

Data Modeling Done Right

Presented by: Rebekyah Brewer Date: May 20, 2025 Session: #37043

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Session 6 Platform Publishing Power

Session 5

Designing

Dynamic

Dashboards

Session 1 Power Bl Potential

Key Learning Outcomes:

Learn the fundamentals of building efficient data models in Power BI. This session will cover how to structure your data using the star schema, handle varying levels of granularity, and manage different types of tables such as fact and dimension tables. You will also explore common challenges like dealing with date tables, multiple date fields, and multi-fact table relationships, all essential for accurate and scalable data analysis.

Session 4 Discovering DAX Session 2 Power Query Proficiency

Session 3 Data Modeling Done Right



Data Modeling Done Right

Prerequisites

Basic Data Modeling Concepts

Basic Power BI Navigation

Data Modeling in Power BI

Data Modeling in Power Pivot Excel

Prerequisites – Technical

Software Requirements

- Power BI Desktop (Free) Power Query is built into Power BI for data transformation.
- Excel (2016 and later, or Microsoft 365) Power Query is available in the "Get & Transform" section.
- Windows OS (Windows 10 or later recommended) Power Query in Power BI is optimized for Windows.

Optional:

 Power BI Service (Pro or Premium Per User License) – If publishing reports online, you'll need a Power BI account

Prerequisites – Technical

Computer Capabilities & Performance Considerations

Power Query processes data transformations, and performance can be impacted by your system specs.

- RAM 8GB minimum; 16GB+ recommended for handling large datasets.
- Processor Intel i5/i7 or AMD Ryzen 5/7 or higher for better performance.
- Storage (SSD Recommended) Faster SSD drives improve data processing speed compared to HDD.
- Internet Speed If working with cloud data, a stable internet connection is necessary.

Prerequisites

Excel & Power Query Basics

Power Query is integrated into Excel and Power BI, so a solid understanding of Excel functionalities will be helpful:

Excel Tables & PivotTables & Power PivotTables

 If you've worked with Excel PivotTables, the transition to Power BI data modeling is easier.

Power Query (ETL Process)

- Extracting data from different sources.
- Transforming and shaping data using Power Query (e.g., removing duplicates, merging tables, unpivoting data)

Who is Data Modeling For?

	User Group	How Data Modeling Benefits Them
1	Power BI Developers	Data modeling is <u>essential</u> for structuring Power BI datasets efficiently using star schema for optimal performance.
2	BI Analysts & Report Designers	Helps create models that support fast, accurate, and scalable reporting in tools like Power BI.
3	DAX Users	A strong data model minimizes the complexity of DAX formulas and improves report performance.
3	Financial Analystsm, Accountants, Credit Managers	A well-designed financial data model supports profitability analysis, forecasting, and budgeting. Helps structure customer and transaction data for segmenting audiences and tracking key metrics.
4	Decision Makers & Executives	Understanding data models helps in financial reporting and operational efficiency

Basic Data Modeling Concepts

Before diving into Data Modeling, a good grasp of:

Relational Databases & Tables

- Familiarity with concepts like tables, columns, rows, primary keys, and foreign keys
- Knowing how different tables relate to each other (one-to-many, many-to-one, many-to-many).

Data Types & Formatting

• Understanding text, numbers, dates, Boolean (True/False), and how they impact calculations.

Data Cleaning & Transformation Basics

• Basic knowledge of handling missing data, duplicates, and inconsistencies.

...would be helpful.



Spreadsheets vs. Databases

RELATIONAL DATABASE HAS A CLEAN STRUCTURE

Customers Jobs Dates Sales Person CompanyOrgUnits Customer ID All Order Index Index Date Index Index Customer Name Order No ID Job No ID ID Parent Company Date Customer DBA Order Date Job Name Year First Name Regions Customer EIN Oder Type Created Date Month Name Last Name Subsidiaries Customer Payment Terms Sales Person ID Actual Start Date Day No Title Locations Customer Primary Address Schedule Start Date Week No Start Date Divisions Amount Customer Status Scheduled Completion Date Day Name End Date Departments Credit Level Actual Completion Date End of Month Active Trade Tax Status Date Closed Region Account GL ID Job Type Supervisor SalesPerson ID Tax Status Tax Schedule SalesPerson ID Project Manager ID Contract Type **Original Contract Amount**

MATCH/VLOOKUP/INDEX

FINANCE SPREADSHEETS DO NOT HAVE A CLEAN STRUCTURE



AR Visual Table Hybrid Mutt

Today: 5/18/2025

Customer ID	Customer Name	Invoice No	Inv Date	Due Date	DBTAge	Origl	Doc Amt	Balance	Current	00-30		30-	60	61-90		91-	120	120+		Job No	Sales Person	Region
CUSTOMERA	Customer A	INV075235	5/3/2025	6/2/2025	-15	\$	22,905.00	\$ 22,905.00	\$ 22,905.00	\$	2	\$	÷	\$	1	\$	41	\$	4	522512523	John Smith	NRT-DXA
CUSTOMERB	Customer B	INV077665	5/4/2025	8/2/2025	-76	\$	51,987.00	\$ 51,987.00	\$ 51,987.00	\$		\$	5	\$		\$	5	\$	5	46250025	Sue Edwards	STH-TRS
CUSTOMERA	Customer A	INV011256	4/15/2025	5/15/2025	3	\$	65,720.00	\$ 65,720.00	\$ -	\$ 65	,720.00	\$	<i>с</i>	\$	-	\$	23	\$	40	52251253	John Smith	NRT-DXA
CUSTOMERC	Customer C	INV012567	3/6/2025	4/5/2025	43	\$	43,251.00	\$ 21,081.00	\$ -	\$		\$	21,081.00	\$		\$	5	\$	5	23251723	JoAnn Tangle	EST-DXA
CUSTOMERD	Customer D	INV011200	1/2/2025	3/2/2025	77	\$	99,461.00	\$ 99,461.00	\$ -	\$	-	\$	<i>\cup</i>	\$ 99	,461.00	\$	40	\$	40	52252125	Gertrude Gree	NRT-TRS
CUSTOMERE	Customer E	INV062002	4/24/2025	6/23/2025	-36	\$	54,700.00	\$ 54,700.00	\$ 54,700.00	\$		\$	5	\$	15	\$	5	\$	-	232542220	Virgnia Slim	EST-SAF
CUSTOMERF	Customer F	INV009302	11/2/2024	12/2/2024	167	\$	10,349.00	\$ 10,349.00	\$ -	\$	-	\$	<i></i>	\$	2	\$	43	\$10,	349.00	33241222	Frank Gilbert	STH-DXA
CUSTOMERF	Customer F	INV011305	1/3/2025	2/2/2025	105	\$	56,139.00	\$ 56,139.00	\$ -	\$		\$	5	\$		\$	56,139.00	\$	5	33251232	Frank Gilbert	STH-DXA
CUSTOMERF	Customer F	INV012678	3/2/2025	4/1/2025	47	\$	47,568.00	\$ 47,568.00	\$ -	\$	-	\$	47,568.00	\$	2	\$	23	\$	4	33251244	Frank Gilbert	STH-DXA
CUSTOMERF	Customer F	INV023256	2/24/2025	3/26/2025	53	\$	80,475.00	\$ 80,475.00	\$ -			\$	80,475.00	\$	100	\$	3	\$	5	332512449	Frank Gilbert	STH-DXA
CUSTOMERZ	Customer Z	INV076562	5/3/2025	6/2/2025	-15	\$	87,953.00	\$ 87,953.00	\$ 87,953.00	\$	2	\$	ę.	\$	23	\$	2	\$	-	23251234	JoAnn Tangle	EST-DXA

\$ 620,508.00 \$598,338.00 \$217,545.00 \$ 65,720.00 \$ 149,124.00 \$ 99,461.00 \$ 56,139.00 \$ 10,349.00

Customers	Billing Transactions	Jobs	Sales Person	CompanyOrgUnits
Customer ID	Index	Index	Index	All
Customer Name	Document No	Job No ID	ID	Parent Company
Customer DBA	Doc Summary	Job Name	First Name	Regions
Customer EIN	Doc Date	Created Date	Last Name	Subsidiaries
Customer Payment Terms	GL Post Date	Actual Start Date	Title	Locations
Customer Primary Address	Due Date	Schedule Start Date	Start Date	Divisions
Customer Status	Order ID	Scheduled Completion Date	End Date	Departments
Credit Level	Invoice Amount	Actual Completion Date	Active	Trade
Tax Status	Retainage Amount	Date Closed	Region	Account GL ID
SalesPerson ID	Tax Amount	Job Type	Supervisor	
	Total Amount	Tax Status		
	Product	Tax Schedule		
	Quantity	SalesPerson ID		
		Project Manager ID		
		Contract Type		
		Original Contract Amount		

AR Visual Table Hybrid Mutt



ENTITY-RELATIONSHIP VS ANALYTICAL DATABASE MODEL





Basic Data Modeling Concepts Organizing Your Analytical Data

Fact vs. Dimension Tables

• Learning the Star Schema and Snowflake Schema structures.

Relationships in Power BI

- Cardinality (one-to-many, manyto-one, many-to-many).
- Direction of relationships (single vs. both directions)
- Active vs. inactive relationships





Building a good data model is one of the most important things you can do in Power BI. - Pragmatic Works

Why is a "Good" Data Model Important?

- Optimized Performance Reduces redundancy and improves efficiency.
- Scalability Allows easy expansion of data as your model grows.
- Accurate Insights Prevents errors and inconsistencies.
- Better Data Relationships Enables complex queries and drill-downs.
- Better DAX Performance & Simplicity Makes DAX Measures easier to write and troubleshoot.



Benefits of Using Data Modeling in Excel:

- 1. Excel is familiar territory for all of us
- 2. Increased opportunities for internal use leads to wider application
- 3. Increased usage cases leads to increased experience
- 4. Small quick wins will encourage motivation to learn more.
- 5. Logical transition to Power PI through PowerPivot



What is a Data Model

A data model is a structured framework that defines how data is stored, organized, and related within a report.

It consists of tables, relationships, and calculations (measures, calculated columns) that help transform raw data into meaningful insights in Power BI.

Different Data Model Types are:

- Flat Model A single table with all data (inefficient for large datasets).
- Relational Model Multiple tables with defined relationships. (most common in Power BI).
- <u>Star Schema</u> A central fact table surrounded by multiple dimension tables (ideal for reporting). Often called dimensional data modeling.
- Snowflake Schema A more normalized version of the star schema with further breakdown of dimensions.

Key Components of Dimensional Data Modeling

- Fact Tables Store measurable numerical data (e.g., sales, revenue, credit limits).
- Dimension Tables Store descriptive data (e.g., customers, products, regions)
- Relationships Define how dimensions relate to facts (typically one-to-many)
- Surrogate Keys Unique identifiers used in dimension tables instead of Natural keys.
- Hierarchies Logical drill-down structures (e.g., Year \rightarrow Quarter \rightarrow Month \rightarrow Day).



de Description	Region			
Control Systems	Midwest Region	01		
Control Systems	Northeast Region	04	SCh	
ing Services	Midwest Region	01	CHI	
ing Services	Northeast Region	04	SCR	
Circuit Television	Midwest Region	01	Сні	
Circuit Television	Northeast Region	04	SCR	
curity	Midwest Region	01	CHI	
curity	Northeast Region	04	SCR	
Integation	Midwest Region	01	CHI	
Integation	Northeast Region	04	SCR	
e Development	Midwest Region	01	CHI	
e Development	Northeast Region	04	SCR	
velopment	Midwest Region	01	CHI	
Control Systems	Midwest Region	02	PEO	
ing Services	Midwest Region	02	PEO	
Circuit Television	Midwest Region	02	PF	
curity	Midwest Region	02		
Integation	Midwest Region	02	PEO	
e Development	Midwest Region	02	PE	
velopment	Midwest Region	02	PEO	
Control Systems	Midwest Region	03	SPR	
ing Services	Midwest Region	03	SP	
Circuit Television	Midwest Region	03		
curity	Midwest Region	03		
Integation	Midwest Region	03		
e Development	Midwest Region			
velopment	Midwest Region	US		

Flat Table also called a denormalized table, is a table that contains all relevant data in a single, wide structure without requiring joins to other tables. Each row in the table represents a complete dataset record, with all necessary attributes included as columns.

ScrarCharacteristics of a Flat Table:

C

- No Relationships or Joins Required All data is stored in a single table, removing the need for complex queries that join multiple tables. (No VLOOKUP/XLOOKUP, SUMIFS or INDEX/MATCH needed)
- Redundant Data Since all information is in one place, some data fields (e.g., customer names, product descriptions) might be repeated across multiple rows.
- Easy to Query Since all data is in one table, gueries are typically simpler and run faster for basic reporting and analysis. All columns needed in one place.
- Wide Table Structure The table may have many columns to store all necessary attributes.
- Lack of Normalization Unlike a normalized relational database structure, flat tables do not follow principles like reducing redundancy through primary and foreign key relationships.

Т		Flat AR	Trial	Balance	Table
-	J				

id	CustomerID	CustomerName	OrderID	SalesRep	Division	TermsID	InvoiceNo	Invoice Date	Due Date	Inv	oice_Amoun	Inv	oice_Balance	Today's Dat
5	8418685	Wiza-Greenfelder	1002666	2182	CCTV-SPR	DR	INV100266600	5/23/2024	5/23/2024	\$	216,142.00	\$	216,142.00	12/31/2024
7	9203958	Sawayn-Schowalter	1002744	1114	SYSI-SCR	DR	INV100274400	7/3/2024	7/3/2024	\$	87,267.00	\$	3.50	12/31/2024
12	6953788	Nolan-McClure	1002797	4101	HWD-SPR	DR	INV100279700	7/8/2024	7/8/2024	\$	477,848.00	\$	477,848.00	12/31/2024
g	5855162	Graham-Collins	1002769	1433	ACS-PEO	N60	INV100276900	7/10/2024	9/8/2024	\$	196,237.00	\$	5,000.00	12/31/2024
10	4928941	Hand, Bruen and Fa	1002780	4634	MON-CHI	N90	INV100278000	7/15/2024	10/13/2024	\$	481,413.00	\$	100,000.00	12/31/2024
16	6487377	Trantow-Kris	1002822	1076	CYB-SPR	N30	INV100282200	7/19/2024	8/18/2024	\$	428,037.00	\$	428,037.00	12/31/2024
15	1195833	Daugherty Inc	1002820	4003	SWD-SPR	N90	INV100282000	7/19/2024	10/17/2024	\$	39,772.00	\$	39,772.00	12/31/2024
20	9546985	Mertz LLC	1002844	4641	SWD-CHI	N30	INV100284400	7/29/2024	8/28/2024	\$	332,564.00	\$	332,564.00	12/31/2024
41	1742275	Hoeger, Quitzon an	1002893	4202	SWD-PEO	N60	INV100289300	8/3/2024	10/2/2024	\$	272,625.00	\$	272,625.00	12/31/2024
22	9879585	Raynor-Ebert	1002858	3581	MON-CHI	N90	INV100285800	8/3/2024	11/1/2024	\$	395,059.00	\$	395,059.00	12/31/2024
23	5553979	McCullough-Reynol	1002861	3407	CYB-SPR	DR	INV100286100	8/4/2024	8/4/2024	\$	342,737.00	\$	342,737.00	12/31/2024
24	1680902	Willms Group	1002866	1306	ACS-CHI	DR	INV100286600	8/6/2024	8/6/2024	\$	407,142.00	\$	407,142.00	12/31/2024
25	6803991	Smitham, Koch and	1002869	2676	CCTV-SCR	N30	INV100286900	8/7/2024	9/6/2024	\$	196,971.00	\$	196,971.00	12/31/2024
28	1032609	VonRueden Group	1002877	1051	MON-PEO	DR	INV100287700	8/11/2024	9/30/2024	\$	57,543.00	\$	57,543.00	12/31/2024
33	1752145	Baumbach-Wilkins	1002884	4818	ACS-CHI	N90	INV100288400	8/18/2024	11/16/2024	\$	367,536.00	\$	367,536.00	12/31/2024
36	3460752	Mayer-Kozey	1002888	1115	MON-CHI	N60	INV100288800	8/19/2024	10/18/2024	\$	322,423.00	\$	322,423.00	12/31/2024
42	2449050	Kohler-Nolan	1002894	4077	CYB-PEO	N60	INV100289400	8/21/2024	10/20/2024	\$	321,975.00	\$	321,975.00	12/31/2024
49	3160691	Swaniawski-Weissi	1002901	4116	ACS-PEO	N60	INV100290100	8/23/2024	10/22/2024	\$	336,570.00	\$	336,570.00	12/31/2024
51	1195833	Daugherty Inc	1002903	4003	SWD-SPR	N90	INV100290300	8/27/2024	11/25/2024	\$	438,170.00	\$	438,170.00	12/31/2024
54	1632070	Hansen-McGlynn	1002906	1254	ACS-PEO	DR	INV100290600	8/30/2024	8/30/2024	\$	327,898.00	\$	327,898.00	12/31/2024
55	6655263	Harber-Parisian	1002907	1290	SYSI-SCR	N90	INV100290700	9/2/2024	12/1/2024	\$	39,553.00	\$	39,553.00	12/31/2024
58	6850075	Mertz, Kub and Bart	1002910	2496	HWD-PEO	N60	INV100291000	9/4/2024	11/3/2024	\$	412,417.00	\$	412,417.00	12/31/2024
109	4934876	Wunsch Inc	1002961	2680	SWD-SPR	N60	INV100296100	9/5/2024	11/4/2024	\$	112,190.00	\$	112,190.00	12/31/2024
120	8054195	Abernathy, Kuhlma	1002972	4490	ACS-CHI	N60	INV100297200	9/5/2024	11/4/2024	\$	380,343.00	\$	380,343.00	12/31/2024
121	1597766	Walsh-Batz	1002973	1433	MON-PEO	N60	INV100297300	9/5/2024	11/4/2024	\$	493,666.00	\$	493,666.00	12/31/2024
60	1043931	Purdy, Ortiz and Ro	1002912	4866	ACS-CHI	N90	INV100291200	9/5/2024	12/4/2024	\$	41,467.00	\$	41,467.00	12/31/2024
85	2657814	Halvorson, Predovi	1002937	2354	HWD-SCR	N90	INV100293700	9/5/2024	12/4/2024	\$	105,388.00	\$	105,388.00	12/31/2024
123	1630499	Wehner, Sanford ar	1002975	4814	HWD-PEO	DR	INV100297500	9/6/2024	9/6/2024	\$	488,791.00	\$	488,791.00	12/31/2024
87	4616344	O'Kon-Schmidt	1002939	4003	MON-SPR	N30	INV100293900	9/6/2024	10/6/2024	\$	236,051.00	\$	236,051.00	12/31/2024

Normalized Table

A normalized table is a part of a relational database design. It follows the principles of, database normalization (organized data) . Essentially it is a process used to organize data to reduce redundancy and improve data integrity.

Normalization involves breaking down large, complex tables into smaller, related tables that follow specific normal forms (rules) to minimize data duplication and ensure consistency.

	-	
Listomore	1.21	n n
Customers	10	JIE

	CustomerID	CustomerName	CustomerAddress	
	C001	ABC Corp	123 Elm St	
,	C002	XYZ Inc	456 Oak St	

Invoices Table

	InvoiceID	CustomerID
*	101	C001
	102	C002

InvoiceDetails Table

InvoiceID	ProductID	Quantity	Price
101	P001	2	800
101	P002	5	20
102	P001	1	800

Products	lahle
Troducts	TUDIC

ProductID	ProductName	
P001	Laptop	
P002	Mouse	

InvoiceID	CustomerName	CustomerAddress	ProductID	ProductName	Quantity	Price
101	ABC Corp	123 Elm St	P001	Laptop	2	800
101	ABC Corp	123 Elm St	P002	Mouse	5	20
102	XYZ Inc	456 Oak St	P001	Laptop	1	800

Star Schema

- Dimensional modeling is based on organizing data into two main types of tables:
- Fact Tables Store quantitative business metrics (e.g., sales revenue, quantity sold).
- Dimension Tables Store descriptive attributes that provide context to facts (e.g., customer details, product names, time periods).
- This structure enables denormalization (reducing complex joins) to speed up queries.



community.dynamics.com





Flat Table

Star schema

Snowflake schema

No schema











1. One-to-Many (1:M) Relationship (Dimension to Fact)

- Most common relationship in a star schema.
- Each Dimension Table has a Unique Value, Primary Key, Natural Key, Surrogate Key.
- The Fact table has a Foreign key referencing the dimension table that tie them together.
- One row in a dimension table can relate to many rows in the fact table.
- Dimension Tables filter Fact tables.
- One Way relationship.
 - Fact tables do not filter dimension tables. If a fact table filtered a dimension table, ambiguity is introduced. Think of a single row in an Excel spreadsheet that contained many rows, attempting to filter its own header row. It can be misleading.

For Example:

- - A Date dimension table has a unique Date Key.
- The Sales fact table has a Date Key as a foreign key. (Several Date Column in fact)
- One date in the Date table can relate to many sales transactions
- 2. Many-to-One (M:1) Relationship (Fact to Dimension)
- This is the reverse perspective of the one-to-many relationship.
- Each fact record refers to a single related dimension record or another table record.



3. One-to-One (1:1) Relationship (Rare)

• This is less common in a star schema but may occur in cases where a dimension is split into multiple tables for performance or security reasons.

For Example:

A Customer table may store general information, while a Customer Details table stores sensitive information (like credit scores) in a separate, restricted table or if there is a junk table .

4. Many-to-Many (M:M) Relationships (Not Directly in Star Schema)

• Star schemas avoid direct many-to-many relationships. The Traditional star schema does not natively support many-to-many relationships.

These relationships are typically resolved using bridge tables (also called junction tables) in more complex data models.

For Example:

If Employees can be associated with multiple Roles, and each Role can belong to multiple Employees, a Role-Employee Bridge Table is used to break the many-to-many relationship into two one-to-many relationships.



Key Difference Between Fact & Dimensions Tables

Feature	Fact Table	Dimension Table
Purpose	Stores measurable business data (metrics)	Stores descriptive attributes (context)
Data Type	Contains numerical and aggregatable data	Contains categorical or descriptive data
Granularity	High granularity (transactions, events)	Lower granularity (business entities)
Examples	Sales, Revenue, Quantity, Profit	Product, Customer, Region, Date
Keys	Contains foreign keys referencing dimensions	Contains a primary key used in fact tables
Data Changes	Frequently updated with new transactions	Less frequently updated, usually static
Usage in Bl	Used for calculations, KPIs, trends	Used for filtering, slicing, and dicing
Relationships	Connects to multiple dimension tables	Connected to fact tables using primary key
Data Size	Larger (stores high volume of records)	Smaller (stores descriptive data only)
Attributes	Narrow Width and Long Length	Wide Width, and Short Length

Fact Table

Stores measurable business data (metrics)

Contains numerical and aggregatable data

Contains foreign keys

Connects to multiple dimension tables

referencing dimensions

Frequently updated with new

Used for calculations, KPIs,

Larger (stores high volume of

Narrow Width and Long

Profit

trends

records)

Length

transactions

Fact Table - Orders

Contains numerical and	OrderIndex_SK	OrderDate	OrderID	OrderAmount	CustomerID_FK	Salesperson_ID_FK DivisionID_FK	Order_StartDate	Order_CompletionDate
aggregatable data	1	1/1/2021	1000000	\$ 392,880.00	2821130	4350ACS	1/31/202	2/14/2021
High granularity (transactions,	2	1/1/2021	1000001	\$ 249,312.00	6806888	3672SWD	1/31/2027	2/14/2021
events)	3	1/1/2021	1000002	\$ 283,777.00	2827187	1470CCTV	1/31/2027	2/14/2021
	4	1/2/2021	1000004	\$ 417,563.00	1318704	1722SYSI	2/1/202	2/15/2021
Sales, Revenue, Quantity,	5	1/3/2021	1000005	\$ 411,681.00	6471969	2680HWD	2/2/202	2/16/2021

Fact Table - Invoices

InvoiceIn	dex (CustomerID_F									
_SK	k	<	OrderID_FK	SalesRepID_FK Divisio	n_FK Te	ermsID	InvoiceNo_NK	Invoice Date	Due Date	Invoice_Amount	Invoice_Balance
	1	6402978	1002460	1783ACS-SF	R NS	90	INV100246000	2/21/2024	5/21/2024	\$ 216,266.00	\$ 216,266.00
	60	1043931	1002912	4866ACS-CH	H NS	90	INV100291200	9/5/2024	12/4/2024	\$ 41,467.00	\$ 41,467.00
	454	1043931	1000328	4866ACS-CH	H NS	90	INV100032800	7/12/2021	10/10/2021	\$ 91,300.00	\$ -
	559	1043931	1000433	4866ACS-CH	H NS	90	INV100043300	8/22/2021	11/20/2021	\$ 291,049.00	\$ -

Fact Table – Payment

PaymentDocID	Payment Date Method	PaymentAmount	ApplyAmount	ApplyBalance	BankID	BatchID
PMT1000000	5/1/2021Check	\$ 392,880.00	\$ 392,880.00	\$ -	Chase-Op	20210501-CHK
PMT10004240	11/16/2021ACH	\$ 343,421.00	\$ 343,421.00	\$ -	Chase-Op	20211116-ACH
PMT10005400	1/8/2022ACH	\$ 379,493.00	\$ 379,493.00	\$ -	Chase-Op	20220108-ACH

Fact Table - Products

Invoice_SK	InvoiceID_NK	CustomerSK_FK	OrderID_SK	Productt_SK	InvoiceDate	Qty	UnitPrice	Discount	TotalAmt	TaxAmount	ItemTotal
1099	9 INV100097300	908	3 1000973	201	4/16/2022	5	\$ 20.00	5%	\$ 95.00	\$7.60	\$ 102.60
2156	5 INV100203000	417	1002030	202	7/31/2023	3	\$ 15.00	0%	\$ 45.00	\$.60	\$ 48.60
959	205	6/28/2021	7/28/2021	15.21%	8/11/2						
-------	-----	------------	------------	---------	---------						
959	205	11/9/2021	12/9/2021	29.10%	12/23/2						
54	205	1/29/2021	2/28/2021	19.30%	3/14/2						
54	205	3/27/2022	4/26/2022	28.25%	5/10/2						
924	5	1/16/2021	2/15/2021	13.25%	3/1/2						
924	5	1/27/2021	2/26/2021	30.14%	3/12/2						
333	10	1/11/2021	2/10/2021	16.24%	2/24/2						
333	10	5/24/2021	6/23/2021	24.13%	7/7/2						
333	10	7/8/2021	8/7/2021	12.10%	8/21/2						
333	10	12/3/2021	1/2/2022	24.18%	1/16/2						
333	10	2/5/2022	3/7/2022	17.23%	3/21/2						
541	185	5/23/2021	6/22/2021	16.21%	7/6/2						
179	185	1/19/2021	2/18/2021	30.12%	3/4/2						
179	185	12/28/2021	1/27/2022	14.20%	2/10/2						
903	185	3/19/2021	4/18/2021	28.12%	5/2/2						
903	185	4/16/2021	5/16/2021	23.19%	5/30/2						
903	185	3/19/2022	4/18/2022	10.26%	5/2/2						
23	75	1/1/2021	1/31/2021	14.15%	2/14/2						
23	75	1/16/2021	2/15/2021	24.24%	3/1/2						
23	75	2/14/2022	3/16/2022	30.23%	3/30/2						
204	75	8/5/2021	9/4/2021	23.30%	9/18/2						
781	12	2/13/2021	3/15/2021	14.20%	3/29/2						
600	12	3/22/2021	4/21/2021	30.25%	5/5/2						
600	12	10/31/2021	11/30/2021	24.10%	12/14/2						
57	12	6/27/2021	7/27/2021	20.23%	8/10/2						
869	13	3/10/2022	4/9/2022	14.13%	4/23/2						
626	14	2/4/2022	3/6/2022	16.13%	3/20/2						
A A E	1 /	2/10/2021	1/17/0001	17 070/	E /1 //						

Dimension Table - Customer

CustomerID_SK	CreationDate	CustomerID_NK	Company_Name	Credit_limit	Credit_risk	Terms	SalesPersonIDFK	Dimens
1	3/10/2001	1043931	Purdy, Ortiz and Rodriguez	\$ 100,000.0	0 High Risk	N30	4866	Stores descriptive
2	5/1/2004	8338926	Kuhn Group	\$ 100,000.0	0 High Risk	N30	4207	(context)
3	1/4/2009	4806121	Braun and Sons	\$ 500,000.0	0 Moderate Risk	N60	2459	
			Jast, Langworth and					Contains categor
4	3/31/2007	9965523	Hodkiewicz	\$ 1,000,000.00) Low Risk	N30	4860	data

Dimension Table - Salesperson

Employee_SK	EmployeeID_I	VK EmployeeName	Position	Location	Start Date	Phone_No	EmailAddress
	1	1001Steven Webb	Salesperson	Chicago	8/20/2019	210-6270	swebb@safecore.us
	2	1011 Jennifer Burke	Service Field	Peoria	4/26/2020	210-5539	jburke@safecore.us
	3	1019Chad Cobb	Salesperson	Peoria	10/19/2020	210-9462	ccobb@safecore.us
	4	1032Mr. Keith Hernandez	z Service Field	Chicago	3/24/2015	210-2264	mkeith@safecore.us

Dimension Table - Regions

OrgIndex_SK	Parent	Subsidiaries	Division_NK	TradeCode	TradeAbbrv	Trade Description	Region	Used for filtering, slicing, an
1SafeCor	e Holdings, LLC	SafeZone Installations	ACS-CHI	01	ACS	Access Control Systems	Midwest Region	aicing
2SafeCor	e Holdings, LLC	SafeZone Installations	ACS-SCR	01	ACS	Access Control Systems	Northeast Region	Connected to fact tables us
3SafeCor	e Holdings, LLC	SafeZone Installations	MON-CHI	05	MON	Monitoring Services	Midwest Region	primary key
4SafeCor	e Holdings, LLC	SafeZone Installations	MON-SCR	05	MON	Monitoring Services	Northeast Region	Smaller (stores descriptive of
5SafeCor	e Holdings, LLC	SafeZone Installations	CCTV-CHI	02	CCTV	Closed-Circuit Television	Midwest Region	only)

Role Playing Dimension – Date Table

Index 💌	Date 📃	Day 💌	Day Name	Month Number	Month Name	Quarter Number	Quarter Year	Short Year	Year 💌
1872	2/14/2025	14	Fri	2	Feb	1	25Q01	25	2025
1871	2/13/2025	13	Thu	2	Feb	1	25Q01	25	2025
1870	2/12/2025	12	Wed	2	Feb	1	25Q01	25	2025
1869	2/11/2025	11	Tue	2	Feb	1	25Q01	25	2025

Dimension TableStores descriptive attributes
(context)Contains categorical or descriptive
dataLower granularity (business
entities)Product, Customer, Region, DateContains a primary key used in fact
tablesLess frequently updated, usually
staticUsed for filtering, slicing, and
dicingConnected to fact tables using
primary keySmaller (stores descriptive data
only)

Wide Width, and Short Length

Date Table – Time Intelligence

Index 💌	Date 🗦	Day 💌	Day Name	Month Number	Month Name	Quarter Number	Quarter Year	Short Year	Year 💌
1872	2/14/2025	14	Fri	2	Feb	7	25Q01	25	2025
1871	2/13/2025	13	Thu	2	Feb	1	25Q01	25	2025
1870	2/12/2025	12	Wed	2	Feb	1	25Q01	25	2025
1869	2/11/2025	11	Tue	2	Feb	1	25Q01	25	2025

- Continuous Date Range no missing oe duplicate dates, typically spans from the earliest to the latest transaction date in your dataset. To support future forecasts, it will need to extend beyond the current date (e.g., 2–3 years into the future).
- One Row per Day Each row should represent a single date (no duplicates).
- Must Include a Column of Type 'Date' At least one column formatted as Date (not DateTime) as the Primary Key.
- Must be Mark as a Date TableIn Power BI Table Tools > Mark as Date Table > Select Date Column
- Sort By Other Columns You will want to Sort Month Name by Month Number, so your visual months are in order.
- Standard Date Attributes The table should include additional columns to support various time-based filtering and grouping: Year: Qtr, YYYY-MM, Full Month Name, Period, Weeks, Date Calculations, Supports Fiscal Year
- No Relationships to Fact Tables with Duplicate Date Columns Only the Date column from the Date Table should be used to create relationships with fact tables. Avoid using multiple date fields from fact tables—use USERELATIONSHIP() in DAX for alternate date fields (e.g., Order Date vs. Invoice Date).

Date Table – DAX Method

DateTable = ADDCOLUMNS (CALENDAR (DATE(2015,1,1), DATE(2030,12,31)), "Year", YEAR([Date]), "Month", FORMAT([Date], "MMMM"), "Month Number", MONTH([Date]), "Quarter", "Q" & FORMAT([Date]), "Day of Week", FORMAT([Date], "Q"), "Day of Year", FORMAT([Date], "DDD"), "Week Number", WEEKNUM([Date]))

Date Table – 'M' Method

let

Source = List.Dates, #"Invoked FunctionSource" = Source(#date(2020, 1, 1), Duration.Days(DateTime.Date(DateTime.FixedLocalNow()) - #date(2020, 1, 1)), #duration(1, 0, 0, 0)), #"Table from List" = Table.FromList(#"Invoked FunctionSource", Splitter.SplitByNothing(), null, null, ExtraValues.Error), #"Added Index" = Table.AddIndexColumn(#"Table from List", "Index", 1, 1), #"Renamed Columns" = Table.RenameColumns(#"Added Index",{{"Column1", "Date"}}), #"Added Custom" = Table.AddColumn(#"Renamed Columns", "Year", each Date.Year([Date])), #"Added Custom1" = Table.AddColumn(#"Added Custom", "Month Number", each Date.Month([Date])), #"Added Custom2" = Table.AddColumn(#"Added Custom1", "Day", each Date.Day([Date])), #"Added Custom3" = Table.AddColumn(#"Added Custom2", "Day Name", each Date.ToText([Date],"ddd")), #"Added Custom4" = Table.AddColumn(#"Added Custom3", "Month Name", each Date.ToText([Date],"MMM")), #"Reordered Columns" = Table.ReorderColumns(#"Added Custom4", {"Date", "Index", "Year", "Month Number", "Month Name", "Day", "Day Name"}), #"Added Custom5" = Table.AddColumn(#"Reordered Columns", "Quarter Number", each Date.QuarterOfYear([Date])), #"Duplicated Column" = Table.DuplicateColumn(#"Added Custom5", "Year", "Copy of Year"), #"Renamed Columns1" = Table.RenameColumns(#"Duplicated Column",{{"Copy of Year", "Short Year"}}), #"Changed Type" = Table.TransformColumnTypes(#"Renamed Columns1",{{"Short Year", type text}}), #"Split Column by Position" = Table.SplitColumn(#"Changed Type", "Short Year", Splitter.SplitTextByRepeatedLengths(2), {"Short Year.1", "Short Year.2"}), #"Changed Type1" = Table.TransformColumnTypes(#"Split Column by Position",{{"Short Year.1", Int64.Type}, {"Short Year.2", Int64.Type}}), #"Removed Columns" = Table.RemoveColumns(#"Changed Type1",{"Short Year.1"}), #"Renamed Columns2" = Table.RenameColumns(#"Removed Columns",{{"Short Year.2", "Short Year"}}), #"Added Custom6" = Table.AddColumn(#"Renamed Columns2", "Quarter Year", each Number.ToText([Short Year]) & "Q" & Number.ToText([Quarter Number],"00")), #"Reordered Columns1" = Table.ReorderColumns(#"Added Custom6", {"Index", "Date", "Day", "Day Name", "Month Number", "Month Name", "Quarter Number", "Quarter Year", "Short Year", "Year"}), #"Changed Type2" = Table.TransformColumnTypes(#"Reordered Columns1",{{"Date", type date}, {"Day", Int64.Type}, {"Index", Int64.Type}, {"Month Number", Int64.Type}, {"Quarter Number", Int64.Type}, {"Month Name", type text}, {"Quarter Year", type text}, {"Year", Int64.Type}}) #"Changed Type2"

Basic Power BI Navigation

Importing Data

• Connecting Power BI to dataset.

Building Simple Data Model

- Connect our Data Model
- Create a Date Table
- Mark our Date Table

Building Simple Reports

- Dragging fields into visuals.
- Formatting charts and tables.



DOWNLOAD FILES

Session 3 Files Download: Data Modeling Done Right

Password: NACM2025

https://tinyurl.com/NACMDataModeling



Link Expiration: 6/18/2025



- 1. OPEN Example File: SafeCore Sample Date.xlsx
- 2. SELECT Tables to import:
 - DimCustomer
 - DimEmployee
 - DimRegions
 - FactSales
- 3. PREVIEW Sample Data
- 4. CLICK Transform Data to open Power Query

Navigator

isplay Opt	tions 🔻	
ispiay Op	lions	1
A Safe	Core Sample Data.xlsx [14]	
~ 📖	DimCustomer	
	DimEmployee	
	DimProducts	
	DimRegions1 2	
	FactInvoices	
	FactPayments	
	FactSales	
	DimCustomers	
	DimEmployees	
	DimRegions	
	Fact_Invoices	
	Fact_Payments	
	Fact_Products	
	Fact_Sales	

OrderIndex_SK	OrderDate	OrderID	OrderAmount	CustomerID_FK	Cus
1	1/1/2021	1000000	392880	2821130	N.
2	1/1/2021	1000001	249312	6806888	e^
3	1/1/2021	1000002	283777	2827187	к
4	1/2/2021	1000004	417563	1318704	ν
5	1/3/2021	1000005	411681	6471969	G
6	1/3/2021	1000006	389785	6616163	Ν
7	1/3/2021	1000007	336069	7092084	Е
8	1/3/2021	1000008	157109	2731478	R
9	1/5/2021	1000009	313227	4684785	s
10	1/5/2021	1000010	230738	7111486	z
11	1/5/2021	1000011	474925	4231597	F
12	1/6/2021	1000012	337555	7604813	с
13	1/6/2021	1000013	152917	1733509	E
14	1/8/2021	1000014	289515	6655263	F
15	1/8/2021	1000015	352736	6529366	ŀ
16	1/9/2021	1000016	379642	9273098	с
17	1/9/2021	1000017	430646	6612223	Z
18	1/9/2021	1000018	365247	6386727	Ν
19	1/10/2021	1000019	46835	7727969	F
20	1/11/2021	1000020	72956	2731478	R
21	1/11/2021	1000021	186539	8526042	Е
22	1/11/2021	1000022	37881	1654300	F
23	1/12/2021	1000023	481800	7208217	T
<					

6

Step 1

Create Group Folders to organize your data sources:

- Datasources ٠
- Staging Table (Optional)
- DataModel ٠

Step 2

- Move your date source files to your ٠ Datasource folder
- Disable load for each ٠

Step 3

- Reference each of your tables to create ٠ copies. (Right Click choose reference)
- Move to your DataModel folder ٠
- Rename for user friendliness. ٠

Step 4

- Set your data types. ٠
- Rename your Columns to make them ٠ user friendly in natural language.
- Remove Extra Columns. ٠
- Perform additional transformations as ٠ needed.

Step 5

Create Your Date Table •

(Use .txt file/Select Blank Query/Advanced Editor) Step 6

Click Close and Apply ٠

📕 拱 🖛 Unt	itled - Power	Query Edit	tor						
File Home	Transfor	rm Ac	dd Column	View To	ols Help				
Close & New Apply ▼ Source Close 6	Recent • Sources • New Query	Enter Data	Data source settings Data Sources	Manage Parameters • Parameters	Refresh Preview • Advanced Editor Query	Choose Remov Columns - Column Manage Columns	e s • Rows • Rows • s • Reduce Rows	Ž↓ Ž↓ Split Column → Group 1 Sort	lata Type: Whole Number ▼ Use First Row as Headers ▼ _{≫2} Replace Values Transform
Queries [9]			< X	√ fx	= Table.TransformColumnTy	pes(Source,{{"Pay	/ments Received",	Currency.Type}, {"Orde	r Balance", Currency.Ty
and Datasour	ces [4]			1 ² 3 OrderIndex	SK 🔽 OrderDate	▼ 1 ² 3 Orde	erID 🔽	\$ OrderAmount 4	123 CustomerID_FK
🔟 DimCus	tomer		1		1	1/1/2021	1000000	392,880.0	2821
E FactSale	es 6		2		2	1/1/2021	1000001	249,312.0	00 6806
DimEm	olovee	2	3		3	1/1/2021	1000002	283,777.0	2827
DimRea	ions1		4		4	1/2/2021	1000004	417,563.0	0 1318
A DataMoo	lal (51		5		5	1/3/2021	1000005	411,681.0	0 6471
Color			6		6	1/3/2021	1000006	389,785.0	0 6616
E Sales			7		7	1/3/2021	1000007	336,069.0	7092
🖽 Salespe	rson	ಿ	8		8	1/3/2021	1000008	157,109.0	2731
🛄 Region:	5		9		9	1/5/2021	1000009	313,227.0	10 4684
Custom	ers		10		10	1/5/2021	1000010	230,738.0	7111 7111
🛄 Date Ta	ble 5		11		11	1/5/2021	1000011	474,925.0	4231
Other Ou	eries 🔍		12		12	1/6/2021	1000012	337,555.0	7604 7 604
			13		13	1/6/2021	1000013	152,917.0	1733
			.14		14	1/8/2021	1000014	289,515.0	0 <u>6655</u>
			15		15	1/8/2021	1000015	352,736.0	0 6529
			16		16	1/9/2021	1000016	379,642.0	9273
			17		17	1/9/2021	1000017	430,646.0	0 6612
			18		18	1/9/2021	1000018	365,247.0	0 6386

Create your star schema

- 1. Select DataModel
- 2. Select Manage relationships
- 3. Select Fact Table as "From". Your Dimension Table as "To" for each.
- 4. Verify your Cardinality is M:1
- 5. Verify Relationship Direction is Single.
- 6. Verify relationship is Active
- 7. Arrange Your tables as a Star Schema or as hierarchy.



elect tables an	d columns that	are related.					
cicci tubico un		ure related.					
rom table							
Sales			\sim				
Customer ID EK	CustomeNines	Division ID EK	0.4	Comel	Order ShinAd	Order ShieCity	Order Sh
CustomenD_FK	Customerivanie	DIVISIONID_PK	Cita	er_compil	Grael_ShipAd	order_shipcity	order_sh
282/18/	Kunn, Altenw	LIMP	Sun	day, Febr	595 Green Park	Bakerstield	CA
647 1969	Gottileb, Kris	END CIT	rues	day, rebr	0379 Arizona	Fresho	CA
0529300	Hegmann-Bo	CYB	Sund	day, Febr	32407 waywo	Los Angeles	CA .
City	Company_wa	Creation_Date	Crec	nt_nmit	Credit_risk	CustomeriD	Custome
El Paso	Purdy, Ortiz a	Saturday, Mar	1000	000	High Risk	1043931	1
Montgomery	Kuhn Group	Saturday, Ma	1000	000	High Risk	8338926	2
New York City	Morar, Lindgr	Monday, Aug	1000	000	High Risk	6499972	8
							•
ardinality				Cross-filt	er direction		
Many to one (*:1)		\sim	Single			\sim
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File	Home	He
Ø Name	Date Table	

Structure

External tools Table tools 3 曲 7 Manage Quick New New New lark as date relationships measure measure column table table Relationships Calculations Calendar

1. 11		1
loou	A 1	

Index 💌	Date 💌	Day 💌	Day Name 💌	Month Number
183	Wednesday, July 1, 2020	1	Wed	7
184	Thursday, July 2, 2020	2	Thu	7
185	Friday, July 3, 2020	3	Fri	7
186	Saturday, July 4, 2020	4	Sat	7
187	Sunday, July 5, 2020	5	Sun	7
188	Monday, July 6, 2020	6	Mon	7
189	Tuesday, July 7, 2020	7	Tue	7
190	Wednesday, July 8, 2020	8	Wed	7
191	Thursday, July 9, 2020	9	Thu	7
192	Friday, July 10, 2020	10	Fri	7
193	Saturday, July 11, 2020	11	Sat	7
194	Sunday, July 12, 2020	12	Sun	7
195	Monday, July 13, 2020	13	Mon	7
196	Tuesday, July 14, 2020	14	Tue	7
197	Wednesday, July 15, 2020	15	Wed	7
198	Thursday, July 16, 2020	16	Thu	7
199	Friday, July 17, 2020	17	Fri	7
200	Saturday, July 18, 2020	18	Sat	7
201	Sunday, July 19, 2020	19	Sun	7
	Monday, July 20, 2020	20	Mon	7
	10- 21 2020	21	Tue	7
	22 2020		Wed	7
				7
				-

Mark Your Date Table



- 1. Select Tables
- 2. Select Date Table
- 3. Click 'Mark as date table' under Table tools menu
- 4. Select 'On'
- 5. Select your Primary Date Column. Must be consecutive.
- 6. Click Save

🕈 S

2

V Data

Q Search

>
Customers

> 🖽 Regions

> 🛱 Salesperson

> 🖽 Sales

Format Your Date Table

- Select Date Column
- Select Column tools and Format
- Choose (Short Date)
- Repeat on other columns as needed.

A*	- Help External tool	ls	Table tools	Column tools		
Date	e 🌮 Form	at 14	, 2001 (Long Dat	te 🗸 💛 🔀 Summari	zation Don't summ	arize 🗸
pe Date	e 🗸 \$ ~ %	D	ate formats			*
Stru	cture		*3/14/2001	(Short Date)		
\times \checkmark			*Wednesday	, March 14, 2001 (Long	Date)	
Index 💌	Date 💌 D	ay	Wednesday,	March 14, 2001 (dddd,	mmmm d, yyyy)	Jarter N
183	Wednesday, July 1, 2020		March 14-20	001 (mmmm d vvvv)		
184	Thursday, July 2, 2020		march 14, 24			
185	Friday, July 3, 2020		Wednesday,	14 March, 2001 (dddd,	d mmmm, yyyy)	
186	Saturday, July 4, 2020		14 March, 20	001 (d mmmm, yyyy)		
187	Sunday, July 5, 2020		3/14/2001 (r	m/d/www)		
188	Monday, July 6, 2020		5/14/2001 (
189	Tuesday, July 7, 2020		3/14/01 (m/	d/yy)		
190	Wednesday, July 8, 2020		03/14/01 (m	ım/dd/yy)		
191	Thursday, July 9, 2020		03/14/2001	(mm/dd/aaaa)		
192	Friday, July 10, 2020		00, 11, 2001	(,, ,,,,,,,,,,,,,,,,,,,,,,,,,,		
193	Saturday, July 11, 2020		01/03/14 (yy	//mm/dd)		
194	Sunday, July 12, 2020		2001-03-14	(yyyy-mm-dd)		
195	Monday, July 13, 2020		14-Mar-01 (dd-mmm-w)		
196	Tuesday, July 14, 2020			33 mm JJ,		
197	Wednesday, July 15, 2020		14/03/2001	(dd/mm/yyyy)		
198	Thursday, July 16, 2020		March 2001	(mmmm yyyy)		
199	Friday, July 17, 2020		2001-03 (vv	vv-mm)		
200	Saturday, July 18, 2020			,,,		
201	Sunday, July 19, 2020		March 14 (m	ımmm d)		
202	Monday, July 20, 2020		01 (yy)			
203	Tuesday, July 21, 2020		2001 (www)			
204	Wednesday, July 22, 2020	22	weu	,	านเ	pro 2
205	Thursday, July 23, 2020	23	Thu	7	Jul	
206	Friday, July 24, 2020	24	Fri	7	Jul	
207	Saturday, July 25, 2020	25	Sat	7	Jul	

Ø 1	lame	Mo	onth Name			\$% Format	Text	•	∑ Summari	zation Don't summari	ze 🔹				E	
923 C	Data type	Tex	t		۷	\$ ~ % \$	Auto Auto	< >	🗄 Data cate	egory Uncategorized	,		Sort by Data column v groups	*	Mana relations	ge New ships column
		Stru	ucture				Formatting			Properties			Marth Name		Relations	ships Calculations
000	X	1						1					Month Name			
_	Index [•	Date 💌	Day	٠	Day Name	Month Number	٠	Month Name	Quarter Number	Quar	ter	Date	-	Year 💌	mmm-yyyy 💌
Ħ	18	33	7/1/2020		1	Wed		7	Jul	-	3 20Q0)3	Day	20	2020	Jul-2020
-68	18	34	7/2/2020		2	Thu		7	Jul	2	3 20Q0)3		20	2020	Jul-2020
日	18	35	7/3/2020		3	Fri		7	Jul	3	3 20Q0)3	Day Name	20	2020	Jul-2020
Pa.	18	36	7/4/2020		4	Sat		7	Jul	4	3 20Q0	3	Index	20	2020	Jul-2020
Uaxil	18	37	7/5/2020		5	Sun		7	Jul	2	3 20Q0	3	3	20	2020	Jul-2020
	18	38	7/6/2020		6	Mon		7	Jul	4	3 20Q0	3	ттт-уууу 💙	20	2020	Jul-2020
	18	39	7/7/2020		7	Tue		7	Jul	3	3 20Q0	3	Month Number	20	2020	Jul-2020
	19	90	7/8/2020		8	Wed		7	Jul	2	3 20Q0	3		20	2020	Jul-2020
	1.		7/9/2020		9	Thu		7	Jul	4	3 20Q0	3	Quarter Number	20	2020	-wr-20120
				1	10	Fri		7	Jul	2	3 20Q0)3	Ous-tay real	10		
								7	Jul	ê	1000	0	ment of the second second			

Sort your Calendar Columns Correctly

- 1. Select a column that needs a specific order. i.e... Month Name or mmm-yyyy column. You do not want these to display alphabetical in visuals.
- 2. Select Sort by Column
- 3. Select the corresponding numeric value to use as sort order.
- 4. Create a visual to validate

Format All Your Other Tables Data Types in Power Bl

ionID_FK 💌	Order_ShipAddress1	Order_ShipCity	Order_ShipState	Order_ShipZip	Sales Tax Rate	Equipment	Labor •	Order_StartDate	Order_CompletionDate	WarrantyPeriod	Payments_Received	Order_Balance
	595 Green Park	Bakersfield	CA	93305	0.071000164906168	\$204,361.0691	\$79,415.9309	Sunday, January 31, 2021	Sunday, February 14, 2021	Saturday, February 4, 2023	\$283,777	\$
	6379 Arizona Junction	Fresno	CA	93778	0.0778144271603021	\$58,896.3298	\$352,784.6702	Tuesday, February 2, 2021	Tuesday, February 16, 2021	Monday, February 6, 2023	\$411,681	\$
	32407 Waywood Way	Los Angeles	CA	90035	0.107427552084025	\$234,686.8158	\$118,049.1842	Sunday, February 7, 2021	Sunday, February 21, 2021	Saturday, February 11, 2023	\$352,736	\$
	24 Knutson Terrace	San Diego	CA	92137	0.102895433093923	\$386,778.5028	\$43,867.4972	Monday, February 8, 2021	Monday, February 22, 2021	Sunday, February 12, 2023	\$430,646	\$
	10 Hudson Pass	Los Angeles	CA	90065	0.081013450357299	\$222,855.6668	\$142,641.3332	Thursday, February 11, 2021	Thursday, February 25, 2021	Wednesday, February 15, 2023	\$365,497	\$
	3 Haas Alley	San Diego	CA BEFC	JRE 92176	0.074583521347967	\$33,964.0497	\$38,117.9503	Friday, February 12, 2021	Friday, February 26, 2021	Thursday, February 16, 2023	\$72,082	\$
	54 Stephen Parkway	Orange	CA	92867	0.0602506174468946	\$147,678.7937	\$113,294.2063	Monday, February 22, 2021	Monday, March 8, 2021	Sunday, February 26, 2023	\$260,973	\$
	74642 Darwin Plaza	San Bernardino	CA	92424	0.07131041913963	\$221,599.7717	\$71,180.2283	Monday, March 8, 2021	Monday, March 22, 2021	Sunday, March 12, 2023	\$292,780	\$
	1 Northland Terrace	Los Angeles	CA	90076	0.0921188032704379	\$109,934.3833	\$51,242.6167	Monday, March 15, 2021	Monday, March 29, 2021	Sunday, March 19, 2023	\$161,177	\$
	5641 Evergreen Drive	Huntington Beach	CA	92648	0.0828986499572432	\$31,909.2438	\$76,194.7562	Sunday, March 28, 2021	Sunday, April 11, 2021	Saturday, April 1, 2023	\$108,104	\$
	0051 Diador Dark	Decadorea	CA	01121	0.00006676705075.45	¢2070020741	\$240 1250	Cundou March 20 2021	Cundou Aneil 11 2021	Coturday April 1 2022	\$200 152	e

Tips:

- Use short dates
- Set all Currency & Percentage formats to 2 decimals instead of 'Auto' default.
- Select Numeric values that will not be aggregated to ' Don't Summarize' in Column Tools.
- You may need to return to Power Query to fix some columns data types that cannot be fixed in Power BI
- Set any data Categories for State, Address, Zip clms.
- 'Hide in Report View' Columns for Surrogate 'Keys' in Fact Tables and Dimensions.
- **'Hide in Report View' All Implicit Measure Fields, Fields that auto sum that you will create Explicit Measures for to replace unless you need them to filter.

Order_ShipState	Order_ShipZip	Sales Tax Rate	Equipment 💌	Labor 💌	Order_StartDate	Order_CompletionDate	WarrantyPeriod	Payments_Received
CA	93305	7.10%	\$204,361.07	\$79,415.93	1/31/2021	2/14/2021	2/4/2023	\$283,777.0
CA	93778	7.78%	\$58,896.33	\$352,784.67	2/2/2021	2/16/2021	2/6/2023	\$411,681.0
CA	90035	10.74%	\$234,686.82	\$118,049.18	2/7/2021	2/21/2021	2/11/2023	\$352,736.0
CA Afte	92137	10.29%	\$386,778.50	\$43,867.50	2/8/2021	2/22/2021	2/12/2023	\$430,646.0
CA	90065	8.10%	\$222,855.67	\$142,641.33	2/11/2021	2/25/2021	2/15/2023	\$365,497.0
CA	92176	7.46%	\$33,964.05	\$38,117.95	2/12/2021	2/26/2021	2/16/2023	\$72,082.0
CA	92867	6.03%	\$147,678.79	\$113,294.21	2/22/2021	3/8/2021	2/26/2023	\$260,973.0
CA	92424	7.13%	\$221,599.77	\$71,180.23	3/8/2021	3/22/2021	3/12/2023	\$292,780.0
CA	90076	9.21%	\$109,934.38	\$51,242.62	3/15/2021	3/29/2021	3/19/2023	\$161,177.0
CA	92648	8.29%	\$31,909.24	\$76,194.76	3/28/2021	4/11/2021	4/1/2023	\$108,104.0
CΔ	91121	8 34%	\$287 903 87	\$248.13	3/28/2021	4/11/2021	4/1/2023	\$288 152 0

Date Table – DAX Method



PowerPivot Excel Comparison

Importing Data

• Connecting Power BI to dataset.

Building Simple Data Model

- Connect our Data Model
- Create a Date Table
- Mark our Date Table

Building Simple Reports

- Dragging fields into visuals.
- Formatting charts and tables.



Benefits of Learning Power Pivot in Excel:

- 1. Excel is familiar territory for all of us
- 2. Increased opportunities for internal use leads to wider application
- 3. Increased usage cases leads to increased experience
- 4. Small quick wins will encourage motivation to learn more.
- 5. Logical transition to Power PI through PowerPivot



Step 1. Load Data into Power Query from Excel

Step 2. Transform Data in Power Query as Needed for Dimension and Fact Tables then 'Close & Load To..' option. Note Original Tables in DataSources have no option not to load.



Step 3. Select Only Create Connection. If working with just DataModel Tables select 'Add this data to the Data Model to bypass Step 4.



STEP 4. All your tables will be under 'Connection only' under Queries & Connections on Tata Tab. Select each of the Tables under your Data Model and click 'Load To:' and then select '"Add this data to Data Model." This avoided loading all tables and only the tables you need. For a visual copy, select 'Table' to create an Excel Table of your data.

STEP 5. Open Power Pivot to edit your tables in Power Pivot and create your data model. Click Manage to access Power Pivot area of Excel.



STEP 6. Set your date table, format your column values, create calculated columns. Connect your relationships for your Data Model.



Queries & Connections	~ X	目	Import Data	? ×
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DimEmployee Connection only.			=\$C\$8]
DimCustomer Connection only. DataModel [5]			Add this data to the Data Model)
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Properties...

STEP 7. Under Home on Menu, Select PivotTable or PivotChart to begin creating your PowerPivot Table and PowerPivot Charts.

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PivotTable Fields V X STEP 8. Begin Active All adding fields to your @~ Choose fields to add to report: PowerPivot Table as 2 Search you would a normal > Customers Pivot Table, except > To Date Table now you have > Employees Multi-tables. > Regions > Sales Measure 2 X Table Name: Sales Drag fields between Measure Name: Sales Amount Total Value Description: Sum of Sales Formula: fx Check DAX Formula = SUM(Sales[SalesAmount]) SUM(ColumnName) CustomerID NK [CustomerName] Customers[City] Customers[Company_Name] Customers[Creation_Date] Customers[Credit limit] Customers[Credit_risk] Catego Customers[CustomerID_NK] Genera E Customers[CustomerIndex_SK] Customers[Email] Date Numbe Customers[SalesPersonID_FK] Curren TRUE\F Customers[State] OK Cancel

STEP 9. Create your DAX measures if needed for additional calculations. (Sign up for next class: Discovering DAX!)

Excel Power Pivot Vs Power Bl Considerations

Feature/Aspect	Power Pivot in Excel	Power Bl
Purpose	Enhances Excel's data modeling and analysis capabilities Good for small scale, one time, ad-hoc analysis reports.	A full-fledged BI and reporting tool for analytics Power BI is better when the analysis needs to be repeated, refreshed, or shared with others dynamically.
Data Modeling	Supports data modeling with DAX and relationships	More advanced modeling, including DAX, M
Data Sources	Limited connectivity (Excel, SQL, Access, OData, etc.)	Extensive support (SQL, APIs, cloud sources, etc.)
User Interface	Excel-based, uses Power PivotTables & Power Query integration	Dedicated UI with visuals, slicers, dashboards
Visualization	Basic (PivotTables, PivotCharts)	Advanced (interactive dashboards, custom visuals) Creating interactive dashboards
Data Refresh	Manual or scheduled via Power Query and Excel features	Automated refresh via Power BI Service
Data Volume	Limited to Excel's memory constraints (~1M rows)	Can handle billions of rows with efficient compression
Sharing & Collaboration	Via Excel file sharing or OneDrive	Cloud-based sharing via Power BI Service
Security	Limited security controls (password, OneDrive settings)	Row-level security (RLS), role-based access
Advanced Features	Some support for DAX, Measures, KPIs	Advanced AI, predictive analytics, Python, R
Deployment	Local desktop use only	Can be deployed to cloud, Power BI Service, Power BI Report Server
Automation	Limited (Excel Macros, VBA, Power Automate)	Supports Power Automate, APIs, AI-driven insights
Updates & Support	Slow updates (dependent on Excel updates)	Frequent updates with new features monthly
Licensing	Included in Excel (with Power Pivot enabled)	Requires Power BI Free, Pro, or Premium



Use a Star Schema instead of a flat table

- A star schema consists of a central fact table surrounded by dimension tables, reducing redundancy and improving performance.
- Avoid a snowflake schema unless necessary, as it increases complexity.
- Power BI performs best with denormalized data structures optimized for reporting.

- 2. Reduce Relationships & Cardinality Issues
 - Use one-to-many relationships rather than many-to-many to prevent performance issues.
 - Reduce high-cardinality columns in relationships (e.g., avoid using unique transaction IDs unless necessary).
 - Avoid bidirectional filtering unless essential—it can introduce ambiguity and slow down calculations.

3. Keep the Model as Simple as Possible

- Remove unnecessary tables and columns that don't add value.
- Create a single source of truth by defining clear measures and relationships.
- Consolidate multiple fact tables if they serve the same purpose.

4. Optimize Table Relationships

- Ensure fact tables are on the "many" side and dimension tables are on the "one" side.
- Use integer keys instead of text keys for relationships (e.g., use CustomerID instead of CustomerName).
- Use surrogate keys where possible to improve relationship efficiency.

5. Use Aggregated Columns & PreCalcs in Data Transformation

- Perform aggregations (e.g., totals, averages) before loading data into Power BI to reduce DAX calculations. (Do in SQL or PowerQuery)
- Avoid row-by-row transformations in Power Query when table-wide calculations are more efficient.
- Remove unnecessary decimal precision in numerical columns.

6. Use Measures Instead of Calculated Columns

- Measures are dynamic and computed at query time, whereas calculated columns increase memory usage.
- Use DAX measures for calculations that involve aggregations (e.g., SUM, AVERAGE, COUNT).
- Only create calculated columns when they are required for relationships or filters.

7. Leverage Power BI's Performance Optimization Features

- Enable query reduction options to minimize unnecessary queries.
- Use aggregation tables for large datasets.
- Utilize composite models when working with large datasets in DirectQuery mode.

- 8. Use Role-Based Security Properly
 - Implement Row-Level Security (RLS) to restrict data access by users or to make reports more region or user specific.
 - Avoid hardcoding filters in RLS—use role-based tables instead.
 - Test RLS configurations thoroughly to ensure security and performance balance.
- 9. Index & Partition Large Datasets
 - Partition large fact tables in the data source to improve query performance.
 - Use indexes on foreign keys in your SQL source system for faster joins.
 - Leverage incremental refresh for large datasets to optimize load times.

10. Document Your Data Model

- Use clear naming conventions for tables, columns, and measures
- Create a data dictionary explaining key business logic.
- Add descriptions in Power BI for datasets, relationships, and measures.

Remember:

Good Data Models Provide:

- Performance Optimization
- Data Accuracy & Consistency
- Better DAX Performance & Simplicity
- Scalability & Flexibility
- Improved Report Performance
- Security & Row-Level Security (RLS) Implementation
- Easier Maintenance & Collaboration
- Efficient Storage & Reduced Data Size
- Data Reusability
- Business Logic & Centralization



Next Steps for Learning

K.I.S.S. – Keep it Simple Stupid.
 Start with small datasets (Excel or CSV) before working with large databases.

with different online data sources
Follow guided tutorials (Microsoft Learn, YouTube, blog posts).
Work on real-world projects to reinforce concepts, even if its just for you.









Attend a Free 1 Day Event Workshop:

Dashboard in a Day - UB Technology Innovations, Dashboard in a Day -OmniData Insights -Inc. - United States United States 09/25/2024 | 10:00 - 18:00 (CDT) 09/26/2024 | 08:00 - 16:00 (CDT) Digital Digital English (United... English (United... C Training C Training **Registration and details** B **Registration and details** B Dashboard in a Day -Dashboard in a Day -PragmaticWorks - United smart BI - United States States @ 09/27/2024 | 08:00 - 16:00 (CDT) E 10/01/2024 | 08:00 - 16:00 (CDT) Digital Digital English (United... English (United.... Training Training **Registration and details Registration and details** B B

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Beginners Guide to Power Bl

Kickstart Your Po	wer BI Journey
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Beginner

C 2 hours Total points: 407 XP 🗘

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