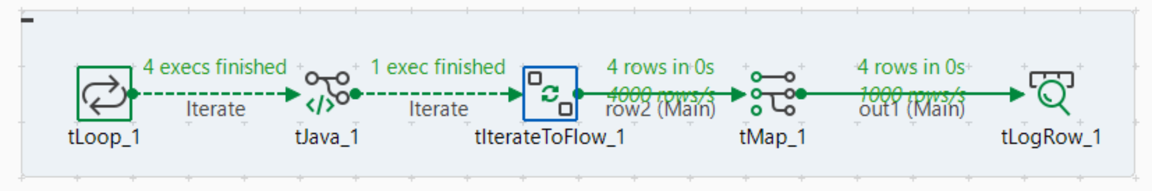
Talend Exercise: Real-Time Micro-Batch Temperature Processing

Objective:

Simulate real-time micro-batch processing of temperature data using a loop, enrich it with logic to classify alert levels, and display results in tabular format.

Workflow:



Step-by-Step Instructions

Step 1: Create the Talend Job

1. Launch Talend Open Studio.

2. Right-click `Job Designs` > Create Job → Name it: `MicroBatchProcessing`.

3. Add description: "Simulates temperature micro-batches using synthetic values and classifies alerts."

Step 2: Add and Configure `tLoop_1`

1. Drag `tLoop` onto the canvas.

2. Set:

   - Loop Type: For

   - From: 0

   - To: 3

   - Step: 1

3. This will generate 4 iterations: index values 0, 1, 2, 3.

Step 3: Add `tJava_1` to Generate Data

1. Drag `tJava` and connect from `tLoop_1` → Iterate.

2. Paste the following code inside `tJava`:

```
String[] deviceIds = {"D001", "D002", "D003", "D004"};

String[] timestamps = {"18-06-2025 10:00", "18-06-2025 10:00", "18-06-2025 10:00", "18-06-2025 10:00"};

Double[] temperatures = {44.5, 52.0, 47.3, 61.9};


int i = (Integer) globalMap.get("tLoop_1_CURRENT_VALUE");


globalMap.put("device_id", deviceIds[i]);

globalMap.put("timestamp", timestamps[i]);

globalMap.put("temperature", temperatures[i]);
```

3. This dynamically stores the data into the globalMap on each loop.

Step 4: Use `tIterateToFlow_1` to Convert Iteration to Row

1. Drag `tIterateToFlow` and connect from `tJava_1` via OnComponentOk.

2. Click on it and define schema with 3 columns:

   - device_id (String)

   - timestamp (String)

   - temperature (Double)

3. Assign expressions:

- device_id: (String) globalMap.get("device_id")
- timestamp: (String) globalMap.get("timestamp")
- temperature: (Double) globalMap.get("temperature")

Step 5: Add `tMap_1` to Calculate Alert Level

1. Drag `tMap` and connect from `tIterateToFlow_1` (Row → Main).
2. Double-click `tMap_1`:
   - Add new output column: alert_level (String)
   - Expression:

     row1.temperature > 50 ? "HIGH" : "NORMAL"
3. Pass through device_id, timestamp, temperature as-is.

Step 6: Display Output in `tLogRow_1`

1. Drag `tLogRow` and connect from `tMap_1` (Row → Main).
2. Set Display Mode = Table for neat formatting.

Step 7: Run and Observe the Output

Click Run.

The output in the Run console should be:

```
|device_id|timestamp       |temperature|alert_level|
|---------|----------------|-----------|-----------|
|D001     |18-06-2025 10:00|44.5       |NORMAL     |
|D002     |18-06-2025 10:00|52.0       |HIGH       |
|D003     |18-06-2025 10:00|47.3       |NORMAL     |
|D004     |18-06-2025 10:00|61.9       |HIGH       |
```

Summary of Components Used

Component	Role
tLoop	Generates 4 loop iterations (0 to 3)
tJava	Injects synthetic micro-batch data into globalMap
tIterateToFlow	Converts each iteration into a single flow row
tMap	Calculates alert_level based on temperature threshold (>50 = HIGH)
tLogRow	Displays formatted results on console