Power BI

Data Life Cycle

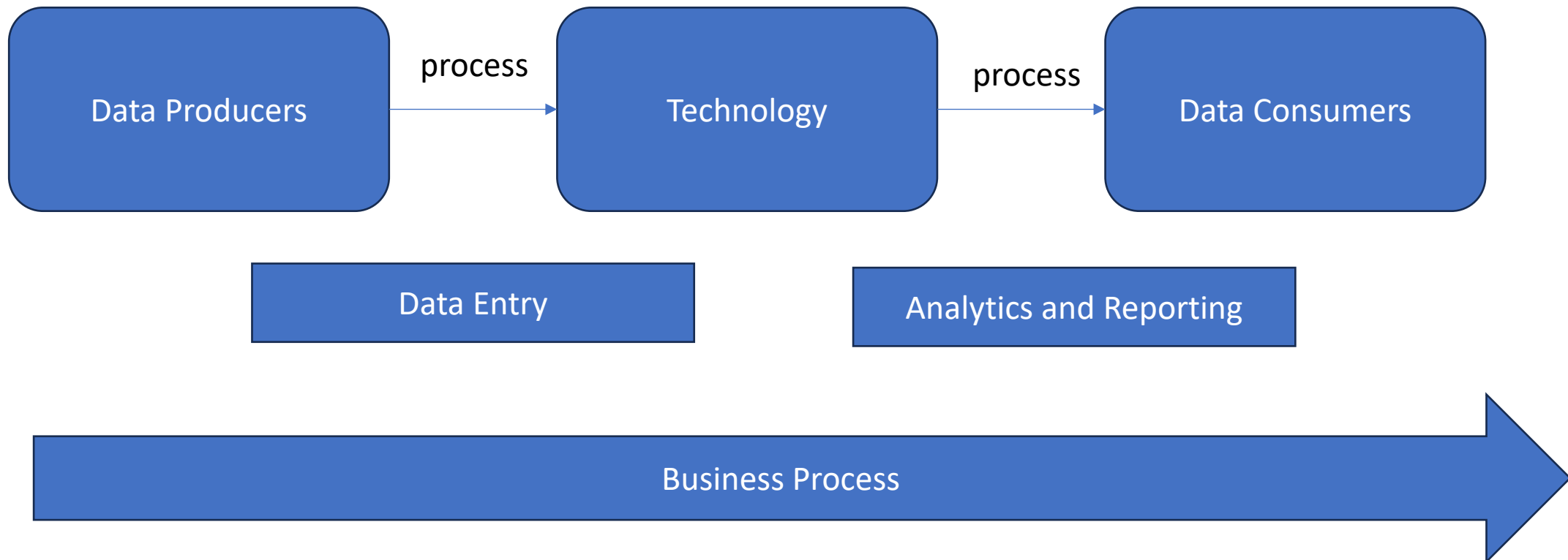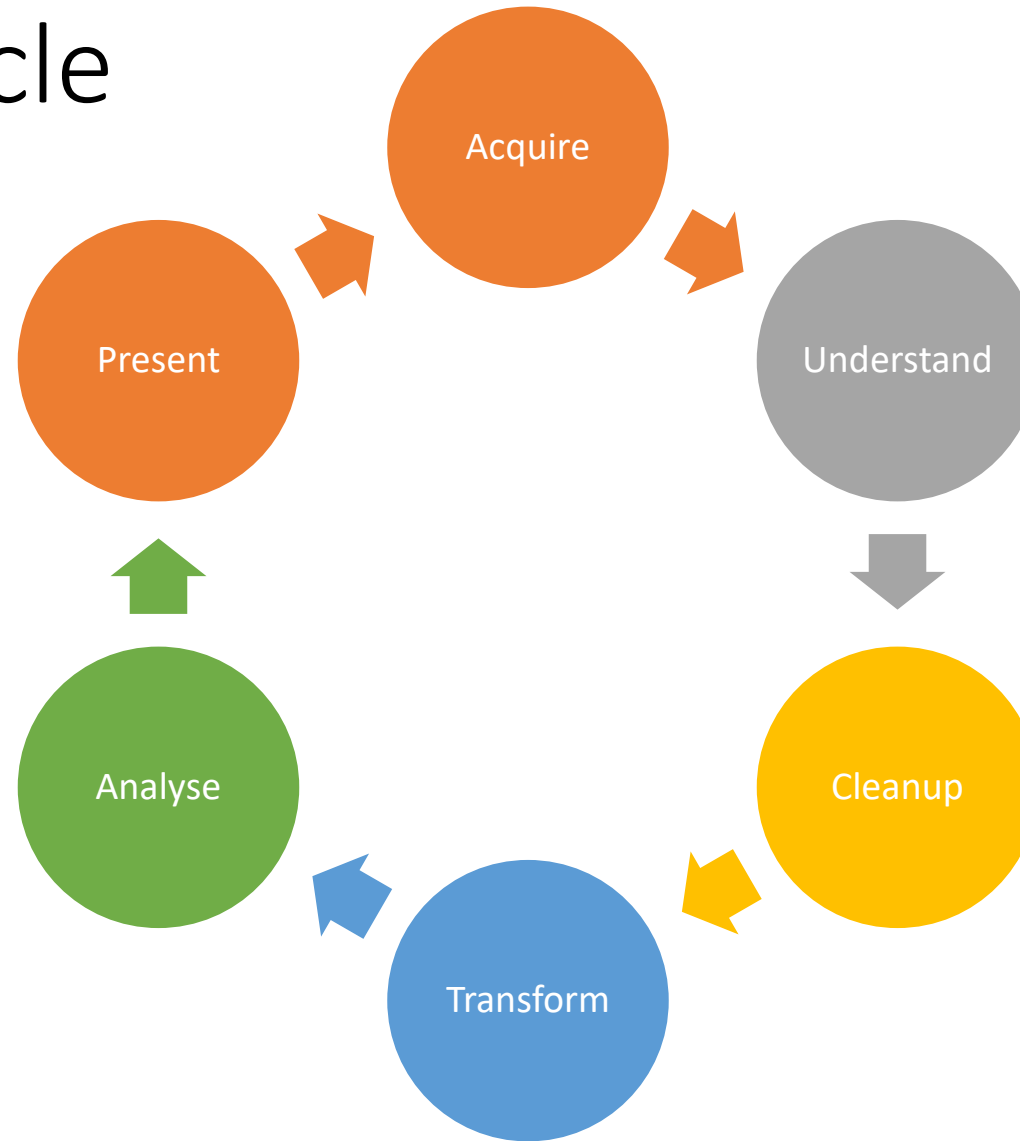| Data Producers	→ process →	Technology	→ process →	Data Consumers

Data Entry

Analytics and Reporting

Business Process →

Data Life cycle

Power BI

- Power BI is a business intelligence tool that enables you to connect to multiple data sources, create visualizations in the form of reports and dashboards, and easily share them with others.

Power BI

- Power BI is made up of 3 main elements:

  - Power BI Desktop - a free desktop application for building and designing reports.
  - Power BI Service - the online publishing service for viewing and sharing reports and dashboards.
  - Power BI mobile apps - for viewing reports and dashboards on the go

Power BI High Level Architecture

Cloud

Data Source

Power BI Service

Power BI Mobile
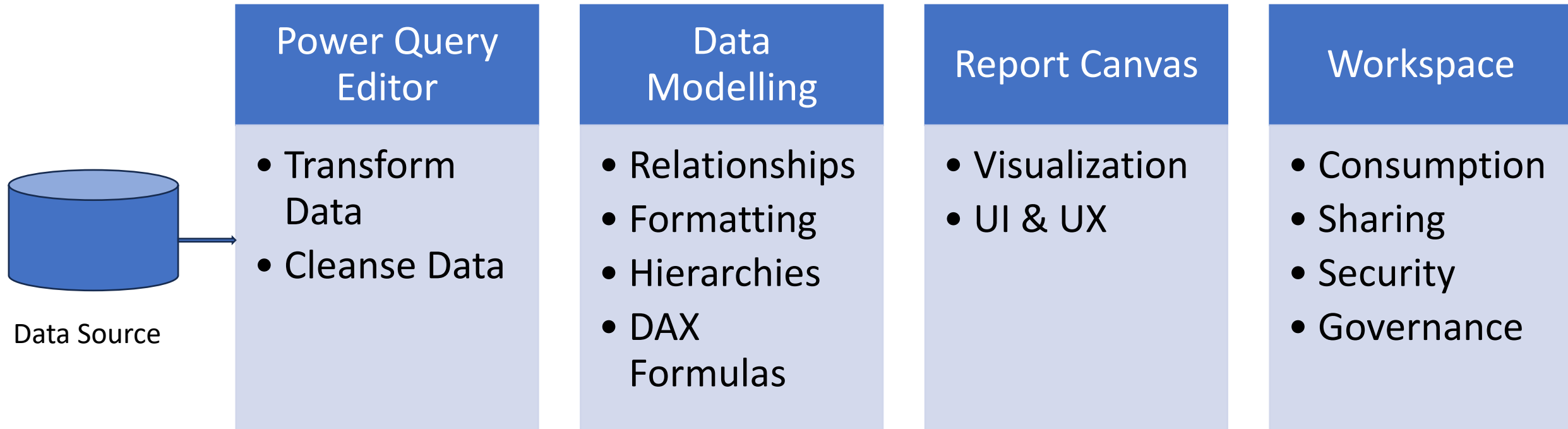
On-Prem

Consume data

Publish

Power BI Desktop

Consume data

Data Source
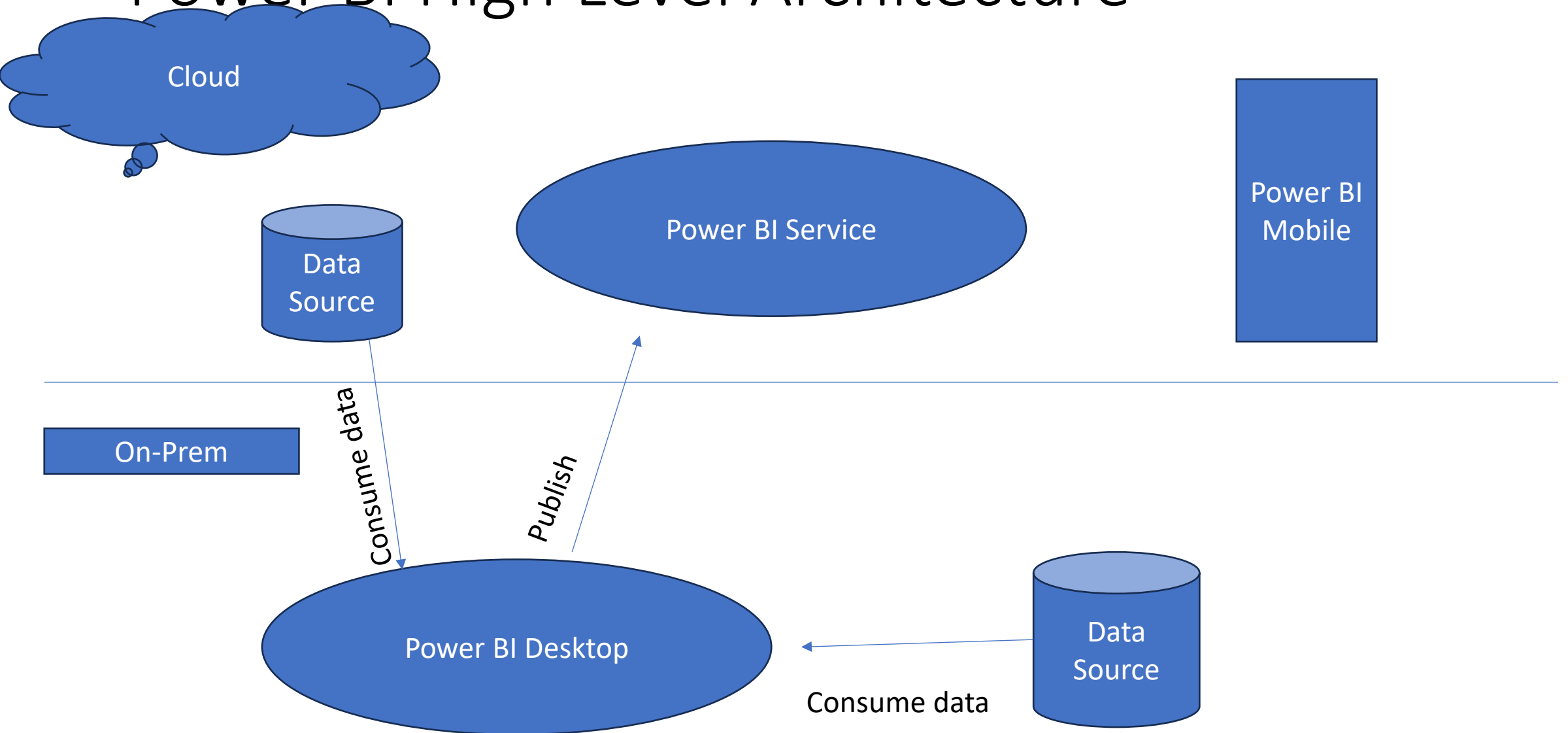
Understand Power BI Licensing

- Power BI Desktop
  - is free download
- Power BI Service
  - Free
  - Pro

Power BI End-to End Process flow

Data Source → **Power Query Editor**
- Transform Data
- Cleanse Data

Data Modelling
- Relationships
- Formatting
- Hierarchies
- DAX Formulas

Report Canvas
- Visualization
- UI & UX

Workspace
- Consumption
- Sharing
- Security
- Governance

Data Types in Power Query

Data Type	Description
Text	Represents a sequence of characters or string values.
Any	Represents any data type (a flexible type that can hold any other type).
True/False (Boolean)	Represents a true or false value.
Date	Represents a date value only (e.g., 2024-10-09).
Time	Represents a time value only (e.g., 12:34 PM).
Date/Time	Represents a date and time value in one column (e.g., 2024-10-09 12:34 PM).
Decimal Number	Represents a 64-bit floating-point number.
Fixed Decimal Number	Represents a fixed-point number with four digits of precision, typically used for currency values.
Whole Number	Represents a 64-bit integer value.
Date/Time/Timezone	Represents a date and time value with a timezone offset.
Duration	Represents a span of time (e.g., 10 days, 3 hours).
Percentage	Represents a decimal number displayed as a percentage.
Binary	Represents binary data (e.g., images, files).

Power Query

- Ribbon - the top ribbon contains almost all of the data transformation options you need to shape your data.

- Queries - this lists all the queries you have set up for this report. For complex reports, you can organize queries into groups for better navigation and management.

- Data view - this is the main table containing the data for the selected query as well as a formula bar. A preview of the data is shown with only the first 1000 rows.

- Transformation steps - the right-hand pane contains each of the transformation steps that have been applied to the selected query. This allows you to keep track of each individual change that has been made to the data. You can insert, delete, and move steps around as needed.

Data Modelling

- Data Modelling methodology that centers around measuring business processes.

- The business process are also know as **Facts.**

- When we measure business processes, we need a way to describe it.

- **Dimensions** are used to describe business process measurements.

- For this we use dimensions as report labels and/or filters.

- The combination of Facts and Dimensions is known as a Star Schema or Dimensional Model

Star Schema

- A star schema is a type of data modeling technique used in data warehousing to represent data in a structured and intuitive way.

- In a star schema, data is organized into a central fact table that contains the measures of interest, surrounded by dimension tables that describe the attributes of the measures.
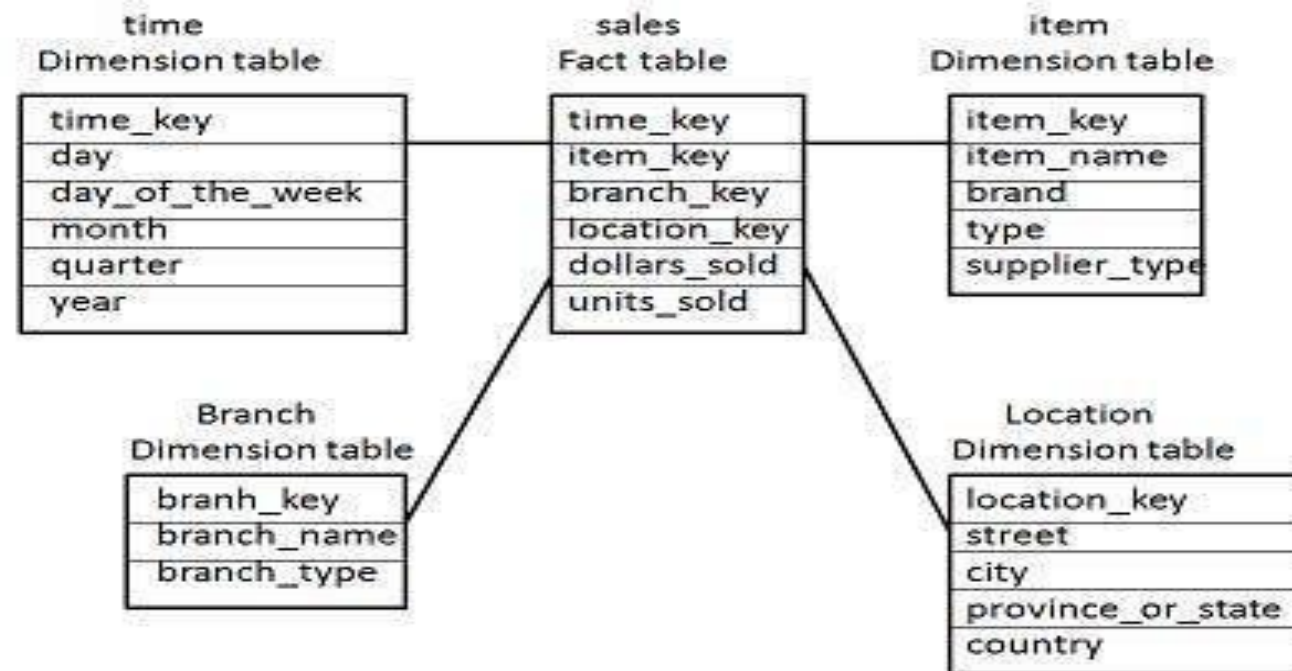
Fact table

- The fact table in a star schema contains the measures or metrics that are of interest to the user or organization.
- For example, in a sales data warehouse, the fact table might contain sales revenue, units sold, and profit margins.
- Each record in the fact table represents a specific event or transaction, such as a sale or order.

Dimension table

- The dimension tables in a star schema contain the descriptive attributes of the measures in the fact table.

- These attributes are used to slice and dice the data in the fact table, allowing users to analyze the data from different perspectives.

- For example, in a sales data warehouse, the dimension tables might include product, customer, time, and location.

Star Schema

- In a star schema, each dimension table is joined to the fact table through a foreign key relationship.

- This allows users to query the data in the fact table using attributes from the dimension tables.

time Dimension table
time_key
day
day_of_the_week
month
quarter
year

sales Fact table
time_key
item_key
branch_key
location_key
dollars_sold
units_sold

item Dimension table
item_key
item_name
brand
type
supplier_type

Branch Dimension table
branh_key
branch_name
branch_type

Location Dimension table
location_key
street
city
province_or_state
country

Cardinality

- Cardinality Official: non-database dictionary definition:-
  - Mathematical:- the number of values in a set.
- When applied to databases, the meaning is slightly different:
  - It's the number of distinct values in a table column, relative to number of rows in the table.
  - Repeated values within the column are not counted.

Types of Cardinality in Data

- **One-to-One (1:1)**:
  - Each row in Table A is linked to one unique row in Table B.
- **One-to-Many (1: Many)**:
  - A single row in Table A can be linked to multiple rows in Table B.
- **Many-to-Many (N:N))**:
  - Rows in Table A can be linked to multiple rows in Table B, and vice versa.

One-to-One Cardinality Example

- Example: A company's employee ID linked to a unique social security number.
- Scenario: Each employee has exactly one social security number, and each social security number is assigned to one employee.

One-to-Many Cardinality Example

•Example: A customer can place multiple orders.
•**Scenario**: Each customer can have many orders, but each order belongs to only one customer.

Many-to-Many Cardinality Example

- Example: Students enrolled in courses.
- **Scenario**: Each student can enroll in multiple courses, and each course can have many students.

Understand DAX

- Data Analysis Expressions
- Modelled After Excel Formula Language
- Functional Language
- Used to encapsulate business logic in your data model
- Examples
  - Calculate a Full name from a First and Last Name
  - Calculate Gross Margin %
  - Calculate Year Over Year % Changes.

Three types of DAX Expression

•Calculated tables - these calculations will add an additional table to the report based on a formula.

•Calculated columns - these calculations will add an additional column to a table based on a formula.
These columns are treated like any other field in the table.

•Measures - these calculations will add a summary or aggregated measure to a table based on a formula.