

# Delivering a Relational Data Warehouse

Week 2 – Designing a Relational Data Warehouse Schema

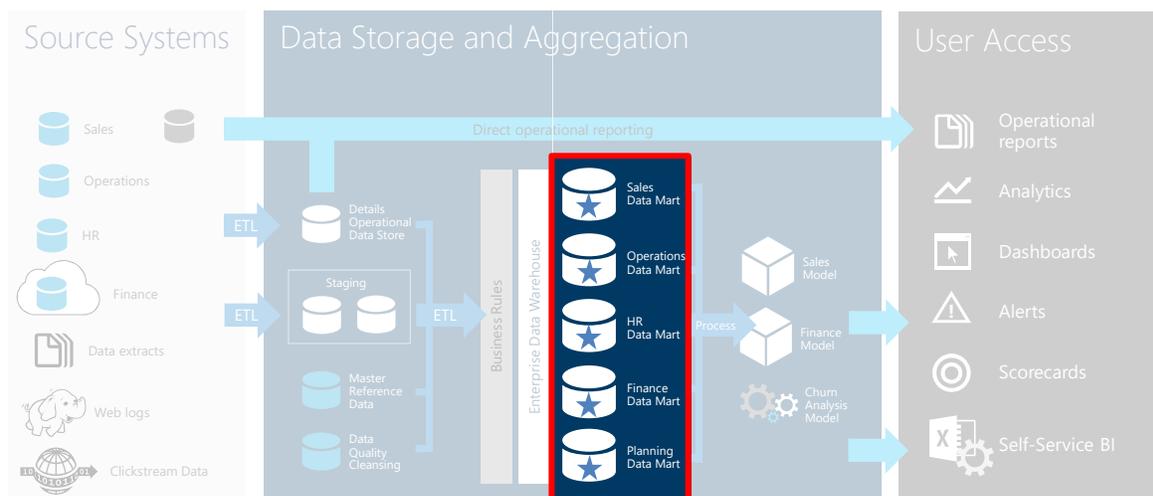
Module 04

## Designing Dimension Tables



## Week Outline

### 2 | Designing a Relational Data Warehouse Schema



# Module Outline

## 04 | Designing Dimension Tables

	Topic
▶	Star Schema
▶	Dimension Table Fundamentals
▶	Dimension Table Design Concepts
▶	<b>Demo:</b> Exploring the AdventureWorksDW Dimension Tables



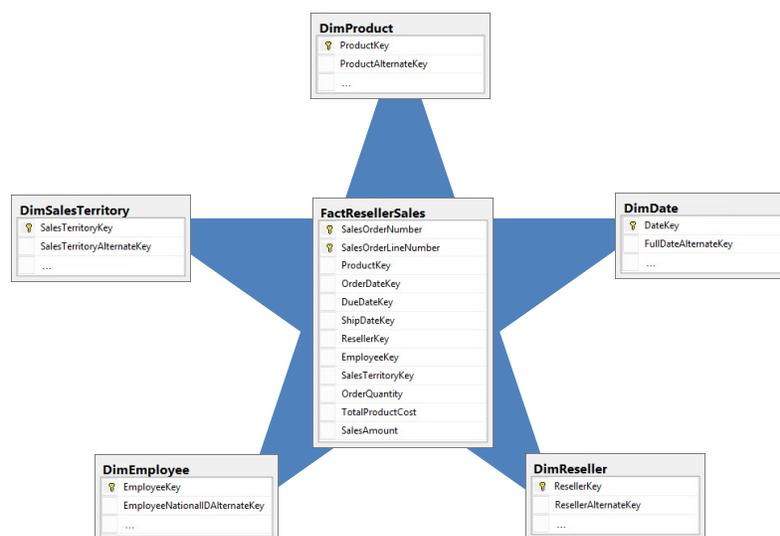
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# Module Outline

## 04 | Designing Dimension Tables

Topic
Star Schema
Dimension Table Fundamentals
Dimension Table Design Concepts
<b>Demo: Exploring the AdventureWorksDW Dimension Tables</b>

## Star Schema



## Star Schema

### Benefits

- Transforms source data into a relational model, optimized for analytic query workloads
- Delivers higher-performance queries
  - Fewer table joins
  - Higher likelihood of useful indexes
- Uses mature modeling techniques that are widely supported by many BI tools
- Requires low maintenance as the data warehouse design evolves



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### 04 | Designing Dimension Tables

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<b>Demo:</b> Exploring the AdventureWorksDW Dimension Tables

## Dimension Table Fundamentals

- Dimension tables describe business entities
  - Products, people, places, concepts—including time
  - Table names are typically prefixed with **Dim**
- They contain attributes that provide context to numeric data stored in the related fact tables
  - Generally, attributes reflect user filtering and grouping requirements
- Generally, they are wide in terms of columns (attributes), and shallow in terms of the number of records
- They often present data that can be organized into hierarchies

## Dimension Table Fundamentals

### Example ► AW Dimension Tables

AdventureWorksDW2016

- Database Diagrams
- Tables (filtered)
  - System Tables
  - FileTables
  - External Tables
  - dbo.DimAccount
  - dbo.DimCurrency
  - dbo.DimCustomer
  - dbo.DimDate
  - dbo.DimDepartmentGroup
  - dbo.DimEmployee
  - dbo.DimGeography
  - dbo.DimOrganization
  - dbo.DimProduct
  - dbo.DimProductCategory
  - dbo.DimProductSubcategory
  - dbo.DimPromotion
  - dbo.DimReseller
  - dbo.DimSalesReason
  - dbo.DimSalesTerritory
  - dbo.DimScenario

- Products
- People
- Places
- Concepts

## Dimension Table Fundamentals

### Example ► AW DimProduct Table

- The AdventureWorksDW DimProduct table contains numerous attributes:

- Keys
- Stocking
- Financial
- Language translations
- Historical tracking

DimProduct	
ProductKey	
ProductAlternateKey	
ProductSubcategoryKey	
WeightUnitMeasureCode	
SizeUnitMeasureCode	
EnglishProductName	
SpanishProductName	
FrenchProductName	
StandardCost	
FinishedGoodsFlag	
Color	
SafetyStockLevel	
ReorderPoint	
ListPrice	
Size	
SizeRange	
Weight	
DaysToManufacture	
ProductLine	
DealerPrice	
Class	
Style	
ModelName	
LargePhoto	
EnglishDescription	
FrenchDescription	
ChineseDescription	
ArabicDescription	
HebrewDescription	
ThaiDescription	
GermanDescription	
JapaneseDescription	
TurkishDescription	
StartDate	
EndDate	
Status	

# Dimension Table Fundamentals

## Hierarchies

- Benefits
  - Enable viewing data at different levels of summarization
  - Provide paths to drill down, or drill up
- Implementation:
  - Denormalized star schema dimension
  - Normalized snowflake dimension
  - Self-referencing relationship

	A	B
1	Row Labels	Sales
2	⊕ FY2010	16,288,442
3	⊖ FY2011	27,921,671
4	⊖ FY2011 Q1	8,880,239
5	⊕ 2010 Jul	2,393,690
6	⊕ 2010 Aug	3,601,191
7	⊕ 2010 Sep	2,885,359
8	⊖ FY2011 Q2	7,041,184
9	⊖ FY2011 Q3	5,266,344
10	⊖ FY2011 Q4	6,733,904
11	⊕ FY2012	36,240,485
12	Grand Total	80,450,597



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## Dimension Table Design Concepts

- Hierarchies
- Primary Keys

## Dimension Table Design Concepts

### Hierarchies ► Review

- Can be implemented as:
  - Denormalized star schema dimension
  - Normalized snowflake dimension
  - Self-referencing relationship

## Dimension Table Design Concepts

### Hierarchies ► Examples

DimDate	
🔑 DateKey	
FullDateAlternateKey	
EnglishMonthName	
MonthNumberOfYear	
CalendarQuarter	
CalendarYear	1
CalendarSemester	
FiscalQuarter	
FiscalYear	2
FiscalSemester	

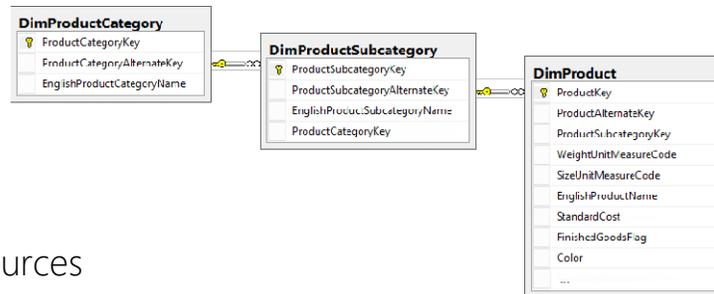
DimProduct	
🔑 ProductKey	
ProductAlternateKey	
ProductSubcategoryKey	
WeightUnitMeasureCode	
SizeUnitMeasureCode	
EnglishProductName	
StandardCost	
FinishedGoodsFlag	
Color	
...	

DimEmployee	
🔑 EmployeeKey	
ParentEmployeeKey	
EmployeeNationalIDAlternateKey	
SalesTerritoryKey	
FirstName	
LastName	
MiddleName	
NameStyle	
Title	
...	

## Dimension Table Design Concepts

### Hierarchies ► Snowflake Dimension Tables

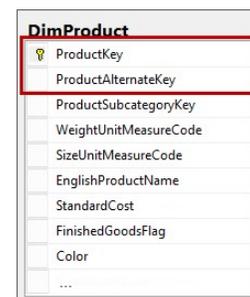
- Define hierarchies by using multiple dimension tables
- Benefits:
  - Support fact tables with varying granularity
  - Simplify consolidation of data from multiple sources
- However, they are often not an optimal design



## Dimension Table Design Concepts

### Primary Keys

- A primary key defines a unique identifier, and is used to relate to a fact table dimension key
  - It can be optionally enforced with a foreign key
- Two candidates:
  - Business key—use the source primary key
  - Implement a data warehouse specific surrogate key to allow:
    - Consolidation of multiple data sources
    - Consolidation of a multi-column business keys
    - Tracking of dimension history (SCD Type 2)
    - Limiting fact table width for storage optimization



## Dimension Table Design Concepts

### Primary Keys ► Recommended Practices

- Using a surrogate key is a recommended practice
  - Even if the business key seems an acceptable candidate
    - Strive to insulate the data warehouse from change
  - Use the smallest possible integer type
  - Do not attempt to give meaning to the key
  - Configure as an IDENTITY column
    - Not necessarily starting with zero
- Always store the business key(s)
  - This enables relating back to source system(s)

DimProduct	
ProductKey	
ProductAlternateKey	
ProductSubcategoryKey	
WeightUnitMeasureCode	
SizeUnitMeasureCode	
EnglishProductName	
StandardCost	
FinishedGoodsFlag	
Color	
...	



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## Demo

### Exploring the AdventureWorksDW Dimension Tables

Demo objectives:

1. Introduce the **AdventureWorksDW** dimension tables
2. Explore the **DimReseller** table
3. Explore the **DimProduct** table
4. Explore the **DimEmployee** table



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