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POWER BI

# Data Modeling

Lecture 6

# What is data modelling?

Data modelling is the process of analyzing and defining all the different data your business collects and produces, as well as the relationships between those bits of data. The process of modelling your data creates a visual representation of data as it's used at your business, and the process itself is an exercise in understanding and clarifying your data requirements.

It's tempting to think of Power BI as just a data visualization tool, but in reality, it's so much more than that. Data visualization makes up about 25% of Power BI's capabilities.

A data model consists of at least one table of data but it can consist of many tables. These tables can either exist independently of each other, or we can create connections between them using data that they share. For instance, I may have one table that gives me all the information about my company's customers, and each customer has a unique ID number.

At that same time, I may have another table that gives me all the purchases the customers have made, and that purchase table also includes each customer's unique ID number.
Both tables have something in common, the customer ID number. And in Power BI, I can use that ID number to connect the two tables together in my data model. The connections between tables and our data model are called relationships.

# Why data modelling is important

By modelling your data, you'll document what data you have, how you use it, and what your requirements are surrounding usage, protection, and governance. Through data modelling, your Organization:

- Creates a structure for collaboration between your IT team and your business teams.

- Exposes opportunities for improving business processes by defining data needs and uses.

- Saves time and money on IT and process investments through appropriate planning up front.

- Reduces errors (and error-prone redundant data entry), while improving data integrity.

- Increases the speed and performance of data retrieval and analytics by planning for capacity and growth.

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You can import the data, make your transformations, and create a robust data model all on your own. So what does data modeling look like in Power BI? Well, it's basically a three step process. First, we import data from a data source or multiple data sources, and these data sources could be anything.

If you own or work for a small business, maybe you have a simple database, and Microsoft Access or MySQL.

Second, we have the ability to transform our data by cleaning it up, joining different data sources together, aggregating them and even completely restructuring them.

Third, we load the data into our Power BI data model where we can begin creating our visualizations. Most of the data modeling process happens inside a tool called Power Query, which is included with Power BI Desktop. Power Query is also included in Microsoft Excel. So imagine for a moment that my body is a Power BI dashboard covered in lots of cool looking charts. Here's a stacked bar chart, here's a map and here's a pie chart.

Power Query is like my body's circulatory system. I breathe in the air around me, my blood becomes oxygenated, and my heart pumps my oxygen rich blood throughout my body. In the same way, Power Query consumes data from your data sources, allows you to transform and supplement that data, and then loads that enriched data into your Power BI data model.
In this analogy, my brain is the data model. Once my brain is properly fueled via my circulatory system, I can engage with you through words and gestures. With Power BI, you use Power Query to load your data model so you can engage with your audience
through your visualizations.

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# Data modelling examples

Now that you know what data modelling is and why it's important, let's look at the three different kinds of data models as data modelling examples.

**Conceptual**
A conceptual data model defines the overall structure of your business and data. It's used for organizing business concepts, as defined by your business stakeholders and data architects. For instance, you may have customer, employee, and product data, and each of those data buckets, known as entities, has relationships with other entities. Both the entities and the entity relationships are defined in your conceptual model.

**Logical**
A logical data model builds on the conceptual model with specific attributes of data within each entity and specific relationships between those attributes. For instance, Customer A buys Product B from Sales Associate C. This is your technical model of the rules and data structures as defined by data architects and business analysts, and it will help drive decisions about what physical model your data and business needs require.
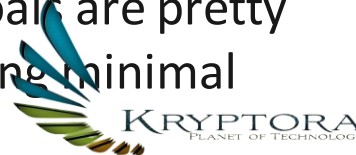
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**Physical**

A physical data model is your specific implementation of the logical data model, and it's created by database administrators and developers. It is developed for a specific database tool, data storage technology, and with data connectors to serve the data throughout your business systems to users as needed. This is the "thing" the other models have been leading to—the actual implementation of your data estate.
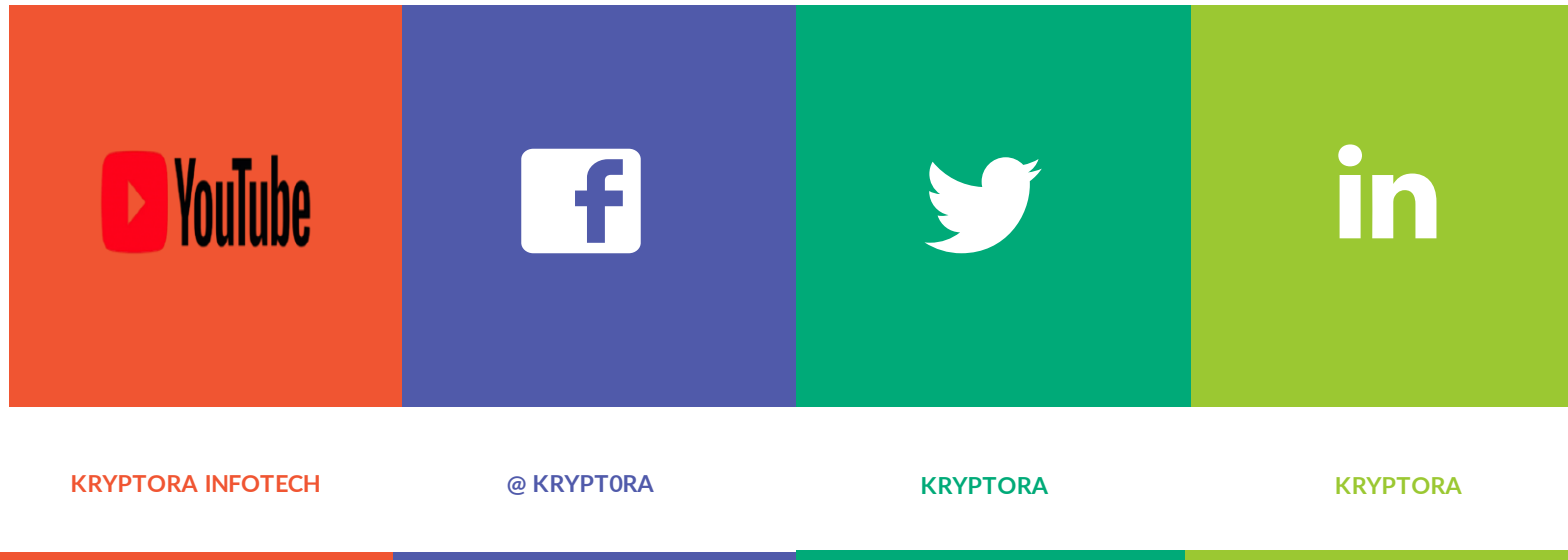
## How data modelling impacts analytics

Data modelling and data analytics go hand in hand because you need a quality data model to get the most impactful analytics for [business intelligence](#) that informs decision making. The process of creating data models is a forcing function that makes each business unit look at how they contribute to holistic business goals. Plus, a solid data model means optimized analytics performance, no matter how large and complex your data estate is – or becomes.
With all your data clearly defined, analyzing exactly the data you need becomes much easier. Because you've already set up the relationships between data attributes, it's simple to analyze and see impacts as you change processes, prices, or staffing.

Data visualization is obviously a crucial aspect of Power BI, because it's the final stage in how we translate the data into insights for our target audience. But data visualization isn't possible without a data model, and what is needed to build a data model depends heavily on what your source data looks like, and what your end goals are for the report or dashboard you're developing. If your source data is exceptionally clean already, and your goals are pretty narrow, you can probably accomplish everything you need just by importing that source data and doing minimal transformations.

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