Visualizing Data from the Data Warehouse

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Project Status Update

Task	Status

Project Status Update

Task	Status
Create data warehouse	Done

Project Status Update

Task	Status
Create data warehouse	Done
Create load process in SSIS	Done

Project Status Update

Task	Status
Create data warehouse	Done
Create load process in SSIS	Done
Expose data and reports to end-users	Not done

Overview

Adding a semantic layer on top of the data warehouse

- A semantic layer is a structure that:
  - Reduces the complexity of the data warehouse
  - Shows only what is relevant
  - Creates pre-calculated measures, to improve performance
- SQL Server Analysis Services is used
  - Multidimensional model
  - Tabular model

Microsoft reporting tools:

- SQL Server Reporting Services
- Power BI
- Power BI Report Server

Creating a Semantic Layer

Stages of Creating a BI Solution

Summary of the previous steps

- Gathered business requirements
- Created the dimensional model
- Implemented the data warehouse in SQL Server
- Extended the DW with auxiliary tables
- Created the load process

Options to move forward

a) Create the visualization layer directly from the data warehouse

b) Create a semantic layer

Semantic layer

“It is a business representation of corporate data that helps end-users access data autonomously using common business terms.

A semantic layer maps complex data into familiar business terms such as product, customer, or revenue to offer a unified, consolidated view of data across the organization.” (Wikipedia)

Clarifying the Confusion

Isn't that what the dimensional design is doing?

- Yes, it is

The dimensional design

- Is an abstraction layer on top of different data sources
- Can be extended and simplified even more with a semantic model on top of it
- There are some advantages for creating the semantic model

Advantages of Using a Semantic Layer

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Sales

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Sales

Procurement

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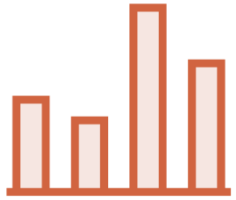
Procurement



Advantages of Using a Semantic Layer

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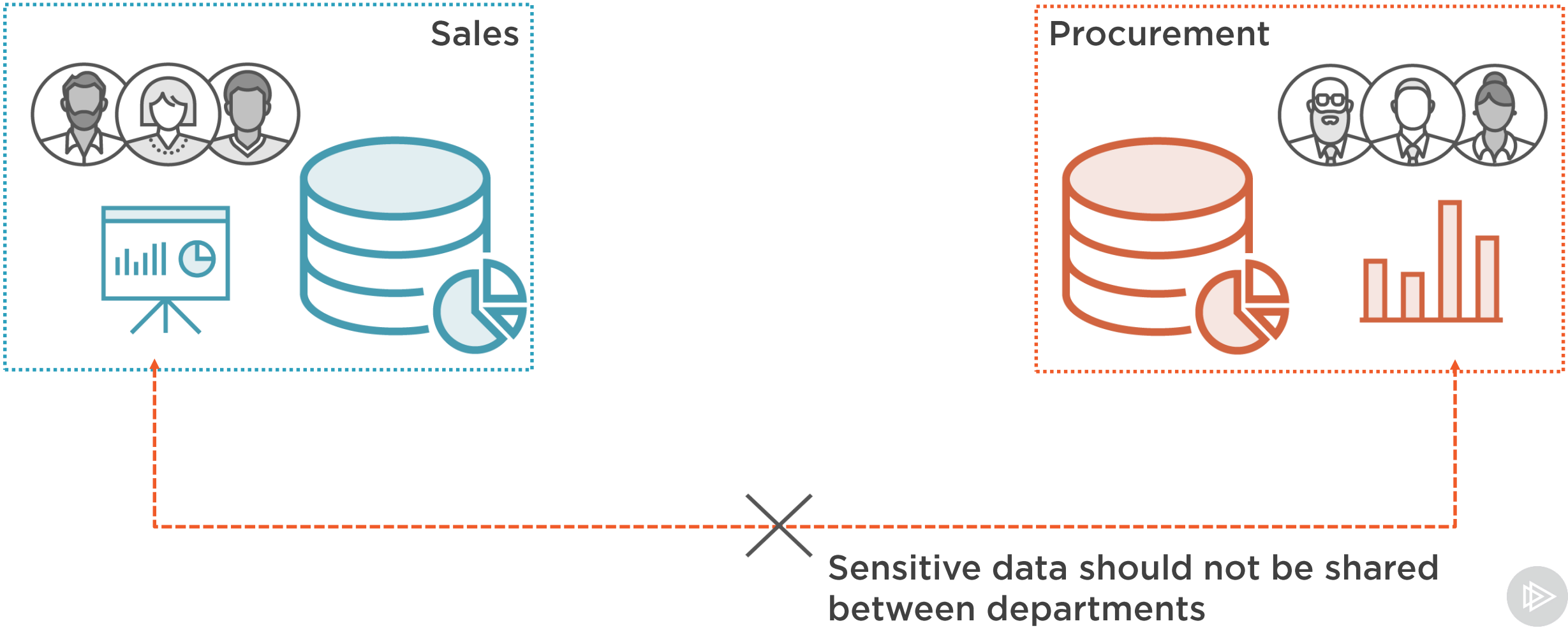

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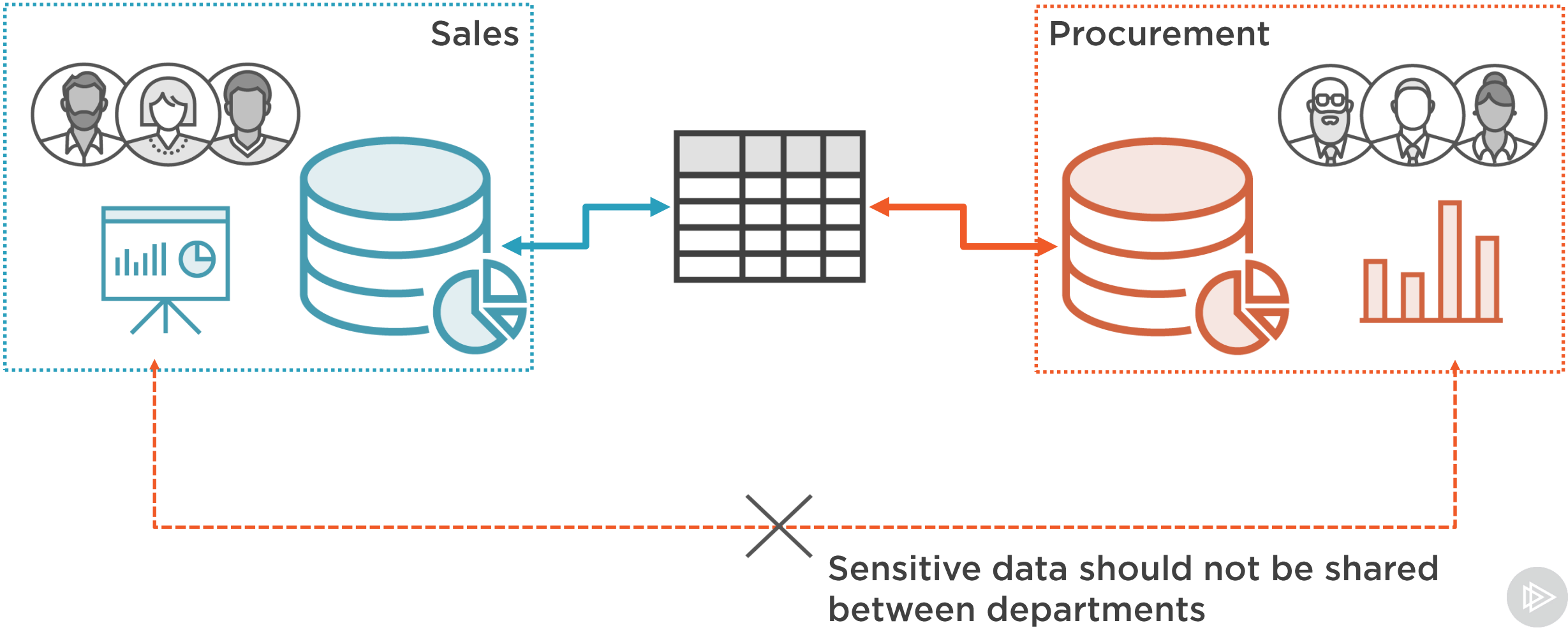

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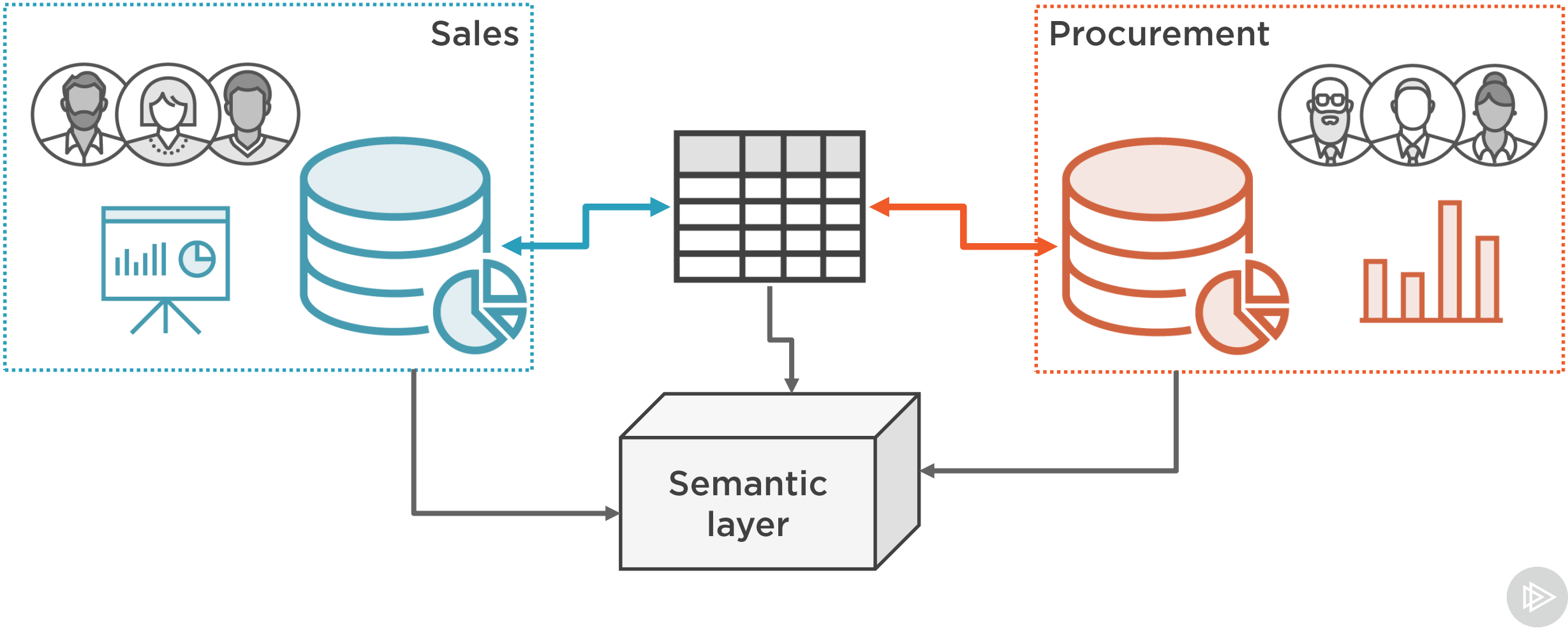

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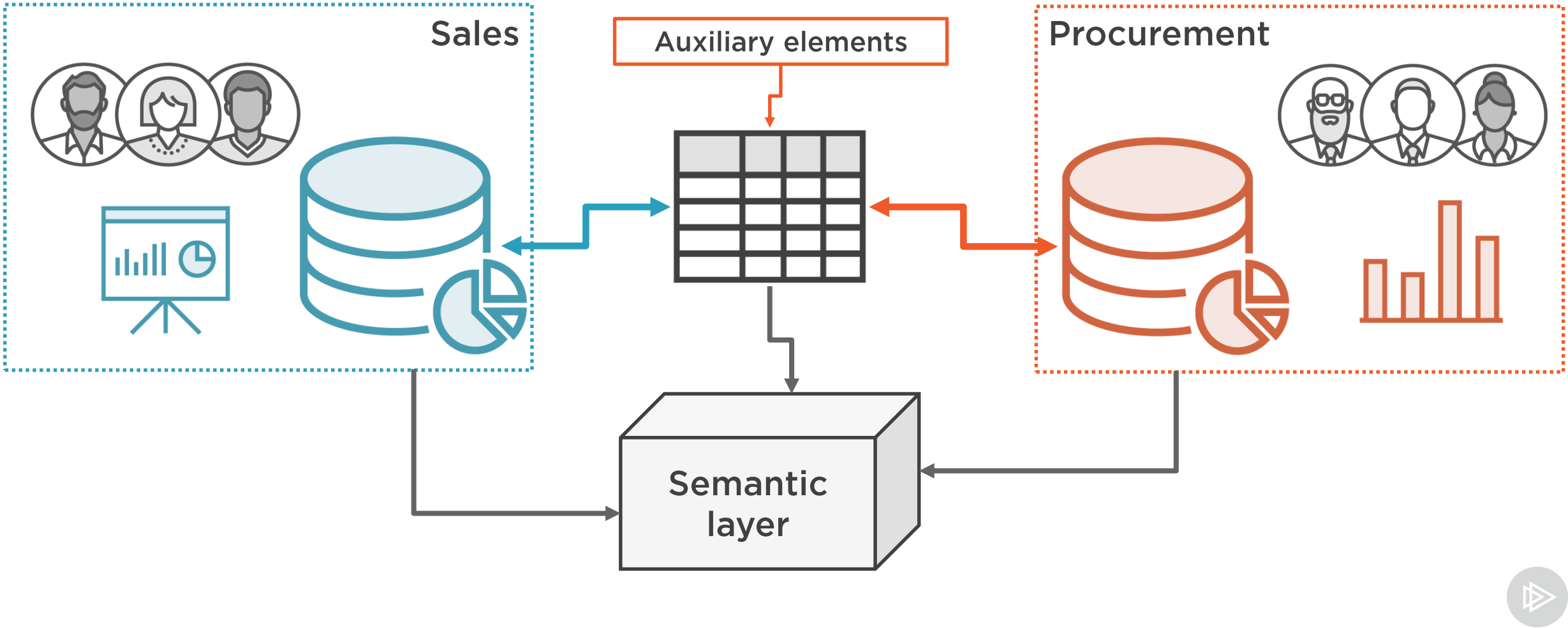

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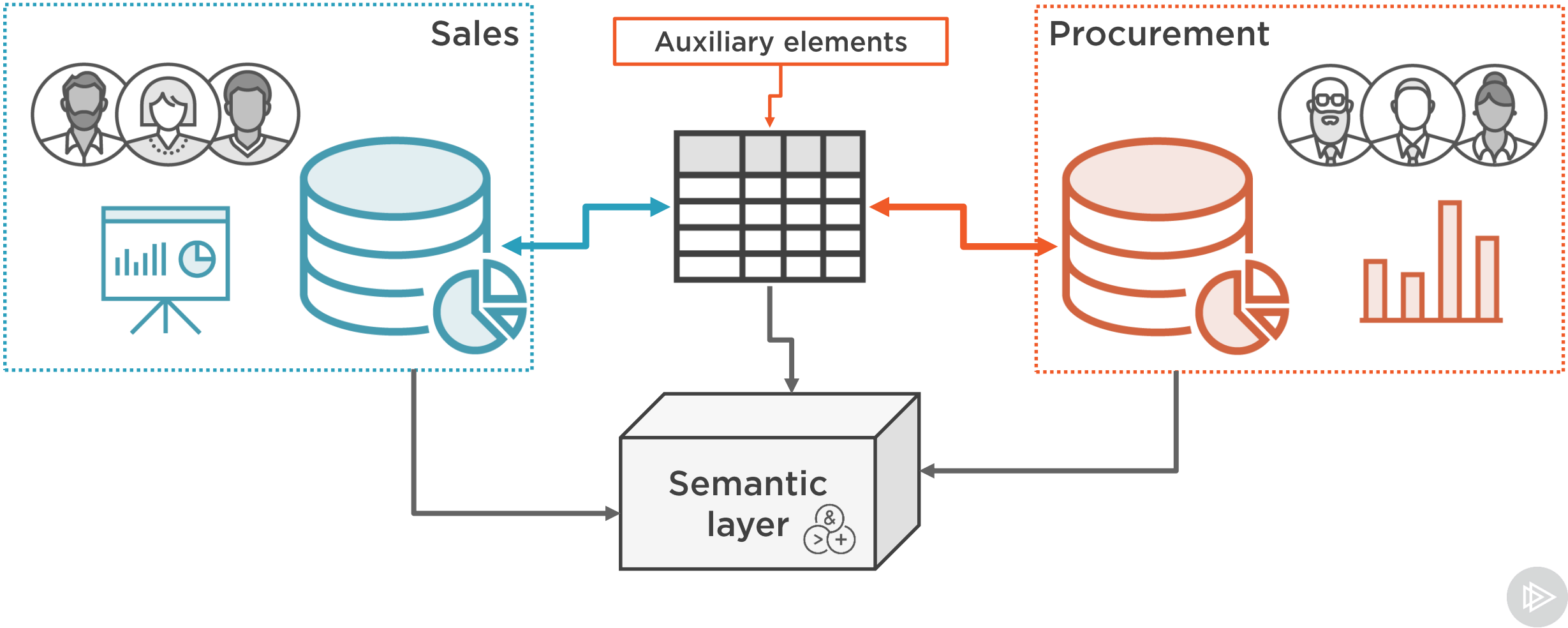

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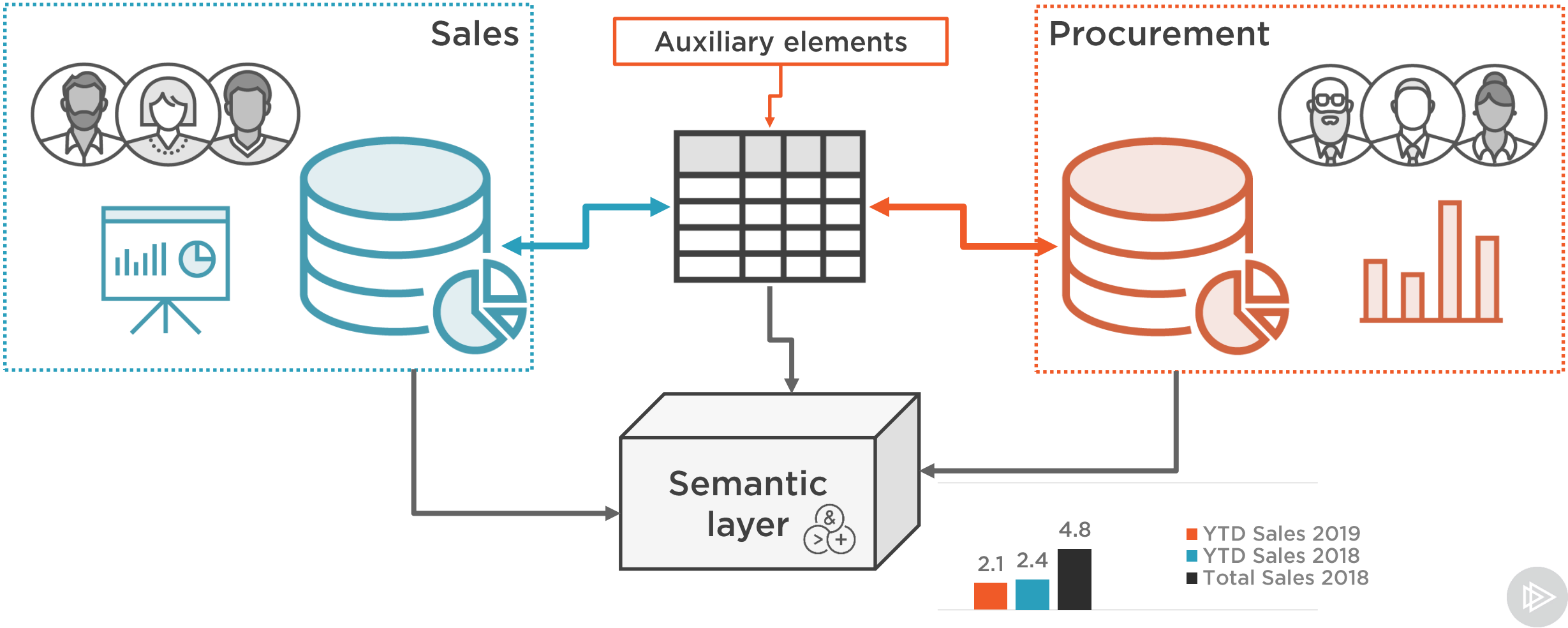
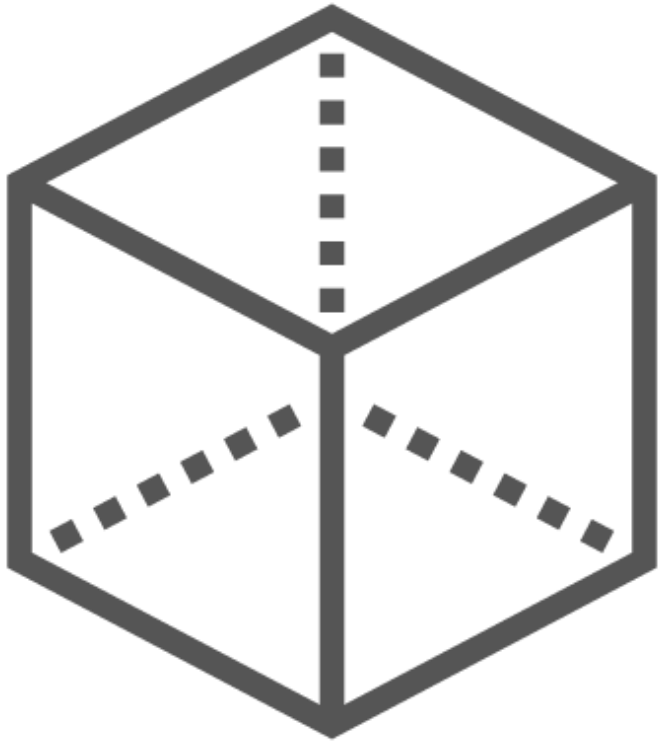


Advantages of Using a Semantic Layer

- Show only relevant data
- Faster query performance
- Complex aggregations
- Readable names for objects
- Consolidate data from multiple source
- Integration with many BI tools

Types of Models in SSAS

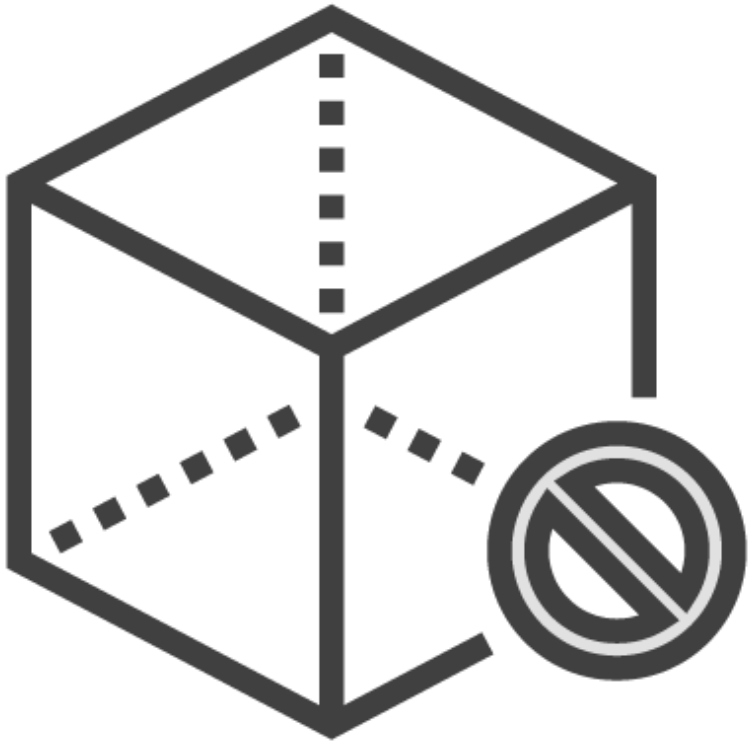


Multidimensional model

Tabular model

The Multidimensional and Tabular Models

The Multidimensional Model



Similar to the star schema design

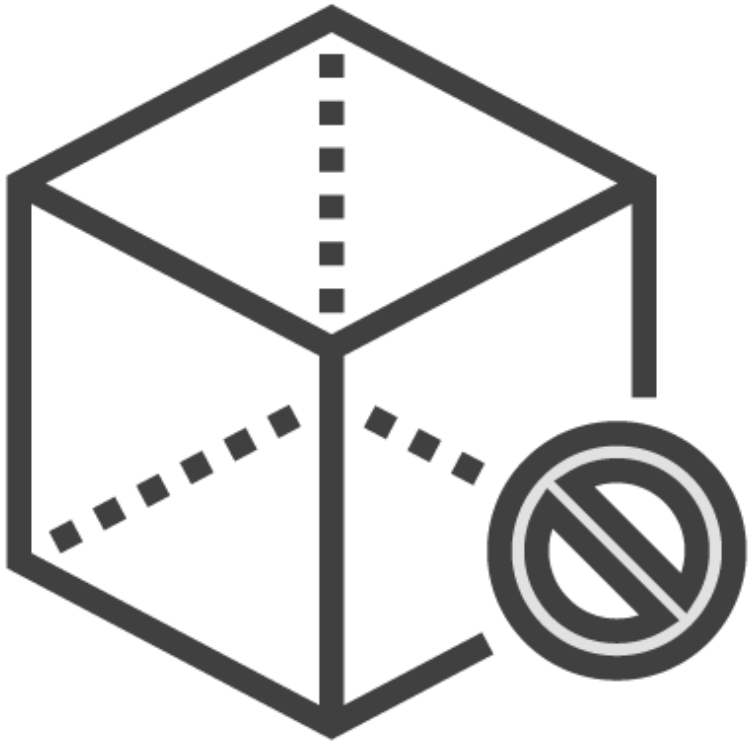
The main structure used for data analysis is the cube

A cube consists of

- Dimensions
- Measure groups

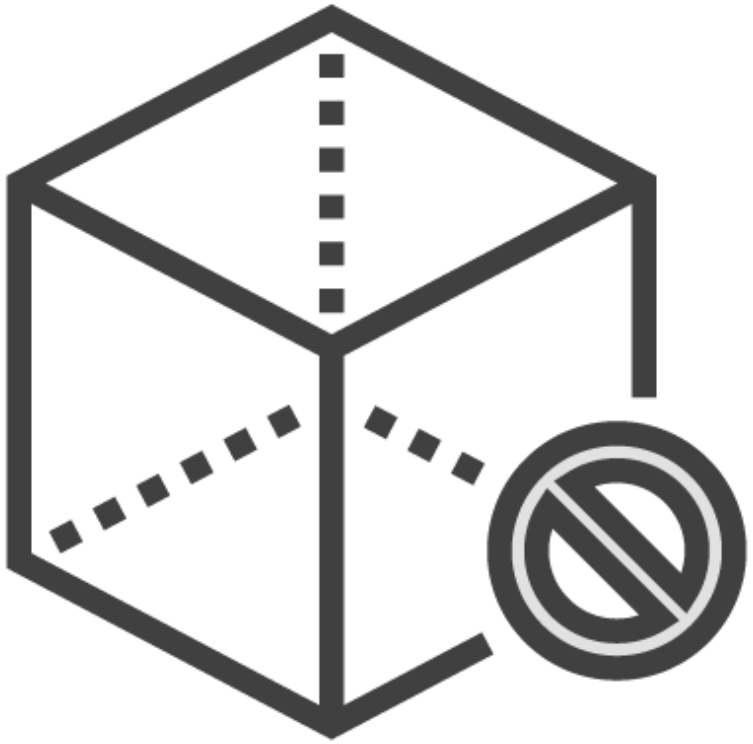
Data sources must be defined before creating other elements

The Multidimensional Model



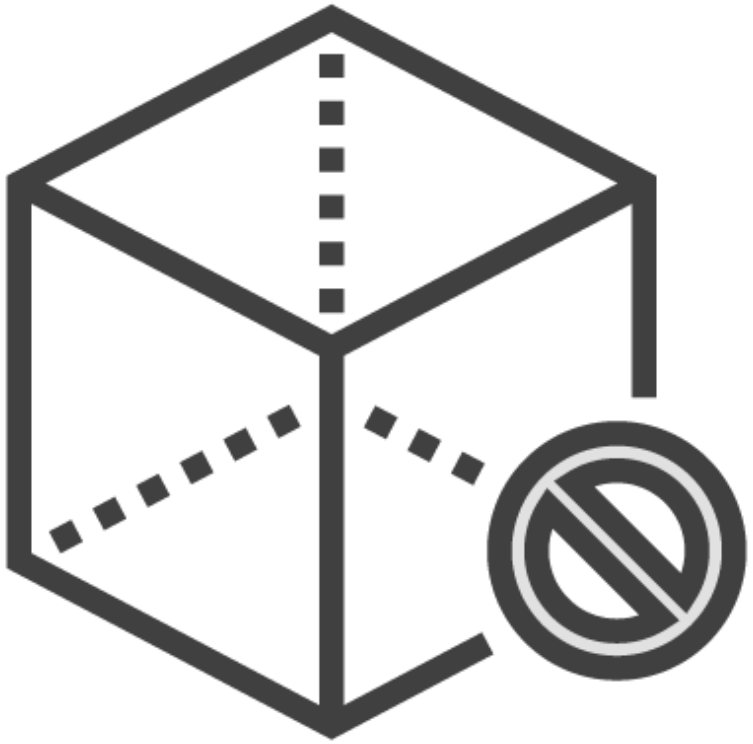
Multidimensional object	Data warehouse object
Dimension	Dimension table

The Multidimensional Model



Multidimensional object	Data warehouse object
Dimension	Dimension table
Measure group	Fact table

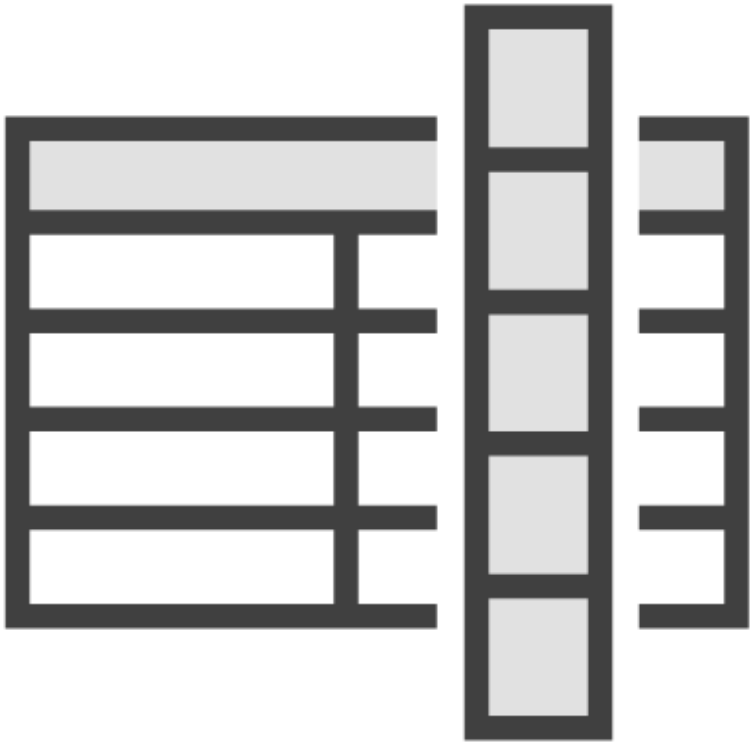
The Multidimensional Model



Multidimensional object	Data warehouse object
Dimension	Dimension table
Measure group	Fact table
Measure	Column in the fact table

New measures can be calculated in this database

The Tabular Model



In-memory database

Connects directly to a relational source of data

Similar to both SQL Server relational databases and a SSAS cube

- Consists of tables and relationships between tables
- You can also create measures and KPIs

The database can be used in Excel, Reporting Services, Power BI, etc.

Multidimensional vs. Tabular Model

Multidimensional

Better option when working with large amounts of data

Better performance in terms of scalability

Easily create and work with parent-child hierarchies

Writeback capabilities

Tabular

Easier for developers to understand and implement the model

DAX language

Doesn't require strong hardware (disk) capabilities. It is only memory-dependent

The database is much smaller than the original source of data

Demo

Creating a multidimensional database in SSAS

- This is a separate type of database

Prerequisite for this demo

- Install SQL Server Analysis Services in multidimensional mode

Demo

Analyzing data from a SSAS database

Creating Interactive Reports

SQL Server Reporting Services

Paginated reports

- The “traditional” reports
- Data is organized in tables, spread on multiple pages
- Optimized for printing or saving as Word or PDF

Mobile reports

- Compatible with several mobile devices
- Connect to different data sources (including SQL Server and SSAS)
- The visualizations are not very diverse, but they still have a modern look and feel

Web portal

- The portal can be accessed from any browser
- Types of reports: Power BI, mobile, paginated, KPIs, Excel files
- The data sets used in reports can be accessed from the portal

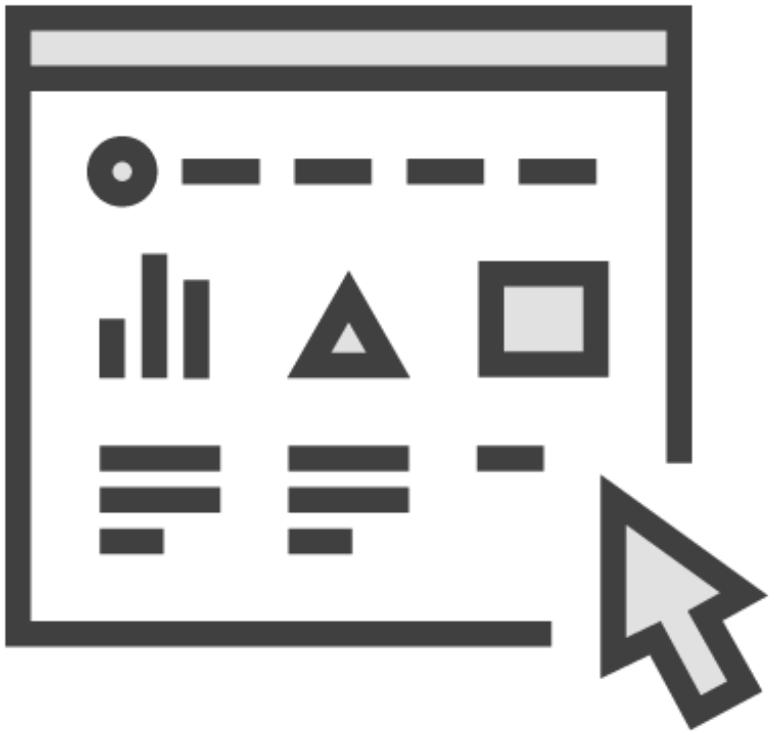
Power BI

Tool used to create rich and interactive reports

Components:

- **Power BI Desktop**
  - Download and use for free, to create reports
  - Collaborative editing is not supported
- **Power BI Service**
  - Cloud service
  - Share reports with people within/external to the organization
- **Power BI mobile app**

Power BI Report Server



Reporting capabilities of Power BI

Data remains on-premises

Users can visualize the reports

- In the web portal
- On mobile devices
- Shared by email

Available in SQL Server Enterprise Edition, or with Power BI Premium license

Demo

Creating and publishing a report with Power BI Report Server

You need to install two components

- Power BI Report Server
- Power BI Desktop for Report Server
- Download them from the Microsoft Download Center

Power BI Report Server is available in

- SQL Server Enterprise Edition
- SQL Server Developer Edition

Course Summary

Fundamental concepts of a data warehouse

- Purpose of a data warehouse
- Facts and fact tables
- Dimensions and dimension tables
- Steps of the dimensional design process

Dimension table techniques

Hierarchies

Fact tables

- Difference between fact and dimension tables
- Common types of fact tables

Course Summary

Creating the SQL scripts for loading a dimension table

- Create the Lineage and Incremental loads tables
- Create the stored procedures for loading data

Implementing a load process in SSIS

- Create a new SSIS project in Visual Studio
- Work with control flow and data flow tasks
- Add parameters
- Deploy the project in SQL Server
- Create a SQL Agent job to run the project automatically

Multidimensional and tabular models

Creating reports on top of the data warehouse

Thank you!