# Dimensional modeling

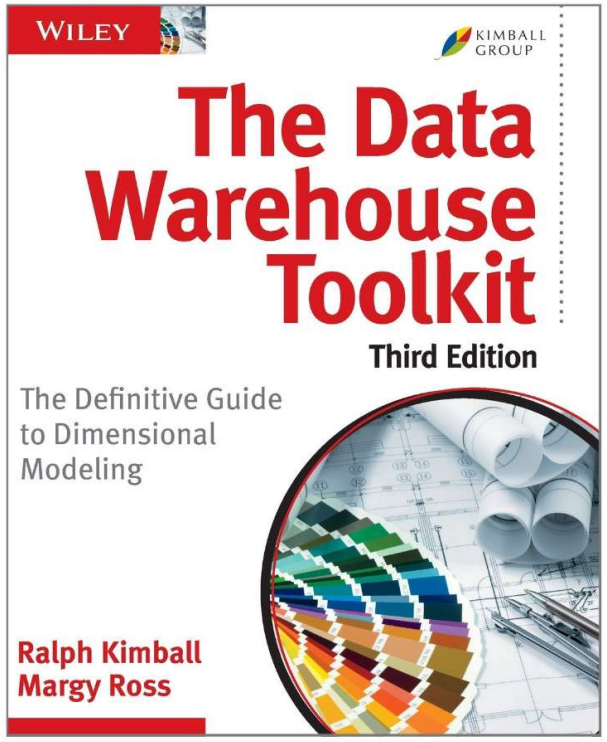
## DATA MODELING IN POWER BI

**Sara Billen**
Curriculum Manager at DataCamp

datacamp

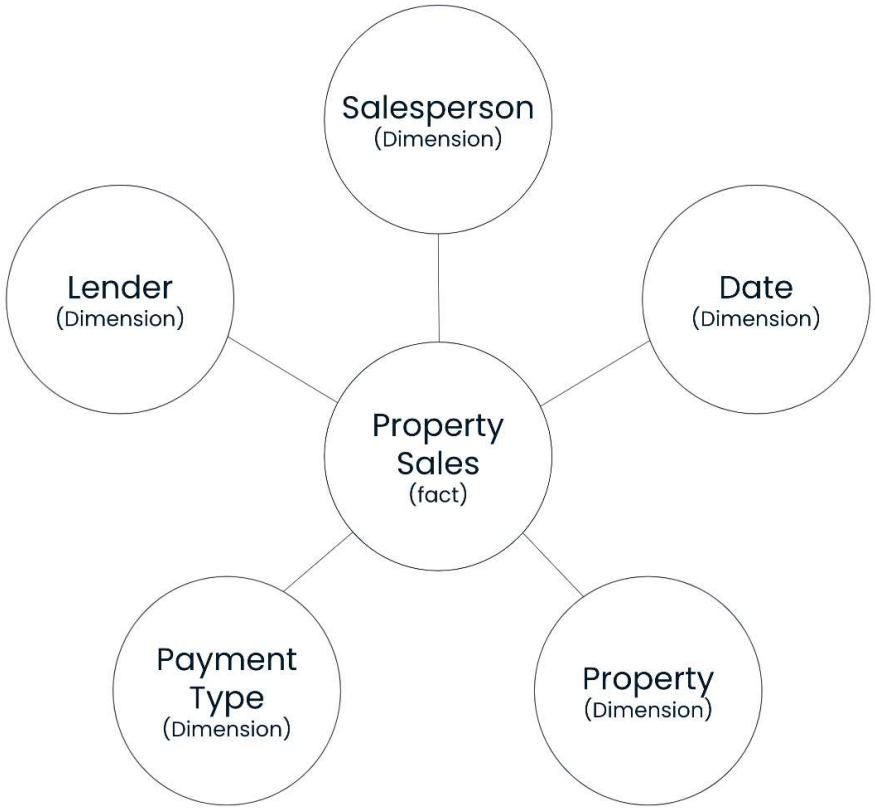
# The Kimball Model

The dimensional model



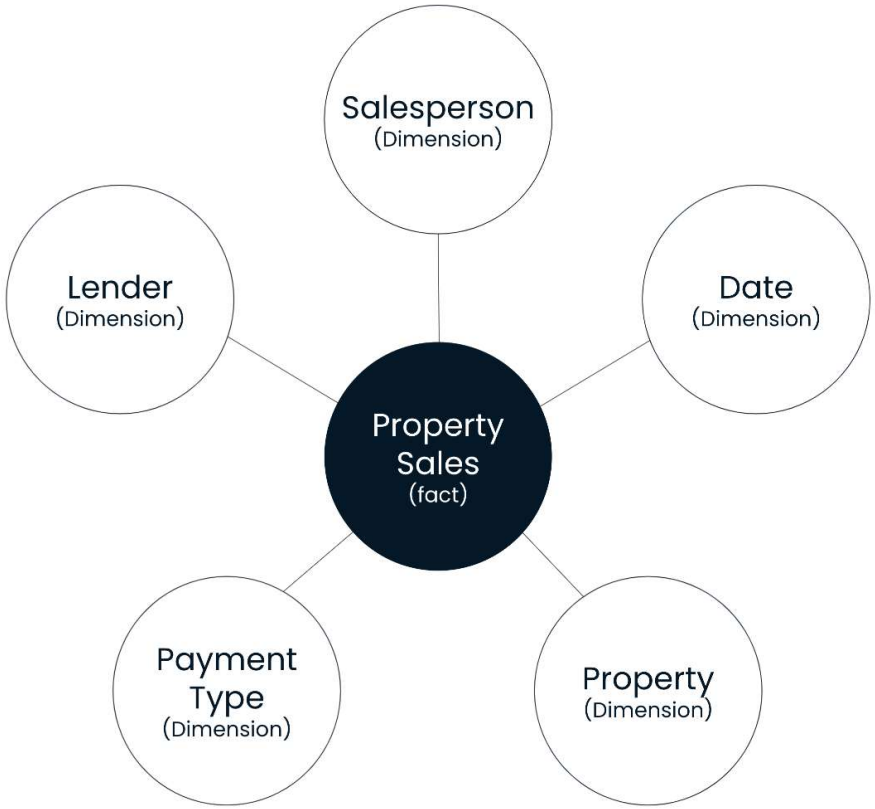
# The Kimball Model

- Key concepts
  - **Facts:** metrics from a business process
  - **Dimensions:** context surrounding a business process
  - Combine to form a **star schema**
- Star schemas are used in data warehouses
- Power BI is optimized for star schemas



# Fact tables

- Made up of
  - **Facts (measures)**
    - Measurements or metrics from your business process
  - **Keys**
    - Used to establish relationships between fact and dimension tables
- Fact tables are long and narrow
  - Lots of rows
  - Fewer columns



# Fact tables: an example

Property Sales table

| LenderID | StartDateID | PropertyID | PaymentTypeID | SalesPersonID | Rent | Duration |
|---|---|---|---|---|---|---|
| CO76 | 20200624 | PG14 | P2 | SA9 | 750 | 24 |
| CO56 | 20200907 | PG4 | P4 | SA12 | 1250 | 12 |
| CO62 | 20201201 | PG16 | P3 | SA5 | 3000 | 36 |
| CO43 | 20200201 | PG6 | P3 | SA6 | 500 | 24 |
| CO76 | 20200530 | PG20 | P2 | SA6 | 5000 | 12 |
| CO76 | 20200115 | PG11 | P2 | SA2 | 2000 | 24 |
| CO32 | 20201201 | PG15 | P2 | SA9 | 450 | 36 |
| ... | ... | ... | ... | ... | ... | ... |

# Fact tables: an example

**Keys:** establish relationships between tables

| LenderID | StartDateID | PropertyID | PaymentTypeID | SalesPersonID | Rent | Duration |
|---|---|---|---|---|---|---|
| **CO76** | **20200624** | **PG14** | **P2** | **SA9** | 750 | 24 |
| **CO56** | **20200907** | **PG4** | **P4** | **SA12** | 1250 | 12 |
| **CO62** | **20201201** | **PG16** | **P3** | **SA5** | 3000 | 36 |
| **CO43** | **20200201** | **PG6** | **P3** | **SA6** | 500 | 24 |
| **CO76** | **20200430** | **PG20** | **P2** | **SA9** | 5000 | 12 |
| **CO76** | **20200115** | **PG11** | **P2** | **SA2** | 2000 | 24 |
| **CO32** | **20201201** | **PG15** | **P2** | **SA9** | 450 | 36 |
| ... | ... | ... | ... | ... | ... | ... |

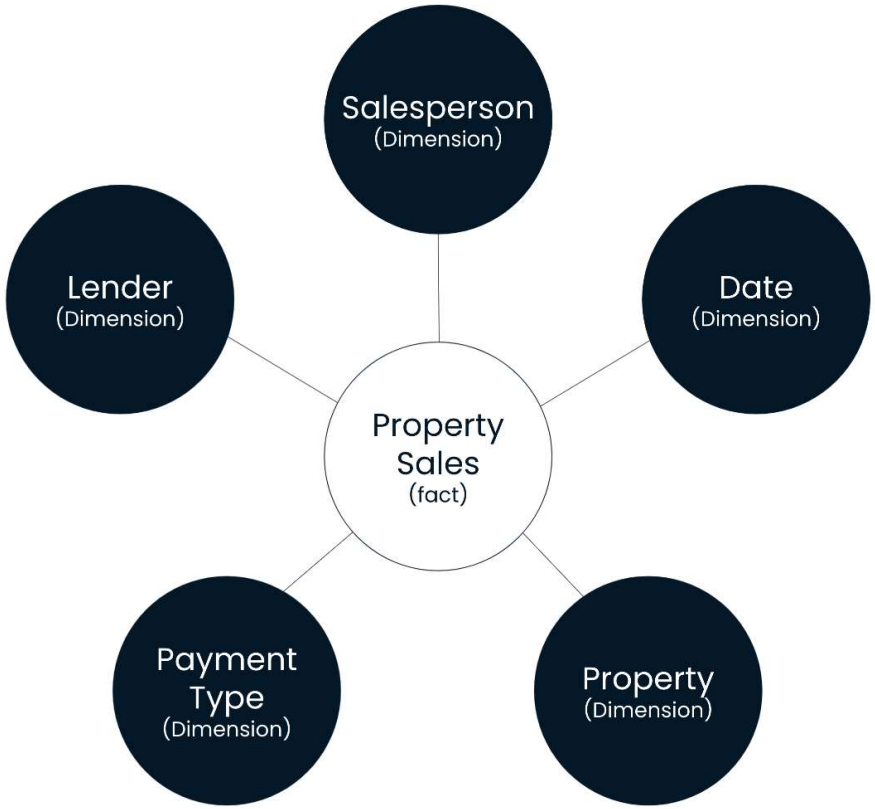
# Fact tables: an example

**Measures:** metrics from the business process

| LenderID | StartDateID | PropertyID | PaymentTypeID | SalesPersonID | Rent | Duration |
|---|---|---|---|---|---|---|
| CO76 | 20200624 | PG14 | P2 | SA9 | **750** | **24** |
| CO56 | 20200907 | PG4 | P4 | SA12 | **1250** | **12** |
| CO62 | 20201201 | PG16 | P3 | SA5 | **3000** | **36** |
| CO43 | 20200201 | PG6 | P3 | SA6 | **500** | **24** |
| CO76 | 20200430 | PG20 | P2 | SA9 | **5000** | **12** |
| CO76 | 20200115 | PG11 | P2 | SA2 | **2000** | **24** |
| CO32 | 20201201 | PG15 | P2 | SA9 | **450** | **36** |
| ... | ... | ... | ... | ... | ... | ... |

# Dimension tables

- Provide context
  - Who, what, when, where, why?
- Shared business concepts
  - E.g., person, employee, customer, vendor
- Contain static or "slowly changing" data
  - E.g., name, date of birth, height
- Dimension tables are short and wide
  - Few rows
  - Lots of columns



# Dimension tables: an example

Salesperson table

| SalesPersonID | FirstName | LastName | DateOfBirth | Salary |
|---|---|---|---|---|
| SA9 | Mary | Howe | 1990-02-19 | 24000 |
| SA12 | David | Ford | 1978-03-24 | 18000 |
| SA5 | Ann | Beech | 1980-11-10 | 12000 |
| SA6 | Julie | Lee | 1985-06-13 | 30000 |
| SA9 | John | White | 1965-10-01 | 9000 |
| ... | ... | | ... | |

# Dimension tables: an example

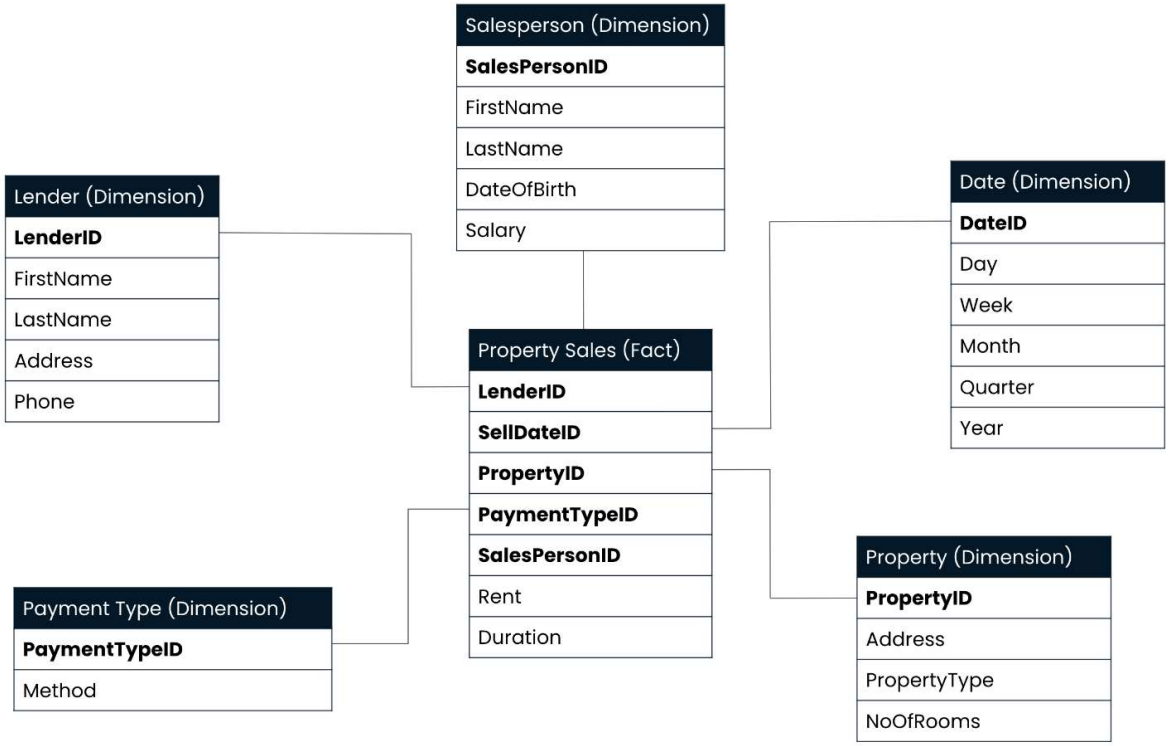
**Key:** establish relationship with fact table

| SalesPersonID | FirstName | LastName | DateOfBirth | Salary |
|---|---|---|---|---|
| **SA9** | Mary | Howe | 1990-02-19 | 24000 |
| **SA12** | David | Ford | 1978-03-24 | 18000 |
| **SA5** | Ann | Beech | 1980-11-10 | 12000 |
| **SA6** | Julie | Lee | 1985-06-13 | 30000 |
| **SA9** | John | White | 1965-10-01 | 9000 |
| ... | ... | | ... | |

# Dimension tables: an example

**Attributes:** various characteristics of the dimension

| SalesPersonID | FirstName | LastName | DateOfBirth | Salary |
|---|---|---|---|---|
| SA9 | **Mary** | **Howe** | **1990-02-19** | **24000** |
| SA12 | **David** | **Ford** | **1978-03-24** | **18000** |
| SA5 | **Ann** | **Beech** | **1980-11-10** | **12000** |
| SA6 | **Julie** | **Lee** | **1985-06-13** | **30000** |
| SA9 | **John** | **White** | **1965-10-01** | **9000** |
| ... | ... | ... | ... | ... |




- Dimensions are used in multiple facts
- Dimensions do not link to other dimensions

# The dataset

## Fact

- **Establishment Survey:** number of employees, number of firms, ...

## Dimensions

- **Industry:** NAICS code, industry group, subsector, sector
- **Time:** year, decade, century
- **Age:** establishment age
- **Geography:** country, state