



Module 4

Materialized View Processing and Design

Lesson 4: Query Rewriting Examples



Lesson Objectives

- Apply matching rules from lesson 3
- Rewrite queries using a single materialized view
- Rewrite queries using the UNION operator to combine multiple materialized views
- Reflect on the complexity of query rewriting for a large number of materialized views



Query Rewriting Example

-- DWQuery1

```
SELECT StoreState, TimeYear, SUM(SalesDollar)
FROM SSSales, SSStore, SSTimeDim
WHERE SSSales.StoreId = SSStore.StoreId
      AND SSSales.TimeNo = SSTimeDim.TimeNo
      AND StoreNation IN ('USA','Canada')
      AND TimeYear = 2016
GROUP BY StoreState, TimeYear;
```

-- MV1

```
CREATE MATERIALIZED VIEW MV1 ...
SELECT StoreState, TimeYear,
       SUM(SalesDollar) AS SumDollar1
FROM SSSales, SSStore, SSTimeDim
WHERE SSSales.StoreId = SSStore.StoreId
      AND SSSales.TimeNo = SSTimeDim.TimeNo
      AND TimeYear > 2014
GROUP BY StoreState, TimeYear;
```



Matching Summary

	MV1	DWQuery1
Grouping	StoreState, TimeYear	StoreState, TimeYear
Conditions	TimeYear > 2014	TimeYear = 2016 AND StoreNation IN ('USA', 'Canada')
Aggregates	SUM(SalesDollar)	SUM(SalesDollar)

- StoreNation not in MV1
- Join MV1 to SSStore on StoreState
 - Test condition on StoreNation
 - StoreState → StoreNation assumed



Query Rewriting Result

-- Data warehouse query

```
SELECT StoreState, TimeYear, SUM(SalesDollar) AS SumSales
FROM SSSales, SSStore, SSTimeDim
WHERE SSSales.StoreId = SSStore.StoreId
      AND SSSales.TimeNo = SSTimeDim.TimeNo
      AND StoreNation IN ('USA','Canada')
      AND TimeYear = 2016
GROUP BY StoreState, TimeYear;
```

-- Query Rewrite

-- Replace SSSales and SSTimeDim tables with MV1

-- Join with SSStore on StoreState to test condition on StoreNation

```
SELECT DISTINCT MV1.StoreState,
                TimeYear, SumDollar1
FROM MV1, SSStore
WHERE MV1.StoreState = SSStore.StoreState
      AND TimeYear = 2016
      AND StoreNation IN ('USA','Canada');
```

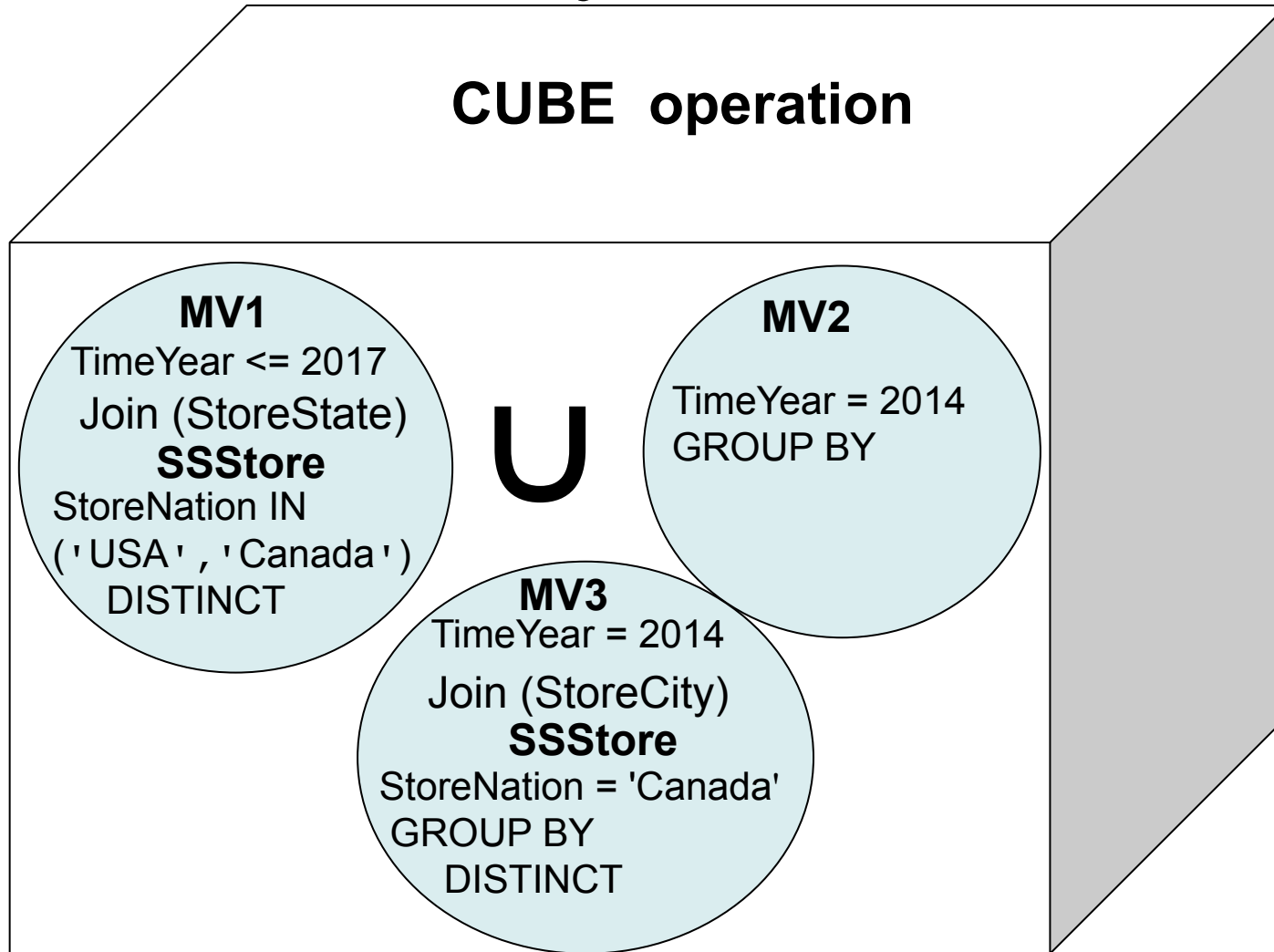


More Complex Example

- MVs
 - MV1: All sales after 2014 grouped by state and year
 - MV2: USA sales in all years grouped by state, year, and month
 - MV3: Canadian sales before 2015 grouped by city, year, and month
- Query
 - Sum of USA and Canadian dollar sales from 2014 to 2017
 - Group by store state and year with a CUBE operation
- Query rewriting
 - UNION operations combining MV1, MV2, and MV3
 - Use GROUP BY clauses for MV2 and MV3 to rollup totals
 - Perform CUBE after UNION operations



Rewritten Query with SELECT Blocks



Additional Problems

- MVs
 - Sum of costs before 2017 by CustZip and TimeYear
 - Sum of USA costs by CustZip, TimeYear, and TimeQuarter
 - Sum of Canadian costs after 2015 by CustZip and TimeYear
- Rewriting using one MV
 - Sum of USA and Canadian costs in 2016 by CustZip and TimeYear
 - Use first MV
- Rewriting using multiple MVs
 - Sum of USA and Canadian costs after 2015 by CustZip and TimeYear
 - Use all three MVs
 - Variation: CUBE operation



Summary

- Summary table to compare query and materialized views
- Examples using a single materialized view and multiple materialized views
- Tedious process performed by extended SQL compiler
- Work problems to gain insight about query rewriting

