Implementing vertical fusion in DirectQuery for Power BI involves optimizing query performance by combining multiple similar queries into a single query. This reduces the number of queries sent to the data source, which can improve performance, especially when dealing with large datasets or complex models.

**What is Vertical Fusion?**

Vertical fusion is a technique where multiple queries that retrieve data from the same table or closely related tables are combined into a single query. This is especially useful in scenarios where multiple visuals or measures are based on the same or similar data. By fusing these queries, you can reduce the overhead and improve the efficiency of data retrieval.

**Steps to Implement Vertical Fusion**

1. **Identify Similar Queries:**
   * Look for queries that are similar in nature, such as those that query the same table with slightly different filters or aggregations. These are prime candidates for fusion.
2. **Combine Queries:**
   * Rewrite the queries to combine them into a single query. This often involves using SQL constructs like UNION, CASE, or subqueries to merge the logic of multiple queries into one.
3. **Adjust Power BI Model:**
   * Ensure that your Power BI model can handle the combined query. This might involve adjusting measures, calculated columns, or relationships to work with the new, fused query.

**Example Scenario**

Let's say you have two visuals in Power BI:

1. A table that shows total sales by region.
2. A card that shows the total sales for a specific region.

Each visual generates a separate query:

* Query 1: SELECT Region, SUM(Sales) FROM SalesData GROUP BY Region
* Query 2: SELECT SUM(Sales) FROM SalesData WHERE Region = 'North'

Instead of executing these as separate queries, you can fuse them into a single query:

sql

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SELECT

Region,

SUM(Sales) AS TotalSales,

SUM(CASE WHEN Region = 'North' THEN Sales ELSE 0 END) AS NorthSales

FROM

SalesData

GROUP BY

Region

**Benefits of Vertical Fusion**

* **Reduced Query Overhead:**
  + Combining multiple queries into one reduces the number of round trips to the data source, lowering the query overhead.
* **Improved Performance:**
  + A single query can often be optimized better by the database engine, leading to faster execution times.
* **Simplified Data Retrieval:**
  + Simplifies the logic of data retrieval by reducing the number of separate queries and making the data processing more efficient.

**Best Practices for Vertical Fusion**

1. **Optimize SQL Queries:**
   * Ensure that the fused queries are optimized for performance. Use appropriate indexing and avoid complex joins if possible.
2. **Monitor Performance:**
   * Use Power BI’s Performance Analyzer and database query tools to monitor the performance of your fused queries and make adjustments as necessary.
3. **Test Thoroughly:**
   * Test the fused queries thoroughly to ensure they return the correct results and handle edge cases appropriately.
4. **Leverage Database Features:**
   * Use features like stored procedures or views in your database to handle complex query logic, which can then be called from Power BI.

**Practical Implementation**

Here’s a more detailed example of implementing vertical fusion in Power BI:

1. **Identify the Queries:**
   * Analyze the queries generated by your Power BI visuals using tools like SQL Profiler or Power BI’s Performance Analyzer.
2. **Combine the Queries:**
   * Rewrite the queries to combine them into a single, optimized query.
3. **Update Power BI Model:**
   * Adjust your Power BI model to accommodate the combined query. This might involve creating new measures or modifying existing ones.
4. **Test and Validate:**
   * Ensure that the fused query produces the expected results. Compare the results of the original queries with the fused query to validate accuracy.

**Example Fusion in Power BI**

Assume you have the following two measures in Power BI:

* **Total Sales:**

DAX

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TotalSales = SUM(SalesData[Sales])

* **North Region Sales:**

DAX

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NorthSales = CALCULATE(SUM(SalesData[Sales]), SalesData[Region] = "North")

Instead of these measures generating separate queries, you can implement vertical fusion by creating a single measure that retrieves both values in one query:

* **Fused Measure:**

DAX

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FusedSales =

SUMX(

SalesData,

SalesData[Sales] +

IF(SalesData[Region] = "North", SalesData[Sales], 0)

)

This is a simplified example, but in practice, you would adjust the DAX to ensure that the single query is generated efficiently by the database.

By implementing vertical fusion, you can optimize the performance of DirectQuery in Power BI, making your reports faster and more responsive.