Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

# Module 3
# Data Warehouse Design Practices and Methodologies

## Lesson 7: Mini Case for Data Warehouse Design

# Lesson Objectives

- Practice with data warehouse design problems
- Prepare for data warehouse design assignment
- Gain insights about analyzing data sources



# Mini Case on Schema Integration

- Apply and integrate skills from module 3 lessons
- Acquire new skills
- Data source specifications, business needs, and sample data



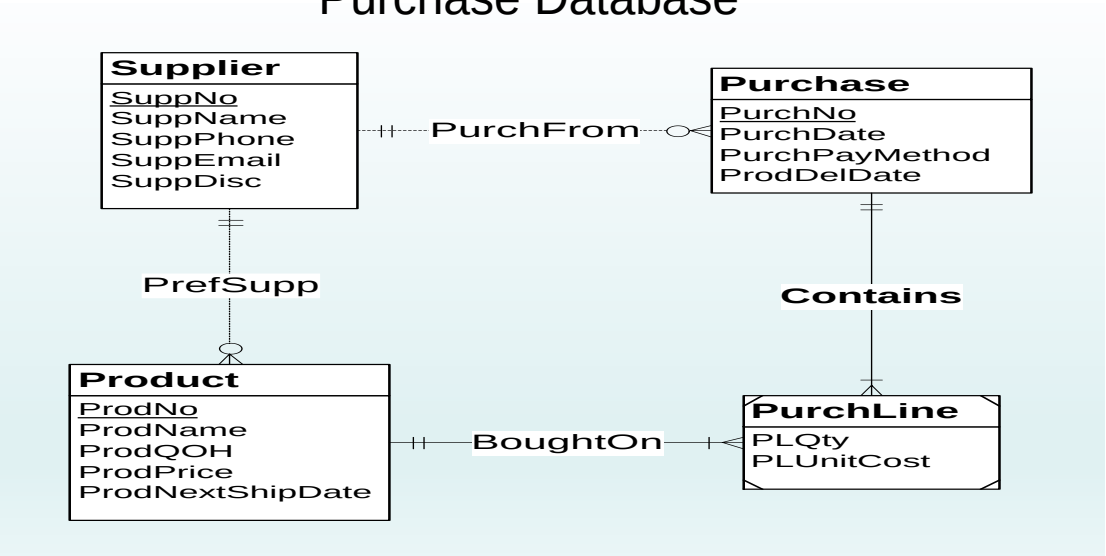
# Design Requirements

| | | | | |
|---|---|---|---|---|
| Specify dimensions and measures | Determine grain | Create table design using transformations | Identify summarizability problems and suggest resolutions | Map data sources and populate tables |



# Data Sources

Purchase Database




Purchases Spreadsheet for Custom Products

| ProdCode | ProdDesc | Supp | Qty | Stock | Unit Price | PurDate | Amount |
|---|---|---|---|---|---|---|---|
| CPC1 | Souvenir 1 | Omart | 20 | 1 | $2.00 | 13-Feb-2021 | $40.00 |
| CPC2 | Souvenir 2 | Smart | 10 | 2 | $3.50 | 14-Feb-2021 | $35.00 |
| CPC3 | Souvenir 3 | Pmart | 20 | 0 | $1.50 | 11-Feb-2021 | $30.00 |



# Business Intelligence Needs

- Track inventory over time by product and supplier
- Calculate inventory measures over time using quantity on hand and value
- Report on additions to inventory (purchases)
- No reporting on deletions to inventory (orders)

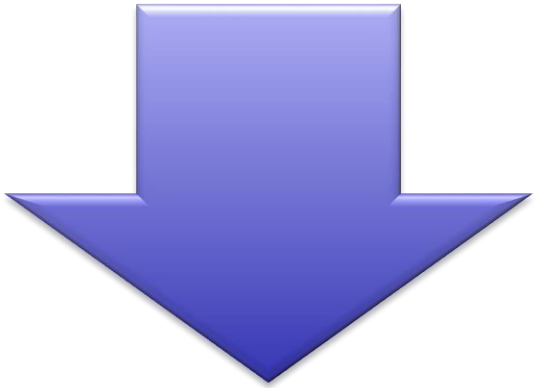


# Important Design Decisions

- Grain determination and relative size calculations
- Simplification using design transformations
- Mappings from source data to populate data warehouse tables



# Grain Size Calculations

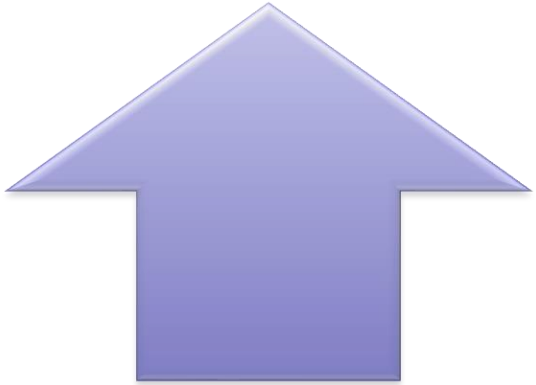


## Fact table size

- Use sizes of dimensions and estimate sparsity
- Fill Ratio: 1 - Sparsity
- Fact Table Size: Product of dimension sizes times fill ratio

## Sparsity

- Match fact table to source tables
- Use sizes of dimensions and source table
- Fill Ratio: Source table size divided by product of dimension table sizes
- Sparsity: 1 – Fill Ratio





# Transformations for Table Design

## Flatten

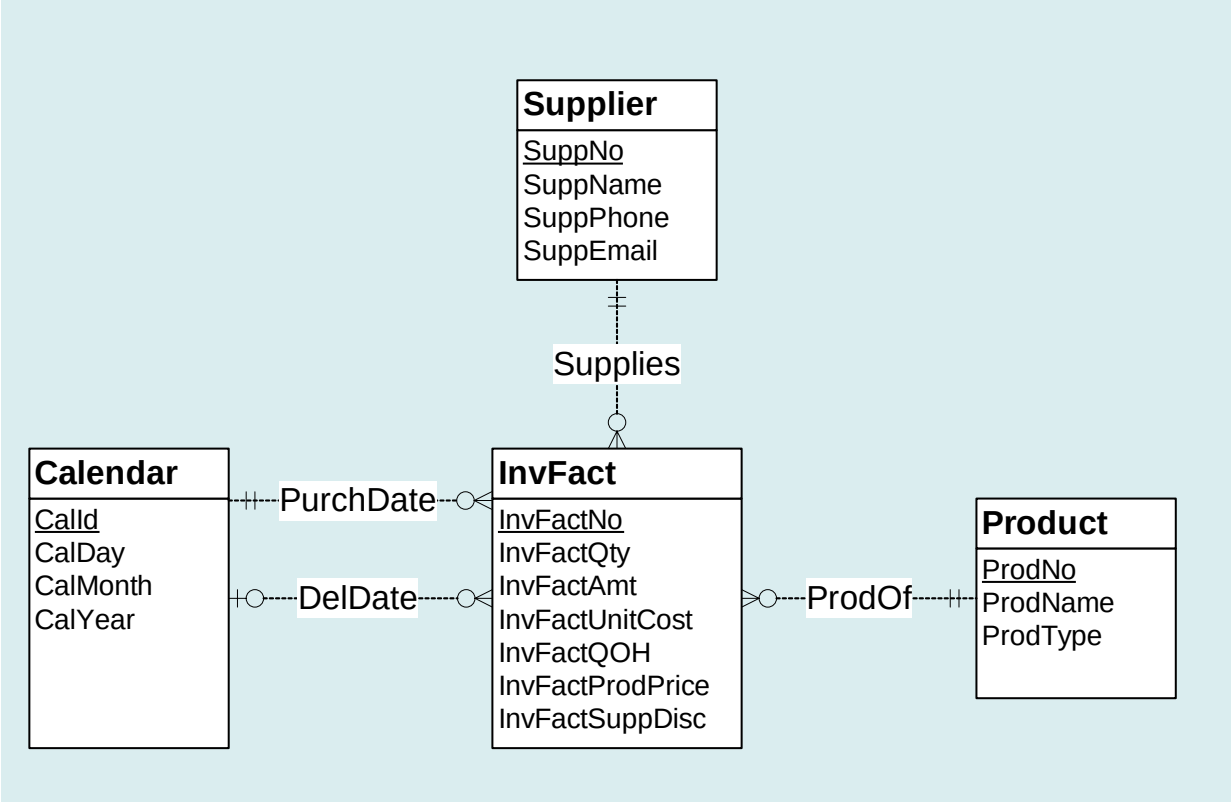
- Purchase and PurchLine tables
- Products grouped by date columns (PurchDate and DelDate)

## Merge

- Merge Supplier table and Supp column
- Merge Product table and ProdCode/ProdDesc columns
- Merge flattened table with spreadsheet rows



# Purchasing Star Schema






# Summarizability Problems

- Incomplete fact-dimension relationship (delivery date)
- Potential problems for hierarchical product dimension (brand, product type)
- Missing values for supplier and product dimensions (product type, supplier phone, and email)



# Mappings from Source Data

**Associations**

- Source column matching
- Conversions

**Additions**

- Generated PK values
- Default values
- Derived values



# Schema Integration Assignment

- Like the practice case
- Artifacts
  - Dimensional design with dimensions and members
  - Grain analysis
  - ERD integrating data sources with indication of design transformations
  - Summarizability problems and resolutions
  - Mapping from data sources
  - Population of DW tables using sample data from data sources



# Summary

- Mini case study to help apply and integrate concepts and skills
- Case study requirements and data sources
- Concept extensions
  - Grain size
  - Mapping source data to data warehouse



# Grain Size Determination

- Determine sparsity
  - Given dimension cardinalities and source table cardinality
  - Associate fact table to tables of data source
  - 1 minus source table cardinality divided by product of dimension cardinalities
- Determine fact table size
  - Given dimension cardinalities and sparsity estimate
  - Product of dimension cardinalities
  - Reduce by sparsity