FINAL PROJECT

Inconsistencies and Resolutions:

1. Chicago:

Issue: The Contributing Factors listed were not present in the 'ContributingFactorMapping' Excel file. The additional factors identified are:

EXCEEDING SAFE SPEED FOR CONDITIONS
TURNING RIGHT ON RED
EXCEEDING AUTHORISED SPEED LIMIT
MOTORCYCLE ADVANCING LEGALLY ON RED LIGHT

Resolution:

EXCEEDING SAFE SPEED FOR CONDITIONS (a) - Resolved by code 150
TURNING RIGHT ON RED (b) - Resolved by code 152
EXCEEDING AUTHORISED SPEED LIMIT (c) - Resolved by code 151
MOTORCYCLE ADVANCING LEGALLY ON RED LIGHT (d) - Resolved by code 153

2. Contributing Factor Columns:

Issue: The dataset contained two separate columns for contributing causes: 'Primary Contributing Cause' and 'Secondary Contributing Cause'.

Resolution:
Merged the two columns into a single column.
Normalized the data for consistency.

3. Speed Limit Data:
Issue: Some entries listed the vehicle speed limit as 0, which is inconsistent.
Resolution:
Updated the speed limit value from 0 to -1, referencing the Austin dataset for consistency.

4. Date and Time Formatting:

Issue: The date and time data were combined in a single column and were formatted as mm/dd/yyyy to keep it consistent across all datasets.

Resolution: Split the combined date and time into separate columns.
Changed the date format to yyyy-mm-dd for consistency and better data handling.

Explanation:

The inconsistencies in the Chicago dataset were primarily related to missing or additional contributing factors. These were identified and resolved using specific codes.

The dataset had two separate columns for contributing causes. To streamline the data, these columns were merged into one and normalized.

In the speed limit data, a value of 0 was considered inconsistent and was replaced with -1, aligning it with data from the Austin dataset.

Lastly, the date and time data were reformatted for better clarity and consistency, separating them into distinct columns and changing the date format to a more universally recognized standard.

2. New York

New York:

1. Contributing Factor and Vehicle Type Columns:

Issue: There were multiple columns for both contributing factors and vehicle types, leading to redundancy and lack of granularity.

Resolution:
Merged the multiple columns into single columns for contributing factors and vehicle types. Normalized the merged data to reduce redundancy and maintain granularity.

2. Crash Date Column:

Issue: One entry in the crash date column had an extra string "ParkingLOT)" which was truncated.

Resolution:
Left the truncated value as it is for the identified entry.

3. Inconsistent Vehicle Type Columns:

Issue: There were columns with non-standard values that did not make sense, such as a column with a number value "20000" and another with "n/a".

Resolution:
Left these non-standard values as they were without modification.

4. Units Involved Calculation:

Issue: There was no specific column for 'Units Involved'; it needed to be computed using other columns.

Resolution:
Calculated the 'Units Involved' by using data from other relevant columns.

5. Crash Time Column:
Issue: The crash time was formatted as "hh:mm" and lacked seconds.

Resolution:
Added the second component to the time format, converting it from "hh:mm" to "hh:mm:ss" for consistency.

6. Date Column with Time Component:
Issue: The date column contained a time component.

Resolution:

Removed the time component from the date column to separate date and time data for better clarity and handling.

Explanation:

The initial issue with the New York dataset was the presence of multiple columns for contributing factors and vehicle types. To streamline this, these columns were merged into single columns and then normalized to ensure consistent and granular data.

An anomaly was found in the crash date column, where one entry had an extra string that got truncated. This anomaly was left unchanged for that specific entry.

There were some columns in the vehicle type category with values that did not align with standard or expected data. These anomalies were left as they were without modification.

The 'Units Involved' information was not readily available as a separate column. Hence, it was derived by computing data from other relevant columns.

The time format in the crash time column was lacking seconds. To enhance consistency and precision, seconds were added to the time format.

Lastly, the date column had a mixed format with both date and time components. To improve data clarity and handling, the time component was removed from the date column, ensuring separation of date and time data.

3. Austin:

1. Vehicle Type Data:

Issue: Individual vehicle types were not explicitly mentioned; they needed to be computed.

Resolution:
Computed and inferred the vehicle types using available data or algorithms, as they were not individually listed.

2. Contributing Factor Columns:

Issue: Multiple columns existed for contributing factors, leading to redundancy and lack of granularity.

Resolution:
Merged the multiple contributing factor columns into a single column.
Normalized the merged data to reduce redundancy and maintain granularity.

3. Date and Time Formatting:

Issue: The date and time data were combined in a single column and formatted as mm/dd/yyyy.

Resolution:

Split the combined date and time data into separate columns.
Changed the date format to yyyy-mm-dd for consistency and improved data handling.

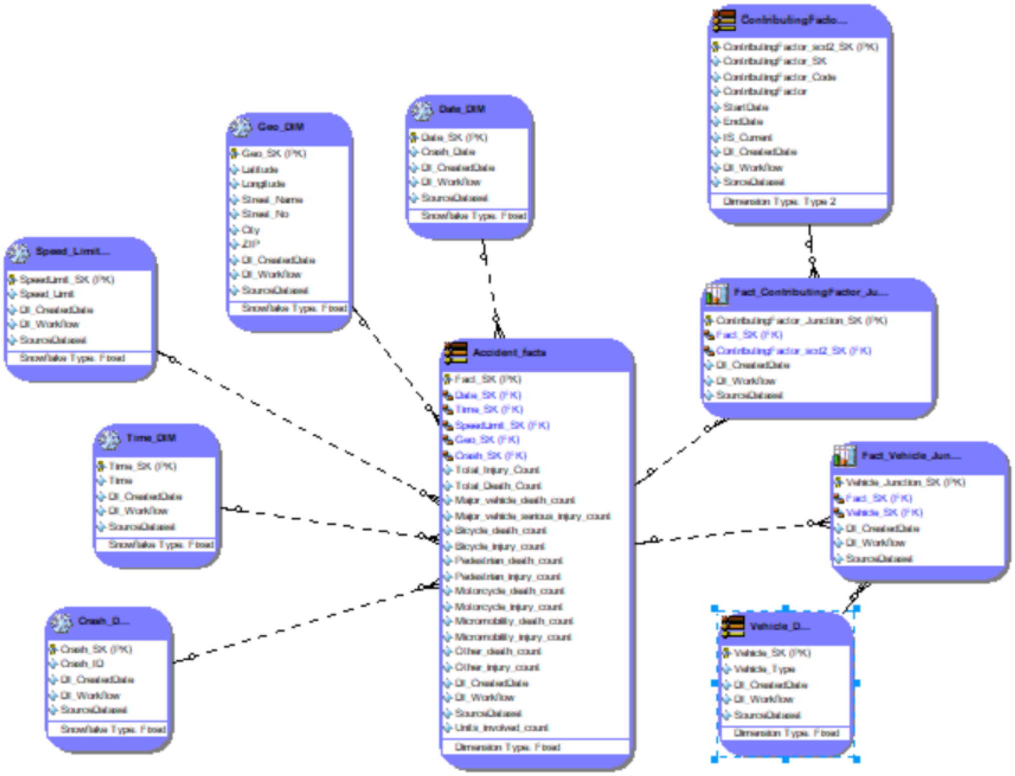
Explanation:

In the Austin dataset, there was no explicit mention of individual vehicle types. To address this, vehicle types were computed and inferred using the available data or through specific algorithms.

Multiple columns for contributing factors were present, which could lead to data redundancy and reduced granularity. To streamline the data, these columns were merged into a single column. The merged data was then normalized to ensure consistency and maintain the level of detail or granularity required for analysis.

The date and time data were initially combined in a single column with a mm/dd/yyyy format. To improve data clarity, organization, and consistency across datasets, the combined date and time were split into separate columns. Additionally, the date format was changed to the more universally recognized and standardized yyyy-mm-dd format. This change facilitates easier data processing, comparison, and analysis.

DIMENSIONAL MODEL



The dimensional model depicted is a star schema designed for traffic accident data analysis. This schema features a central fact table containing measures such as the total injury count, pedestrian injury count, various types of injuries and deaths, and the number of units involved in accidents.

Surrounding this central fact table are several dimension tables, each providing descriptive attributes for detailed analysis:

- Time Dimension (Time_DM): Attributes include time, creation date, and workflow, enabling analysis of accident timing.

- Geographical Dimension (Geo_DM): Attributes include latitude, longitude, street name, and city, useful for location-based analysis of accidents.

- Date Dimension (Date_DM): Captures date-specific information for trend analysis over different time periods.

- Speed Limit Dimension (SpeedLimit_DM): Contains speed limit information to analyze the impact of speed on accident frequency.

- Crash Dimension (Crash_DM): Likely to hold specific details about the crashes.

- Contributing Factor Dimension (ContributingFactor_DM): Data on various contributing factors to an accident, essential for root cause analysis.

- Vehicle Dimension (Vehicle_DM): Information about vehicles involved in accidents.

- Fact tables for contributing factors and vehicle junctions: These include keys to other dimensions and are used to scrutinize specific aspects of accidents, such as contributing factors or vehicle-related incidents.

To address the questions provided:

- The total number of accidents is determined by counting records in the Accident Facts table.

- The top 3 areas with the most accidents are identified by grouping by city and street in the Geo Dimension and ordering by the accident count.

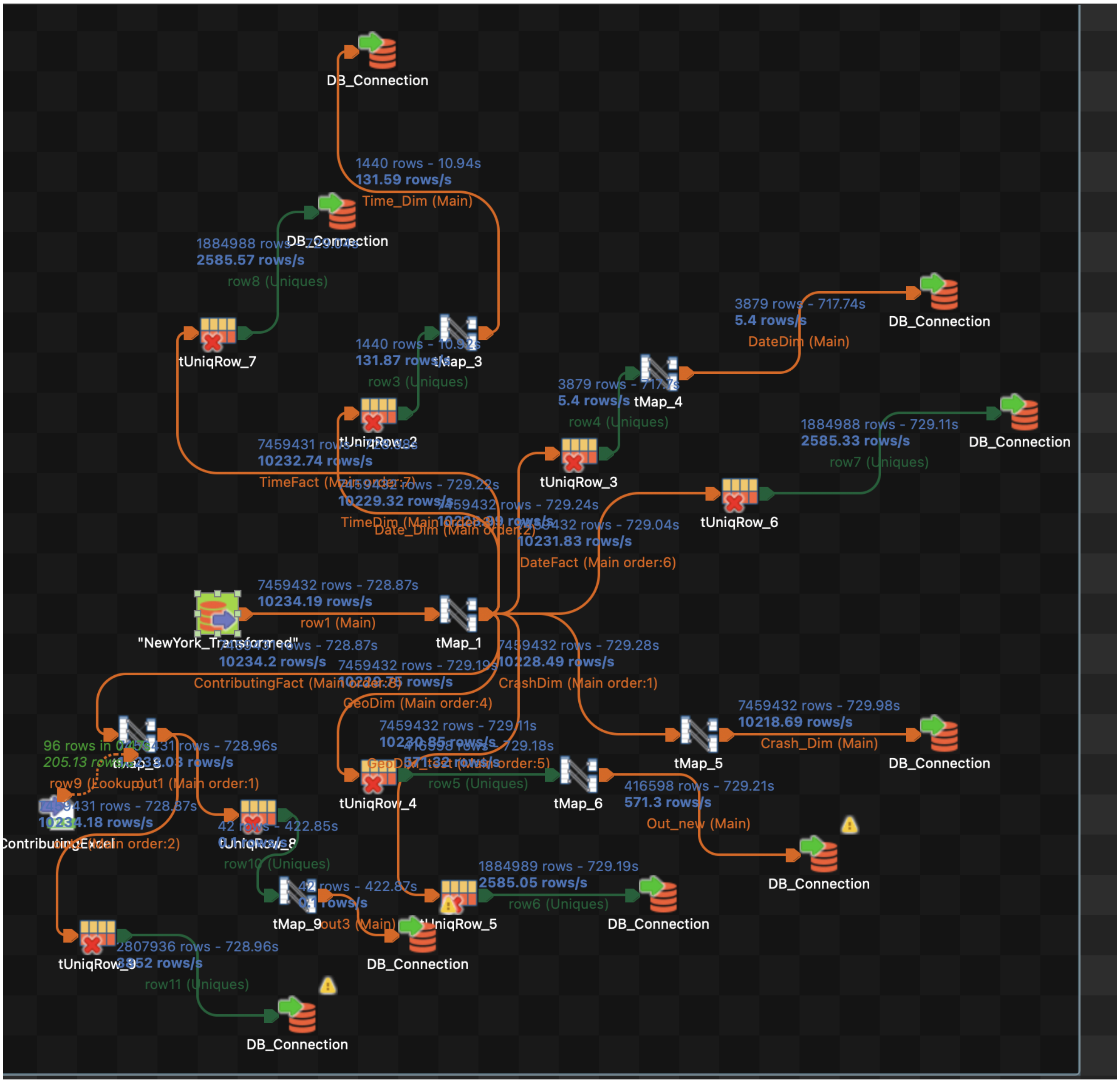
- Accidents resulting in injuries are tallied by summing injury counts in the Accident Facts table, with filters applied for city-specific reports.

- Pedestrian involvement is quantified by summing pedestrian injury and death counts in the Accident Facts table, with the option to filter by city.

- The most common factors involved in accidents are identified by joining the Accident Facts table with the Contributing Factor Dimension and aggregating the data.

Reports are generated by applying filters, grouping, and aggregating data as required by each specific question. The model supports efficient querying for analytics.

WORKFLOW SCREENSHOTS: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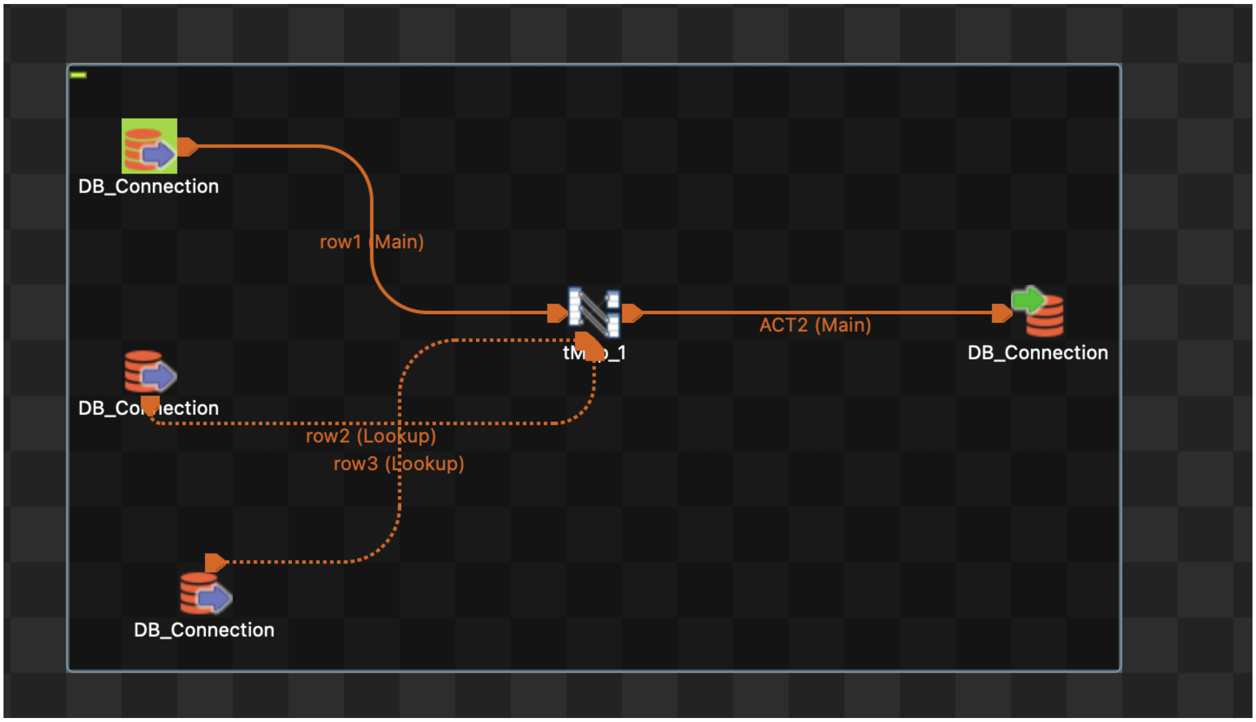
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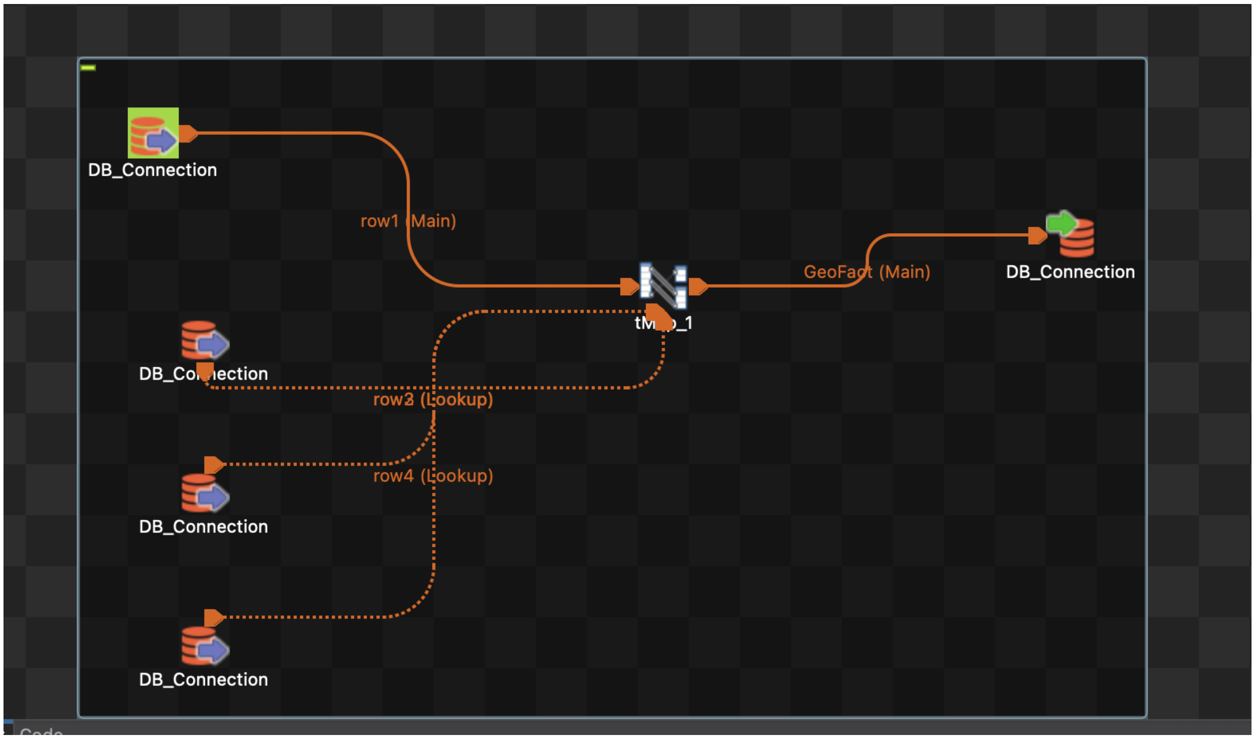
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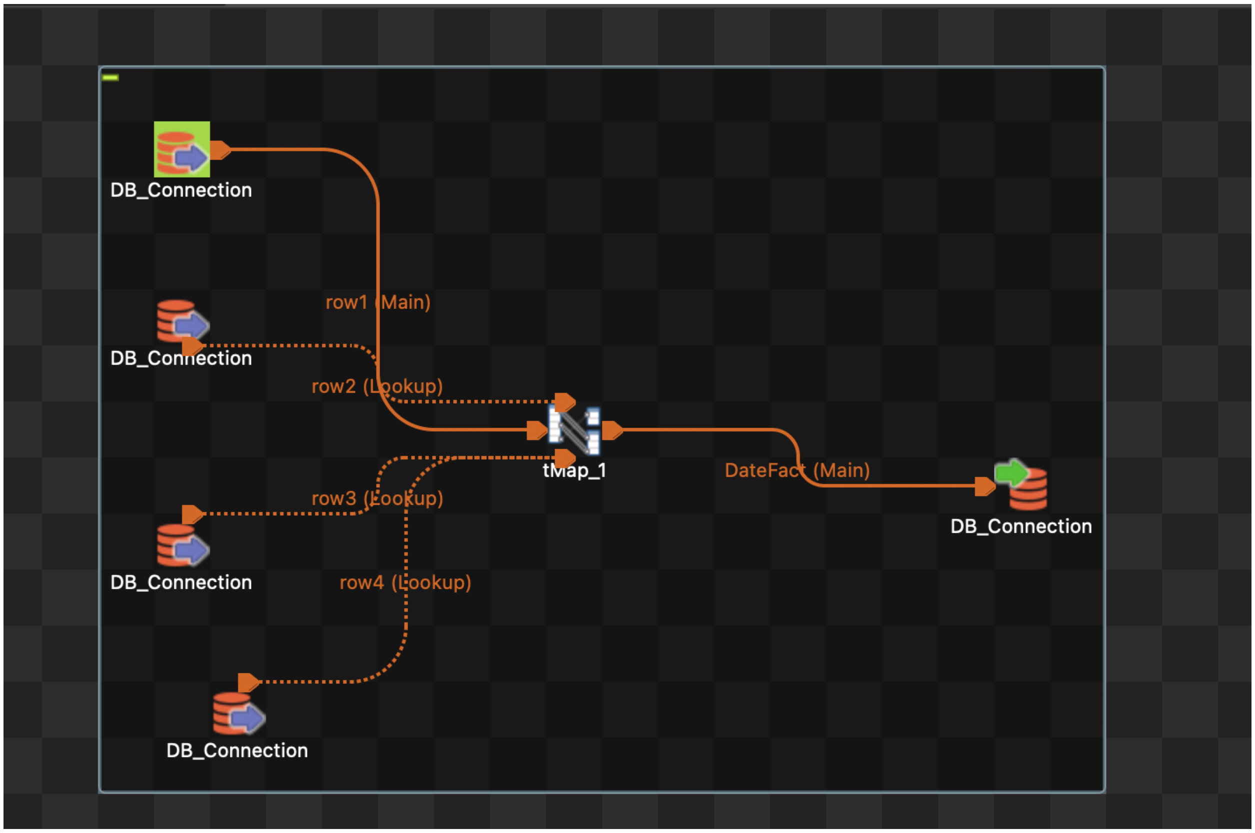
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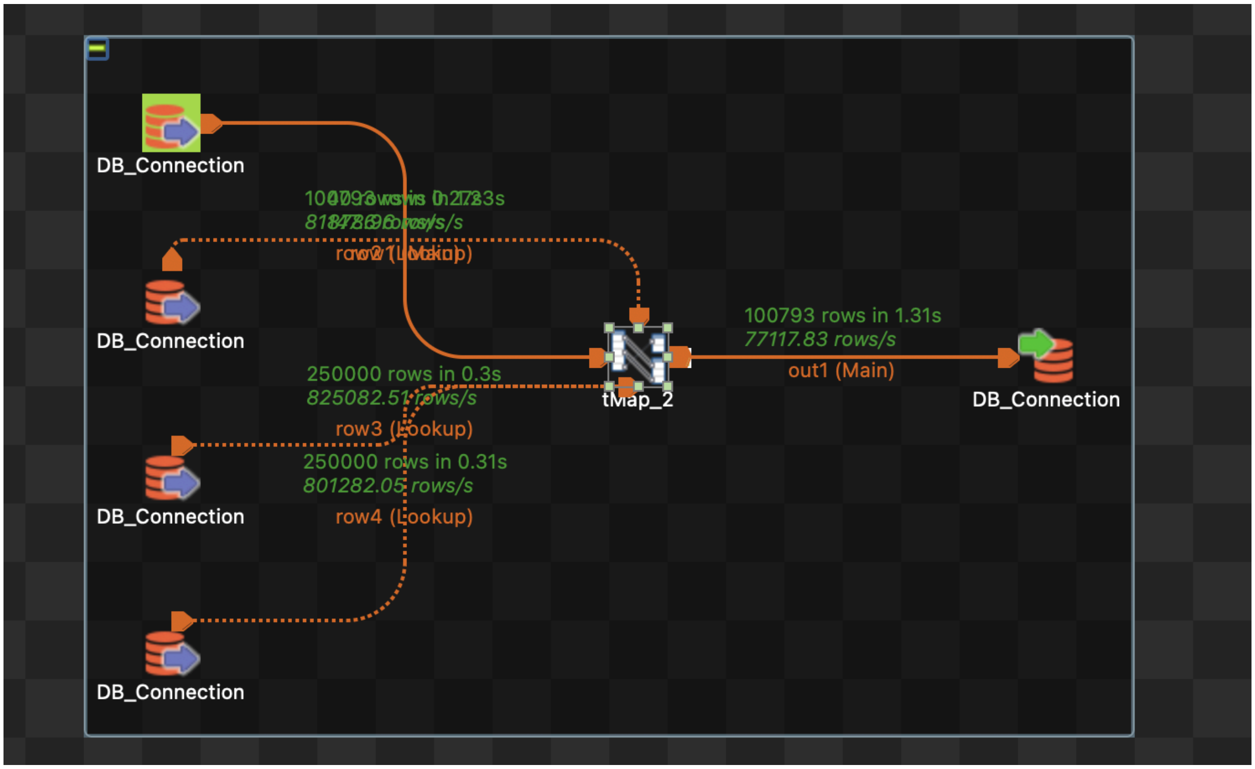
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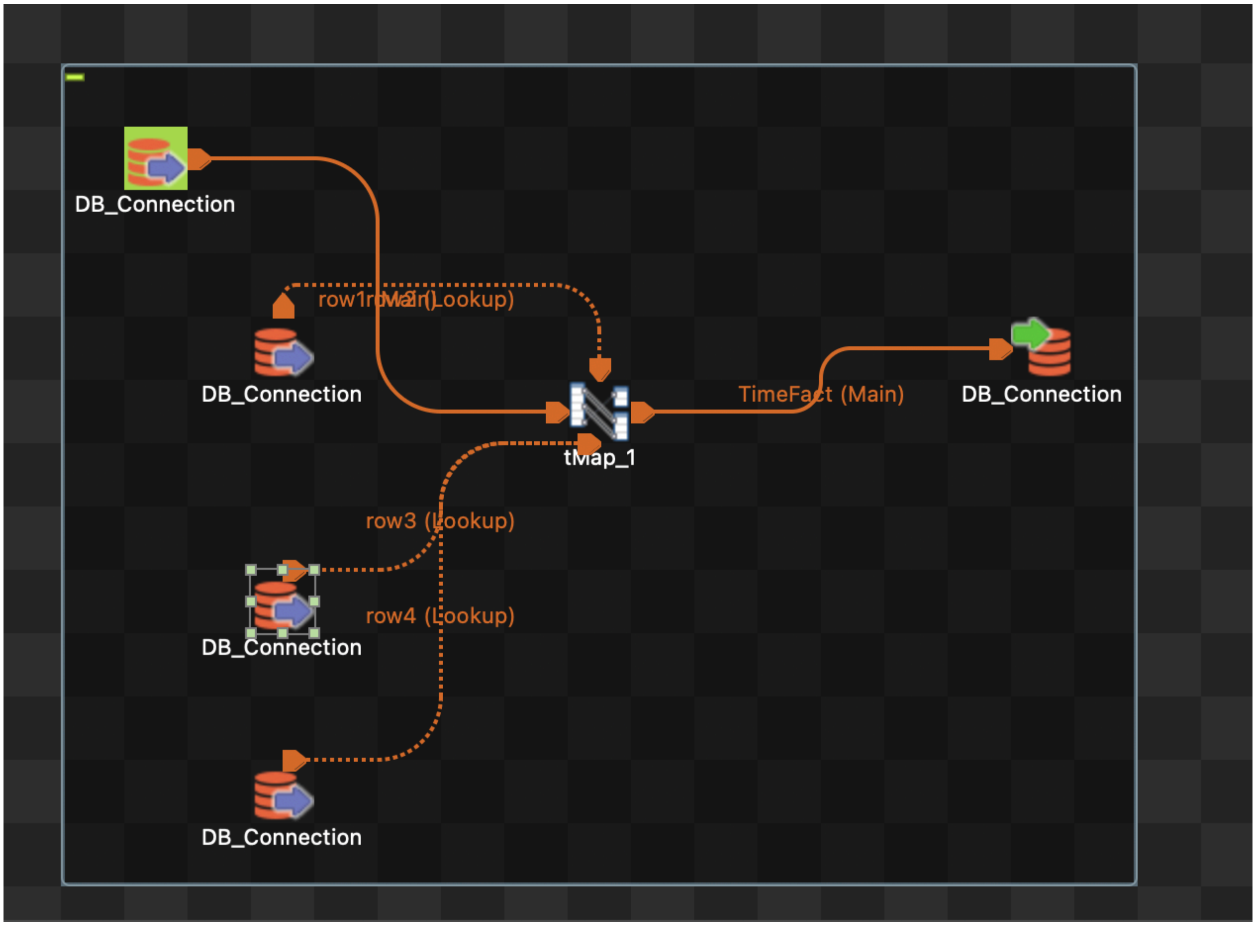
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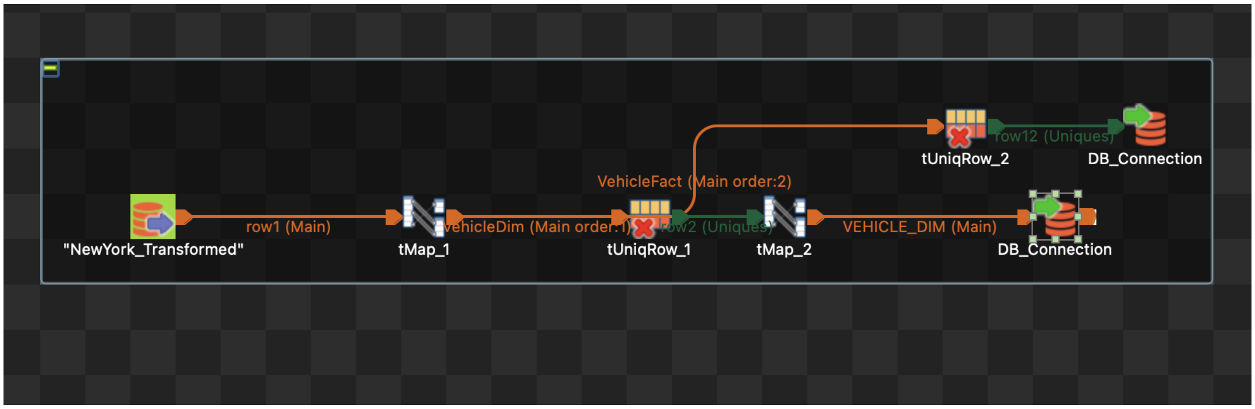
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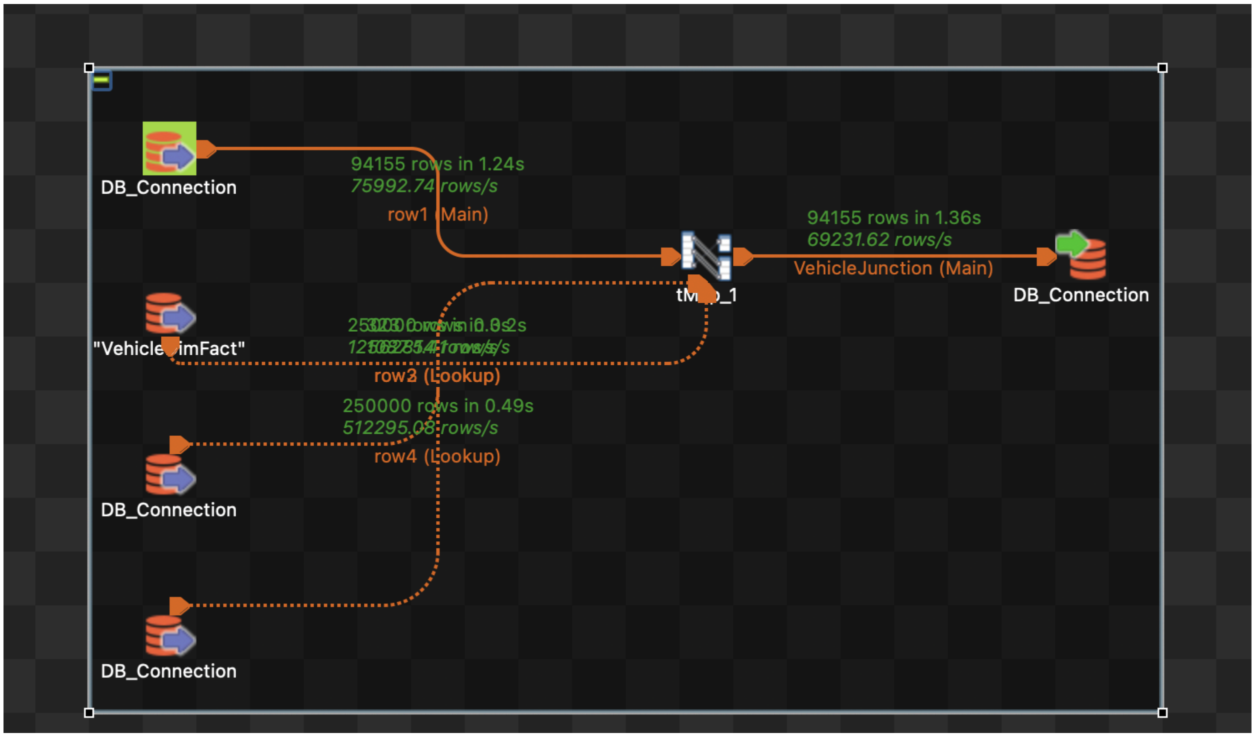
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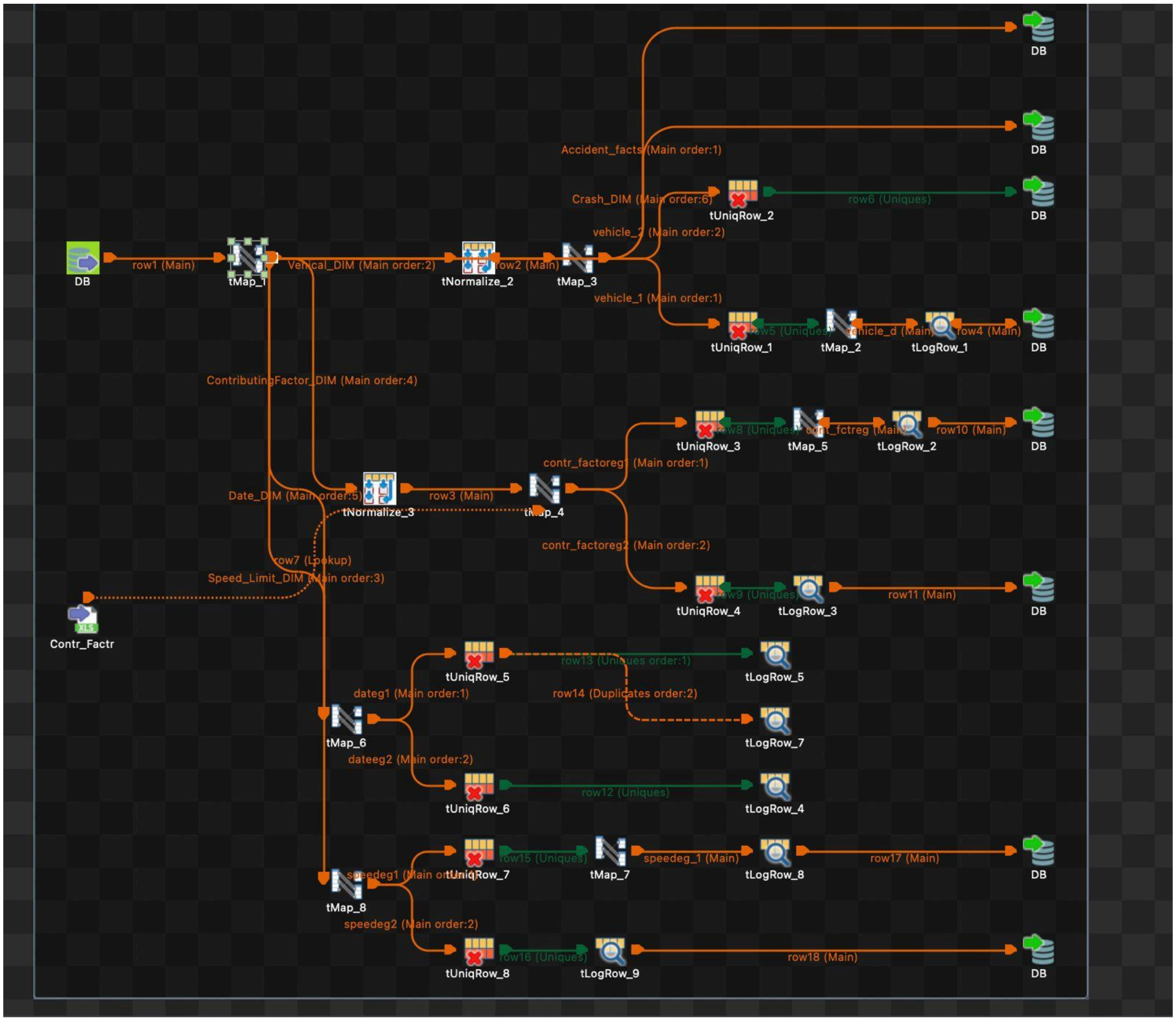
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vehicle_2 (Main order:2)
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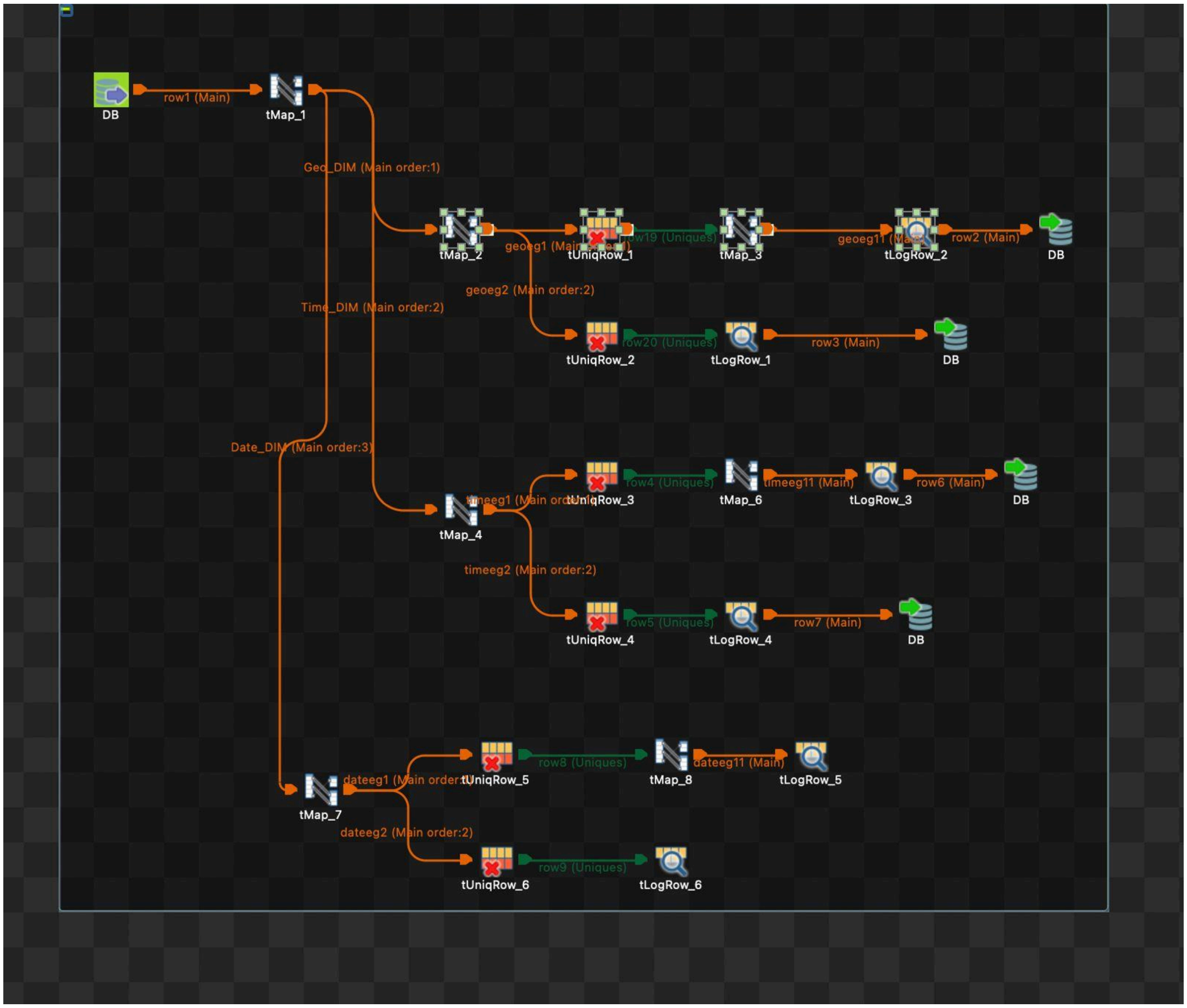
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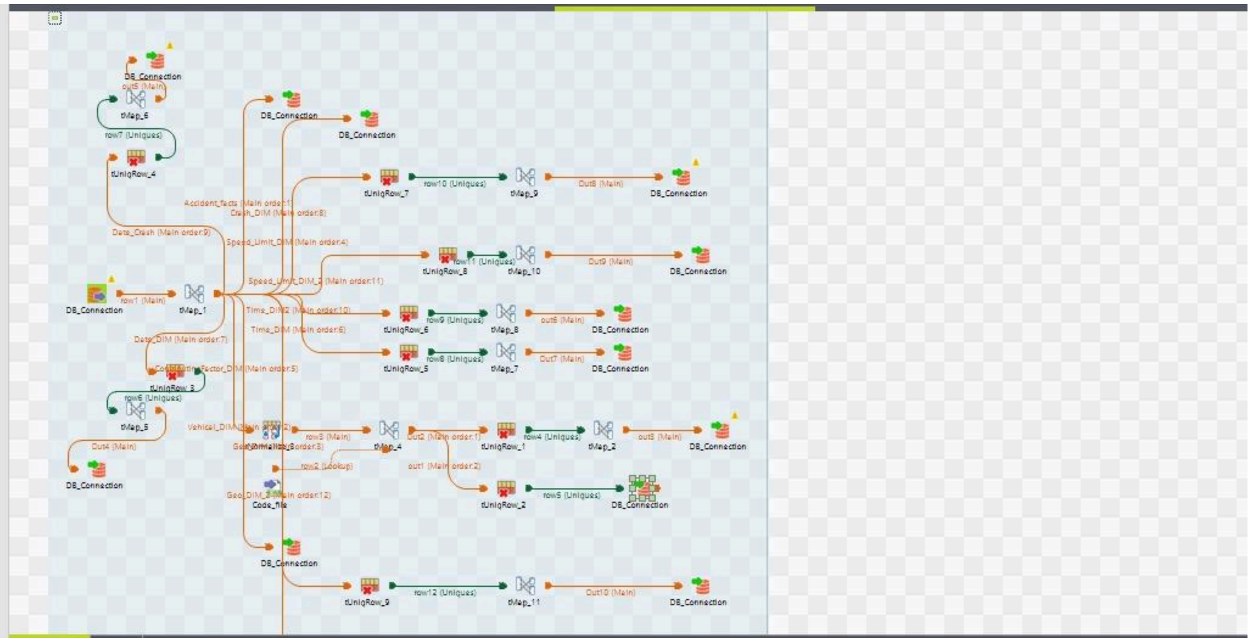
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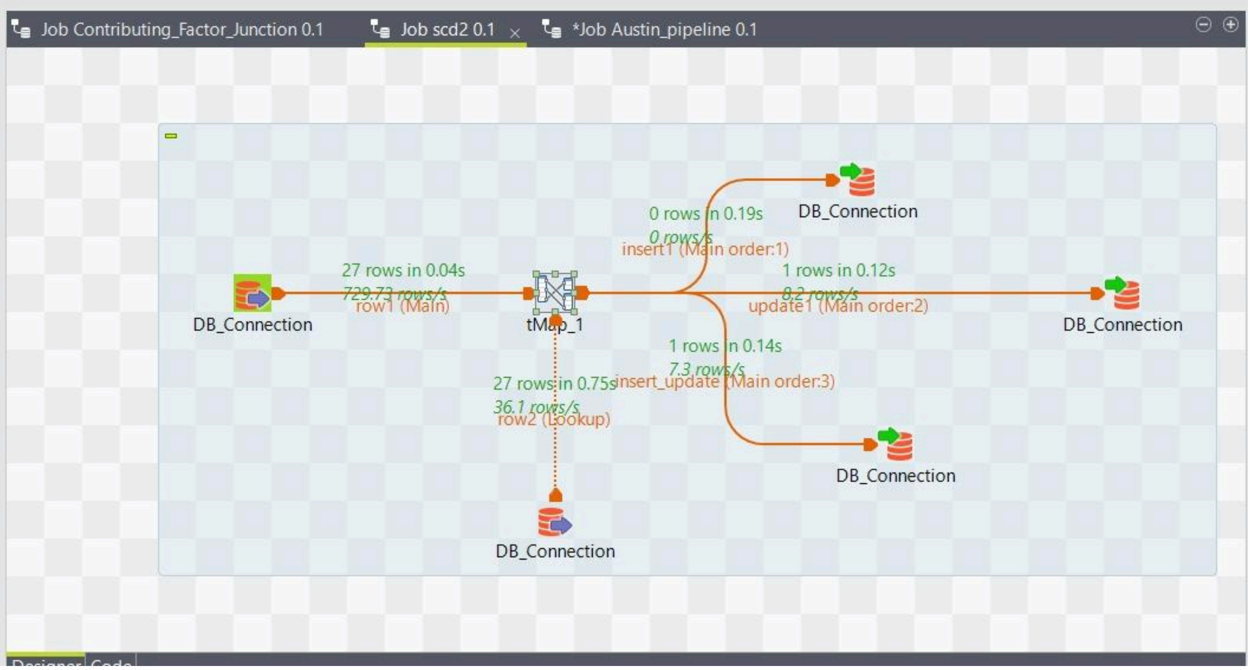
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