workspace "Load Data to ArcSDE.fmw" to load the GML data into your ArcSDE
  Right-click database, Administration -> Administer Database
  - create version WaterUpdates1
  - load b.CoV_Water_Default-WaterUpdates1.gml into version WaterUpdates1
  - create version WaterUpdates2
  - load c.CoV_Water_Default-WaterUpdates1-2.gml into version WaterUpdates2
  - create version WaterUpdates3
  - load d.CoV_Water_Default-WaterUpdates3.gml into version WaterUpdates3

Use the version hierarchy shown in the image:



Note: You can't create all the versions and then load them, you have to create, load, create, load etc.

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Comments

1 comment

Sort by

Vanessa Simpson
5 months ago

In the video they mention that this is for Traditional versioning, not Branch versioning- can you point me to any tutorials or help on how we might use this same or similar technique with Branch versioning? I am looking for help on how to keep our publication database updated now that we are moving to branch versioning and we can no longer utilize database replication between the editing database and the publication database.

Thanks in advance

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