

When Time Becomes Space





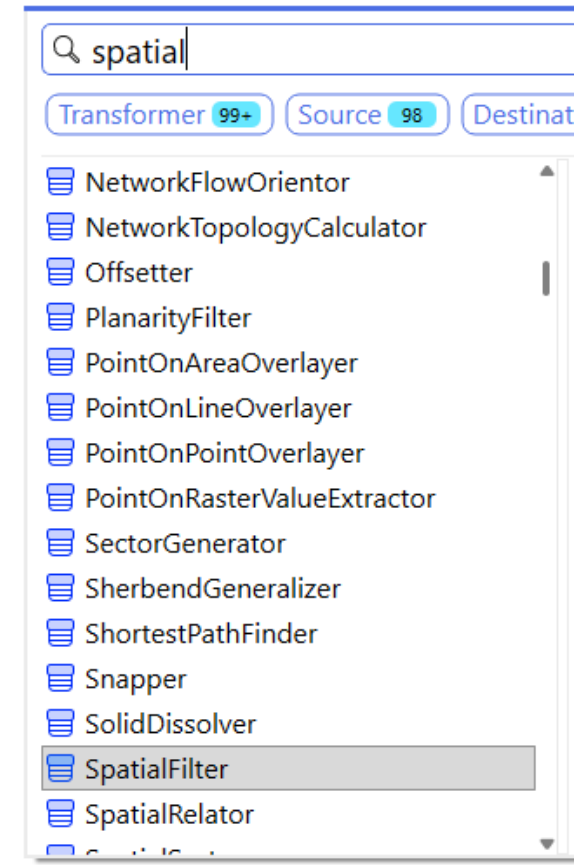
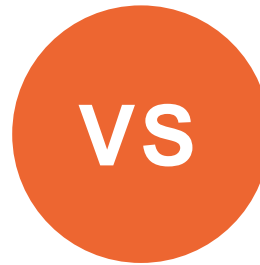
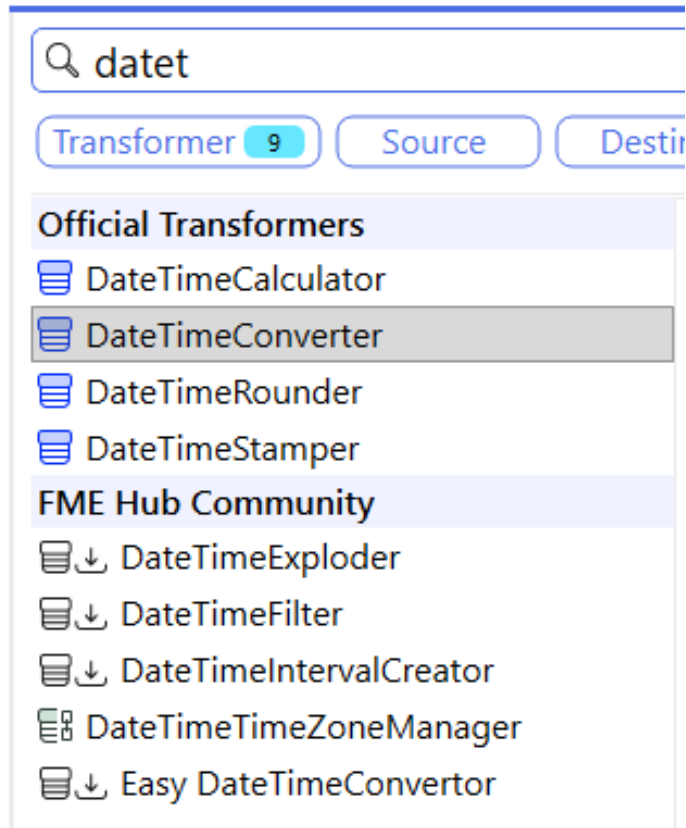
The Question Is Usually About A Relationship

- When did the asset get inspected?
- When did the pipe burst?
- What assets were onsite yesterday?
- How old is the road surface?

The timestamps are easy, the relationship between them is the problem



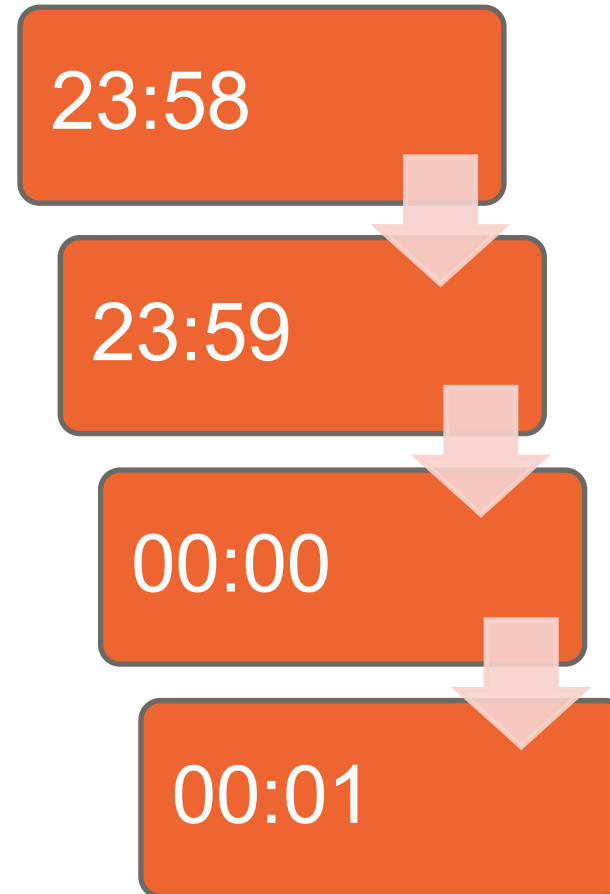
Temporal Question. Spatial Toolbox.





Time Is Linear. Its Labels Are Not.

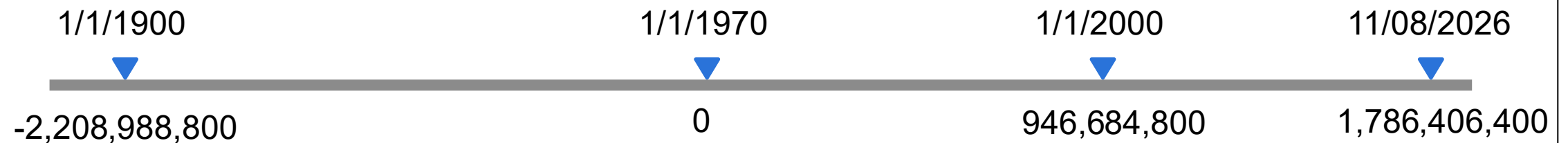
- Human-readable time is not a continuous number line
 - Minutes reset every 60
 - Hours reset every 24
 - Days reset every month
 - Months reset every year





Put Time On An Axis

- Epoch (Unix Timestamp)
- Seconds from 1 January 1970
- Continuous, ever-increasing value
- No rollovers or resets
- Time becomes the X coordinate
- Y coordinate is set as a constant value





Events Become Points

Durations Become Lines

Time Gaps Become Distances



FME Implementation

DateTimeConvertor

- Converts datetime to Epoch
- Use the Quick Reference!

Second

%S Two digit seconds (00-59.999999999)

%s Seconds since Unix Epoch

%Es Seconds since Unix Epoch, unzoned

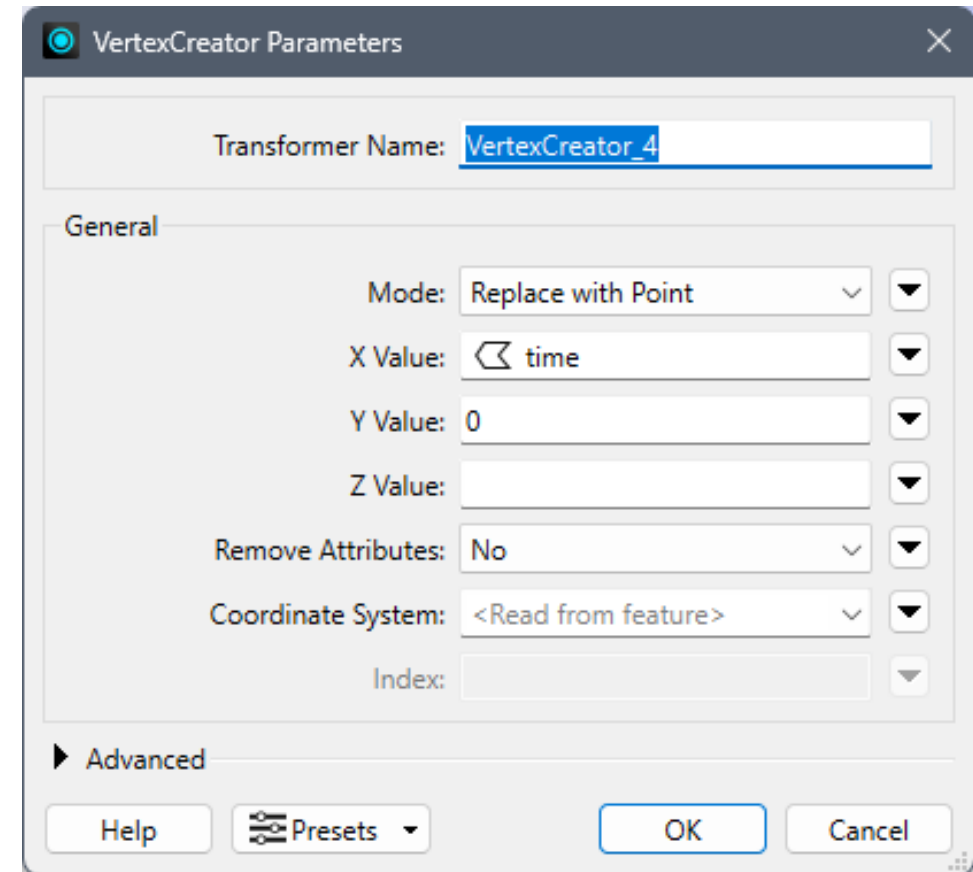
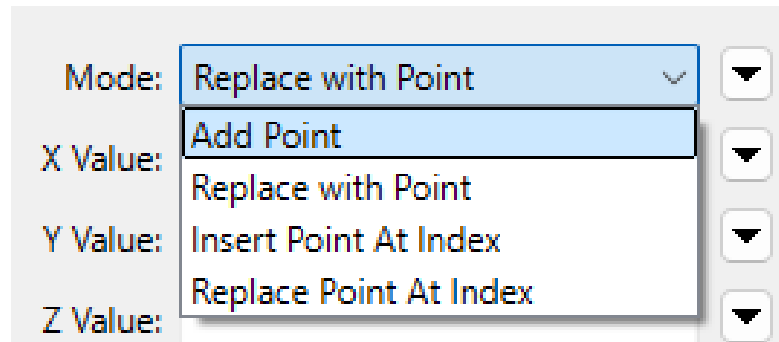
The screenshot shows the 'DateTimeConverter Parameters' dialog box. The 'Transformer Name' is 'DateTimeConverter_4'. Under the 'General' tab, 'Datetime Attributes' is set to 'time'. 'Input Format' is '%Y-%m-%d %H:%M\$'. 'Output Format' is '%Es'. 'Repair Overflow' is 'Yes'. 'Passthrough Nulls, Empties, or Missing' is 'No'. The 'Preview' section shows a preview of the data: '2026-08-14 10:00 -> 1786701600'. The 'Quick Reference' section is also visible. At the bottom, there are buttons for 'Help', 'Presets', 'OK', and 'Cancel'.



FME Implementation

VertexCreator

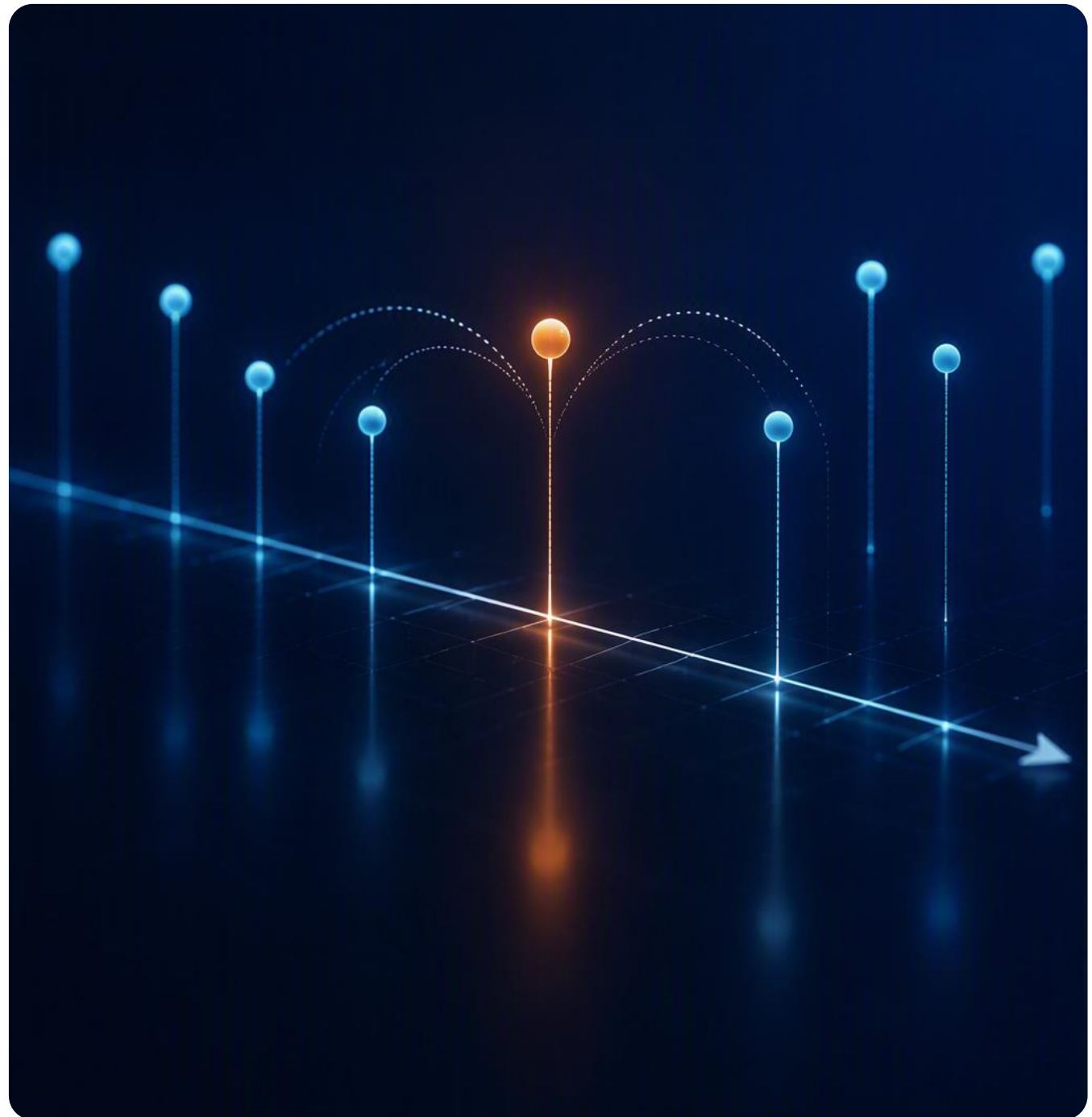
- Converts Epoch to point
- Y value is arbitrary
- Use two for Lines
- Make note of the Mode





Neighbours In Time

**Identify the event
closest to a pipe
failure**

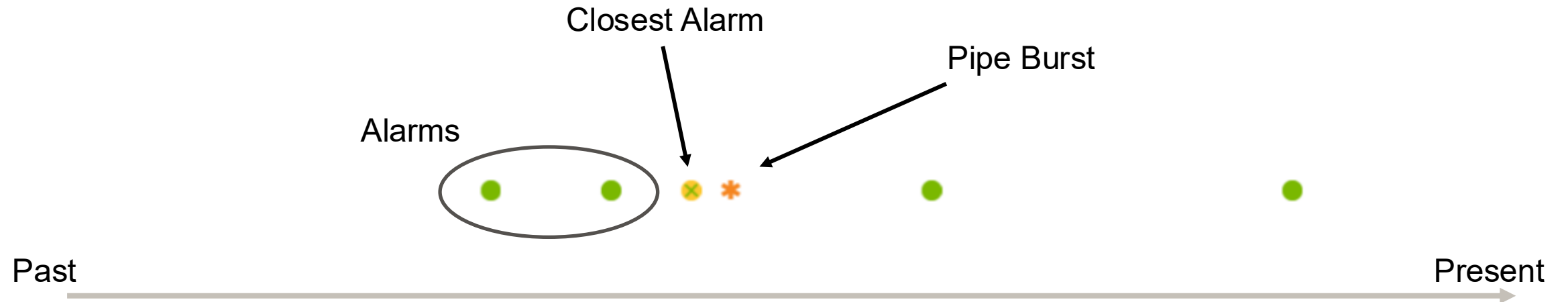




Neighbours In Time

Identify the event closest to a pipe

1. Convert burst event to point
2. Convert alarms to points
3. Use NeighbourFinder to identify the closest event

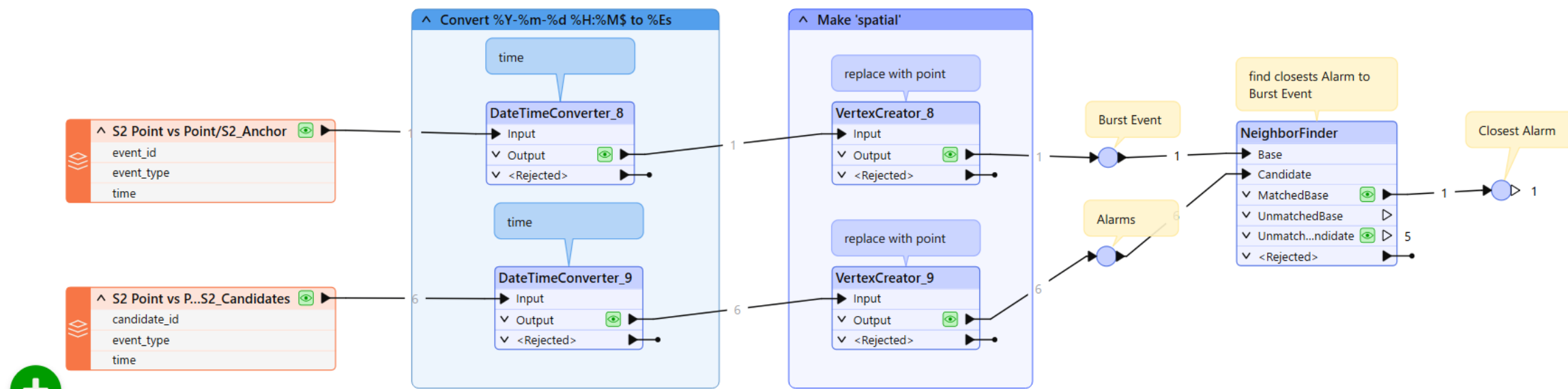




Neighbours In Time

Identify the event closest to a pipe

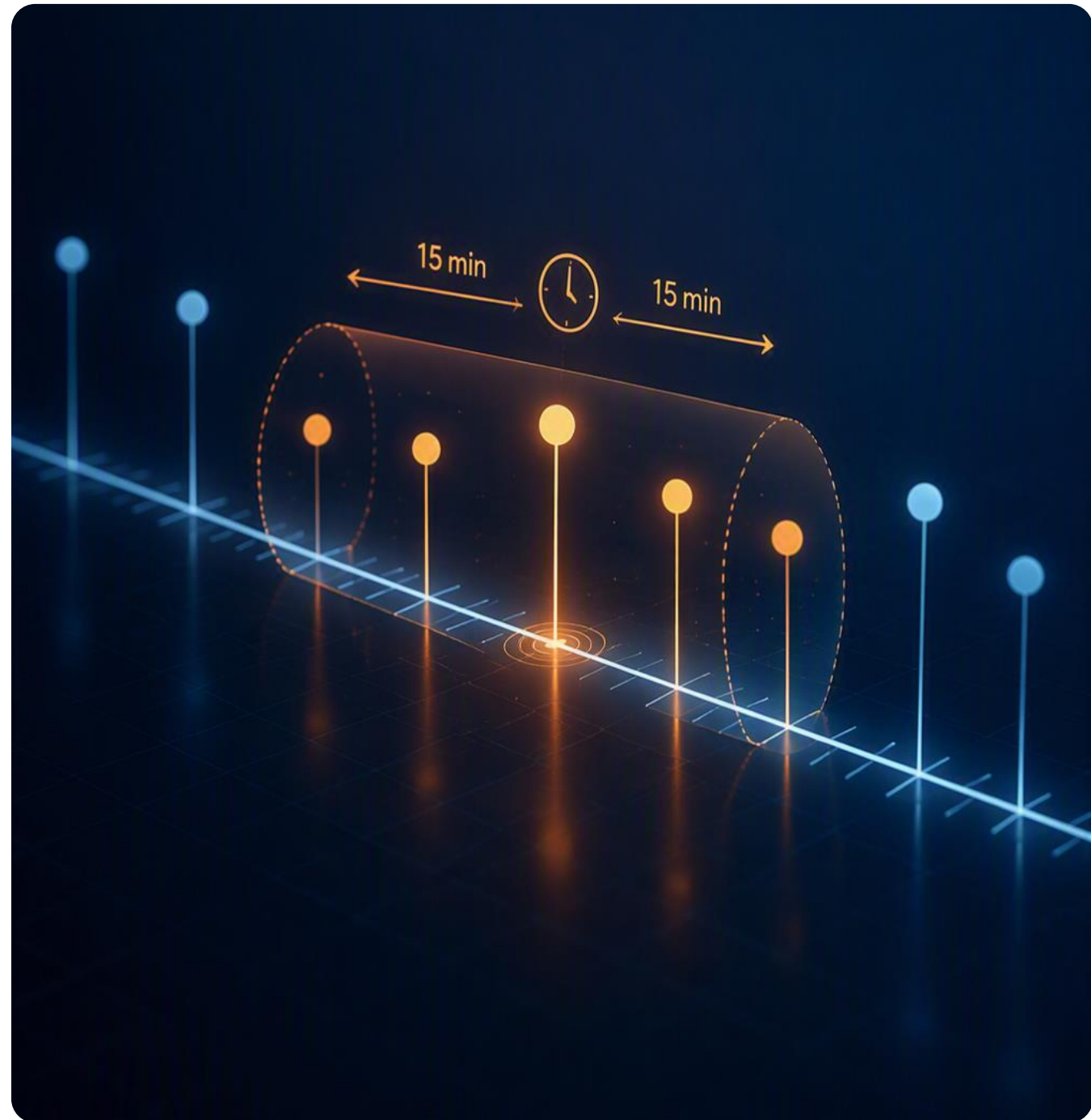
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Drawing A Window Around Time

Identify events occurring with 15 minutes of a vehicle entry

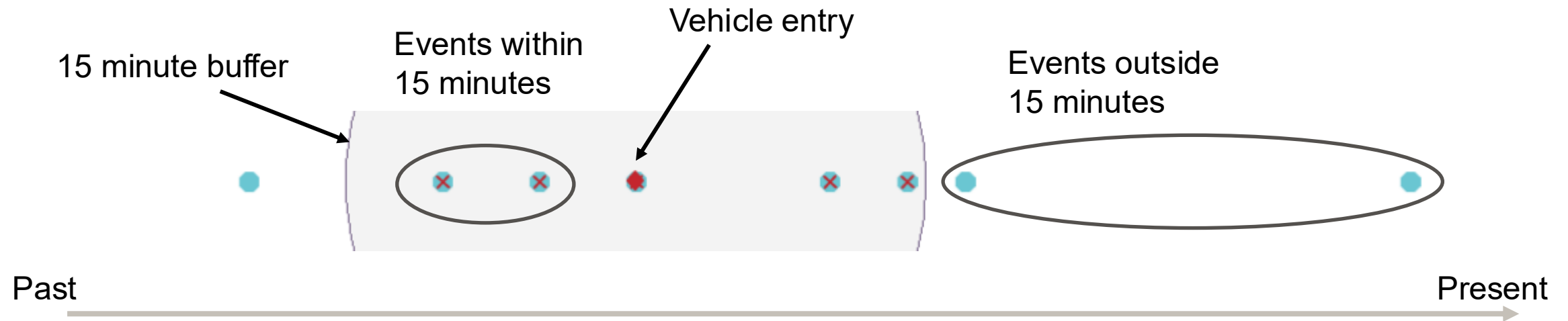




Drawing A Window Around Time

Identify events occurring with 15 minutes of a vehicle entry

1. Convert vehicle entry to point
2. Convert events to points
3. Buffer vehicle entry by time period
4. Use SpatialFilter to find events within the specified time period

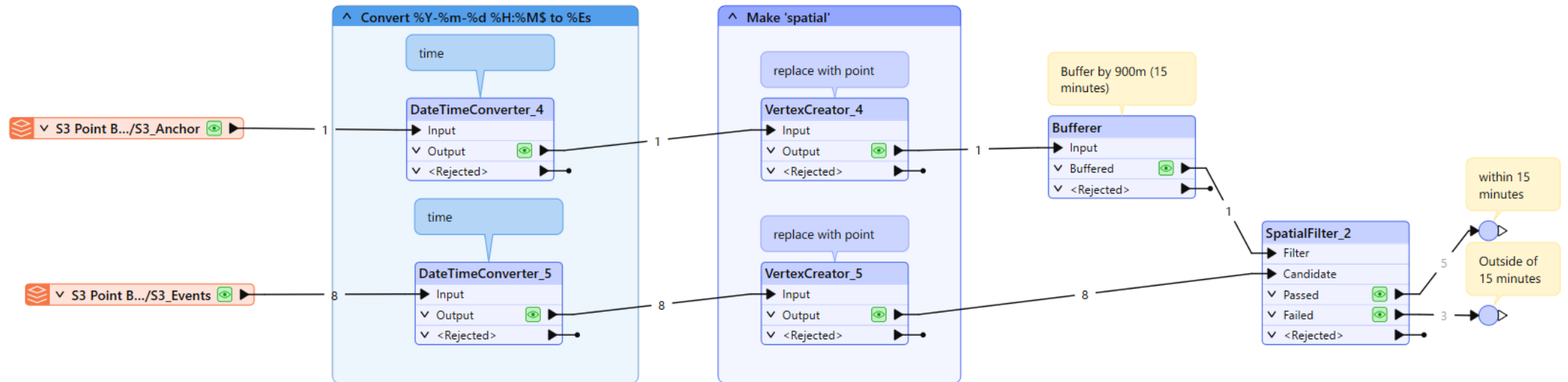




Drawing A Window Around Time

Identify events occurring with 15 minutes of a vehicle entry

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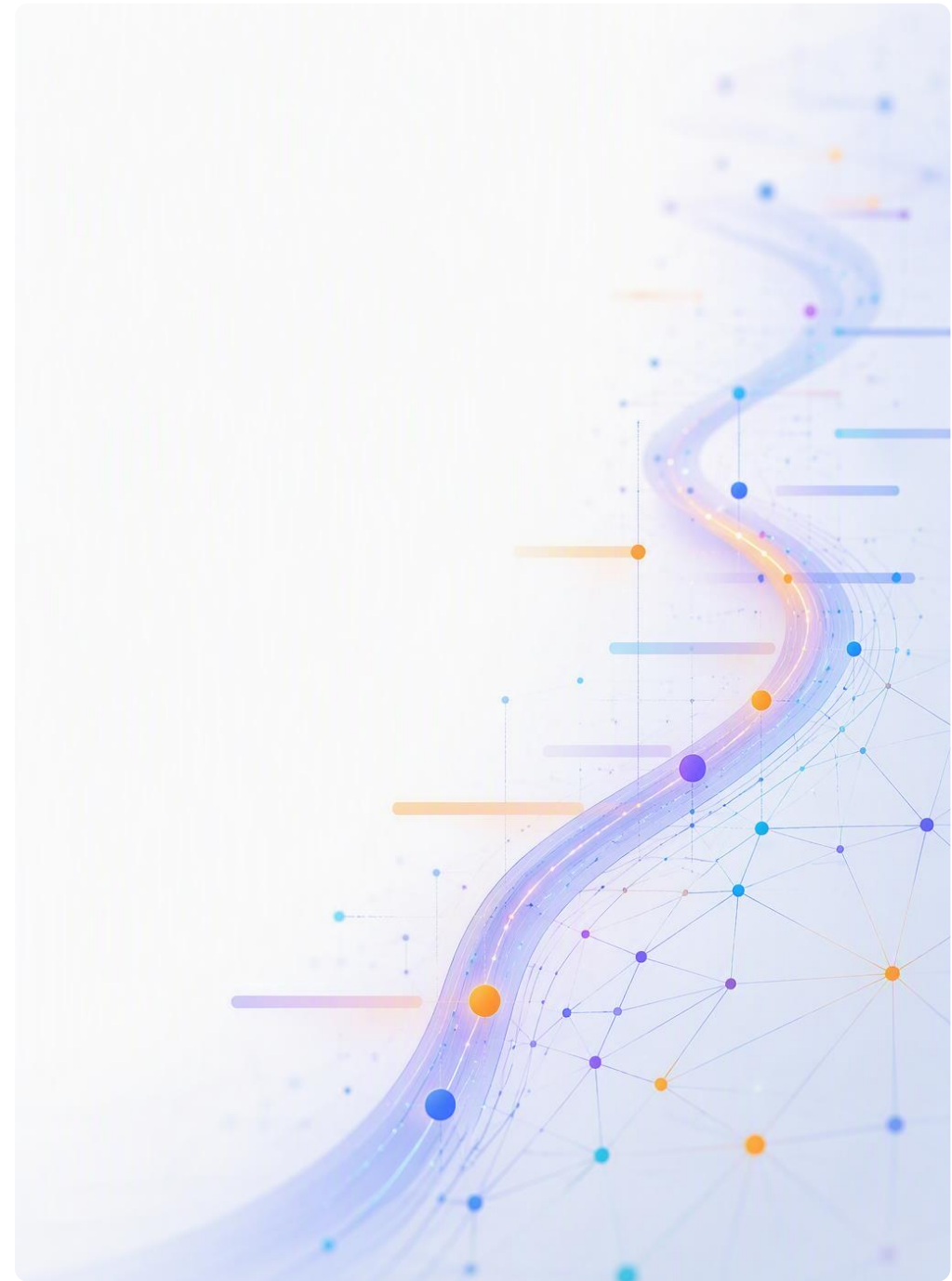


Everything Is A Spatial Problem Now

- Events become points, time periods become lines
- Temporal relationships become spatial relationships
- Spatial Transformers become temporal analysis tools

What else becomes possible?

- Temporal Clustering
- Event Correlation
- Temporal Networking





“Time flies like an arrow

Fruit flies like a banana”

- Chris Morris, Locus NZ

Thank you

