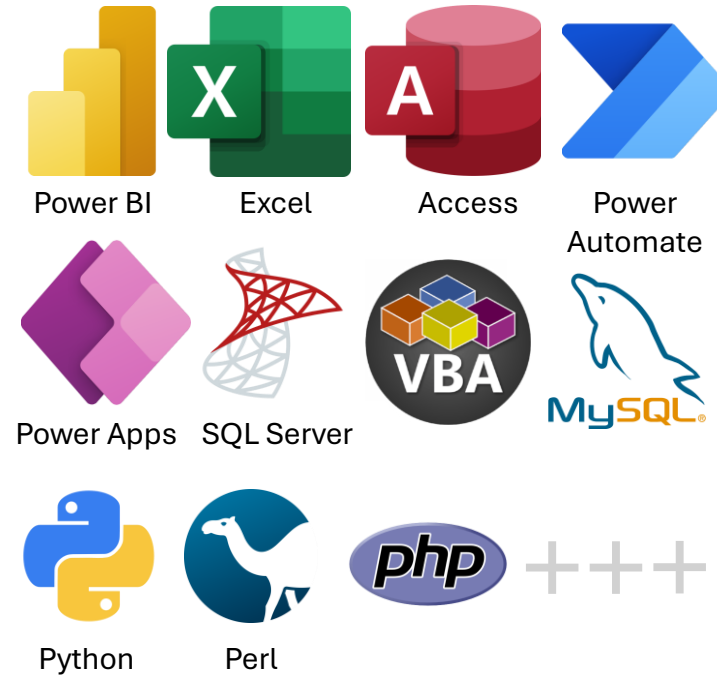




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Darcy Whyte

Trainer (~20%)

System Developer (40 years)

Business Intelligence Specialist

Full-Stack Data Analyst

Analytics Engineer

Business Intelligence Engineer

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613-563-3634 text



Courses

You are here



L1: The Definitive Introduction to Power BI Desktop

L2: Power BI Practitioner

L3: Power BI Master

Industry/Task Specific

Power BI Finance

Power BI Process Management

Power BI Service Industry

Power BI Case Management

Power BI Logistics and Manufacturing

Power BI Energy and Mining



Custom Courses/Consulting

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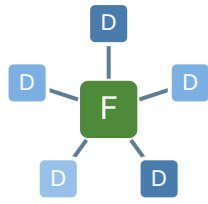
What is Power BI?

BI = Business Intelligence

Data



Clean

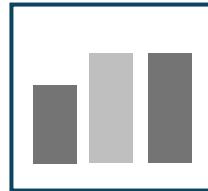


ETL

Analyze



Visualize



Share

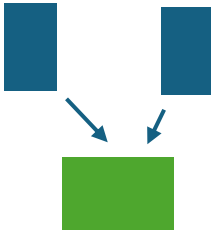


Insight



Data

Person			Dimension			Activity			Fact			Location			Dim																		
Person ID			First			Cell			Activity ID			Activity			Day			Rep			Person ID			Loc ID			Loc ID			Name			
1	Primary Key		Yoko			123			1	Primary Key		Push up			Jan 4			4			1	Foreign Key		2			Foreign Key				Home		
2			Cher			567			2			Dance			Jan 7			10			1			1			Foreign Key				Work		
3			Ned			777			3			Cook			Jan 9			15			3			1			Foreign Key				Park		



Normalized

Table, Record, Field, Relationship, One to Many, Snowflake, Entities (Things)

A table for each “Thing”.

Activity		Flat			
First	Cell	Activity	Day	Rep	Loc
Yoko	123	Push up	Jan 4	4	Work
Yoko	123	Dance	Jan 7	10	Home
Ned	777	Cook	Jan 9	15	Home

Many “Things” in one table.

Activity	Cross Tab		
First	Jan	Feb	Mar
Yoko	14	62	11
Cher	0	12	8
Ned	15	33	7

A summary, often created with Pivot.

Denormalized

Tables

Typically, you will be given data that is in all these forms.

But, we want to create a dimensional model that separates descriptive data from measurable data.

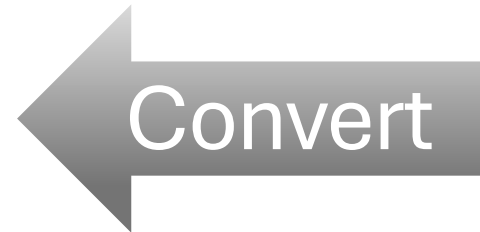
Typically, we summarize data that's in **fact** tables, and we slice the results by **dimension** tables.

Dimension

Categories, Reference Tables, Descriptive Context

Fact

Quantitative data about a process, measurements, observations, transactions



Flat

Common in spreadsheets.

Some combination of dimensional, factual and even cross tab information.

Cross Tab

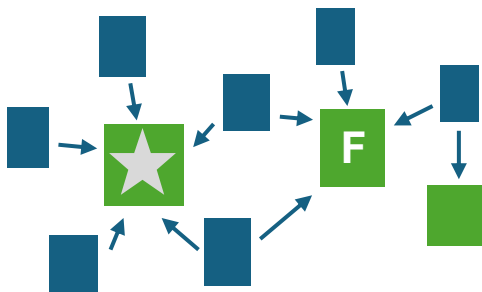
Sales by product and month.

Data summarized by two or more dimensions.

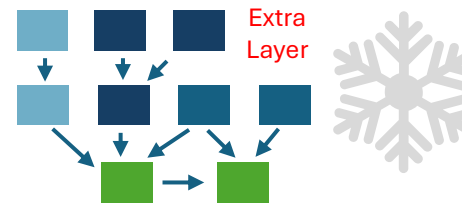
Dimensional Modelling

Star Schema is optimized for analysis.
Known as **Fact Constellation** or **Galaxy**, if more than one fact table.

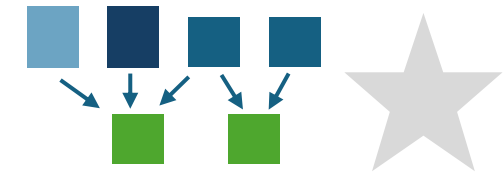
- ✓ fact and dimensional tables
- ✓ no relationships between facts
- ✓ no relationships between dimensions



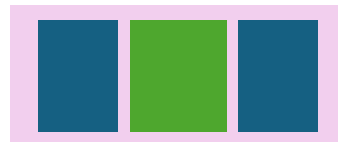
Snowflake/Normalized: De-normalize/flatten by combining tables.



Combine



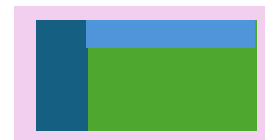
Flat Files: Normalize by breaking tables apart.



Break Apart



Cross Tabs: Unpivot to become a fact or flat table.

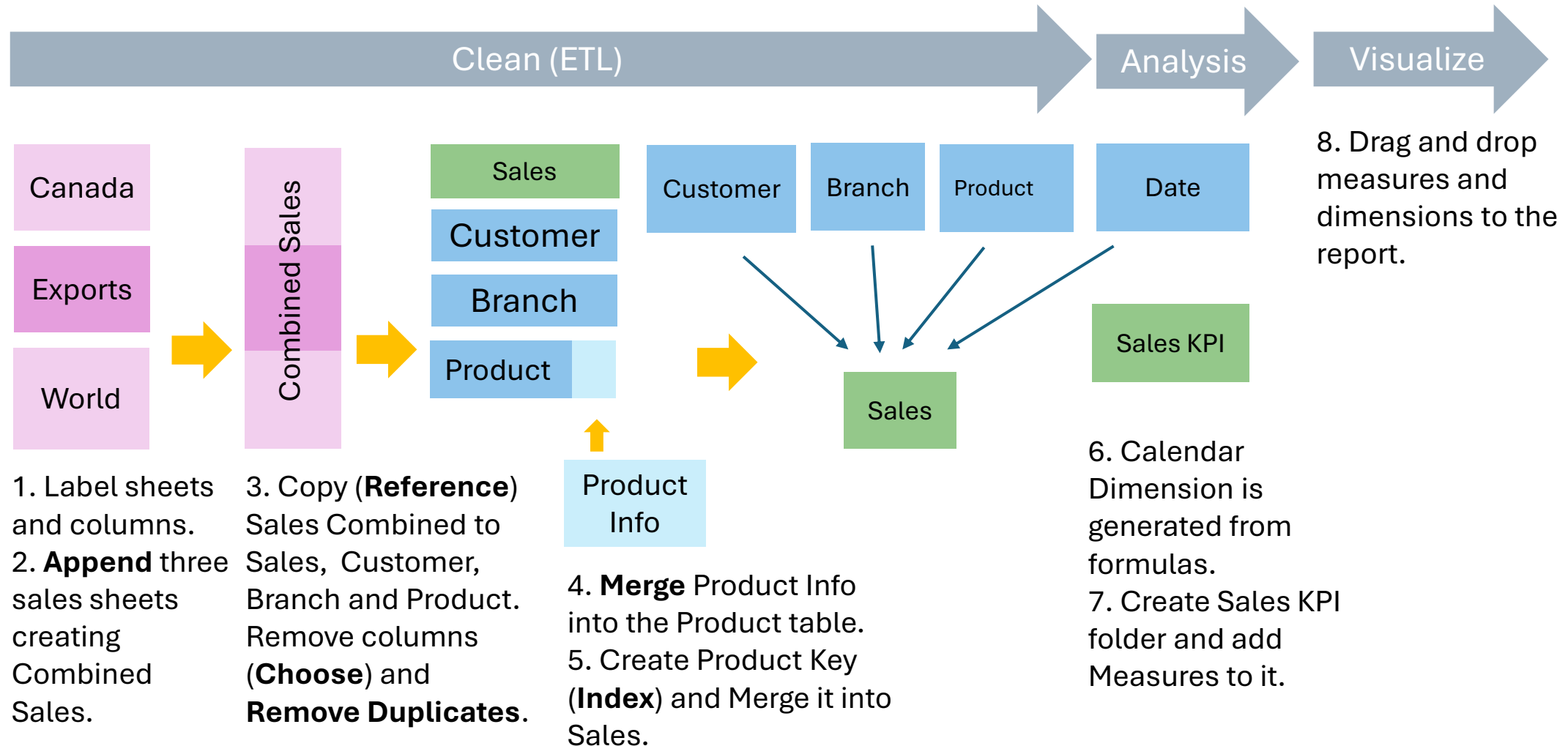


Unpivot

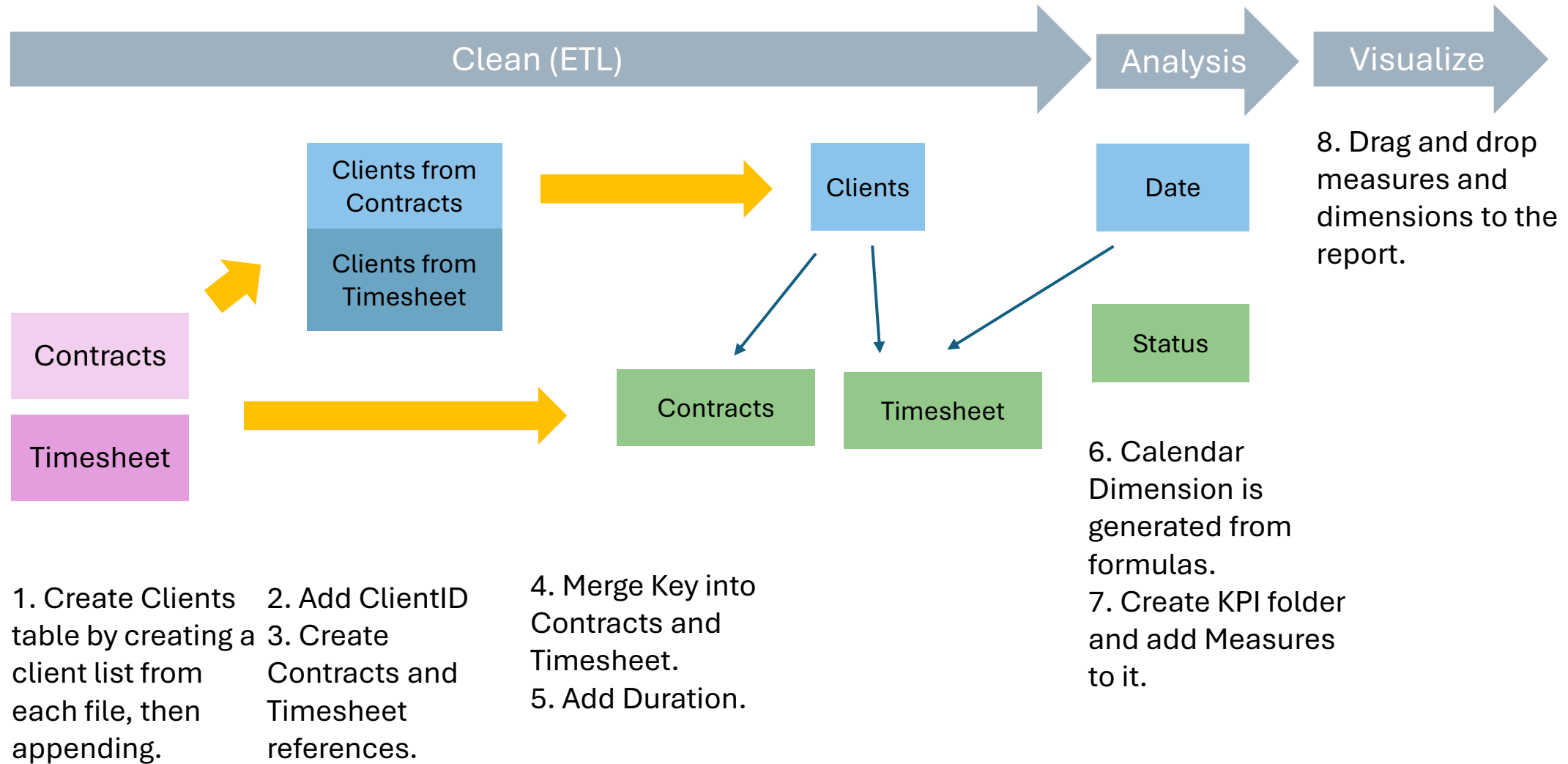


Becomes a
Fact table or
Flat Table!

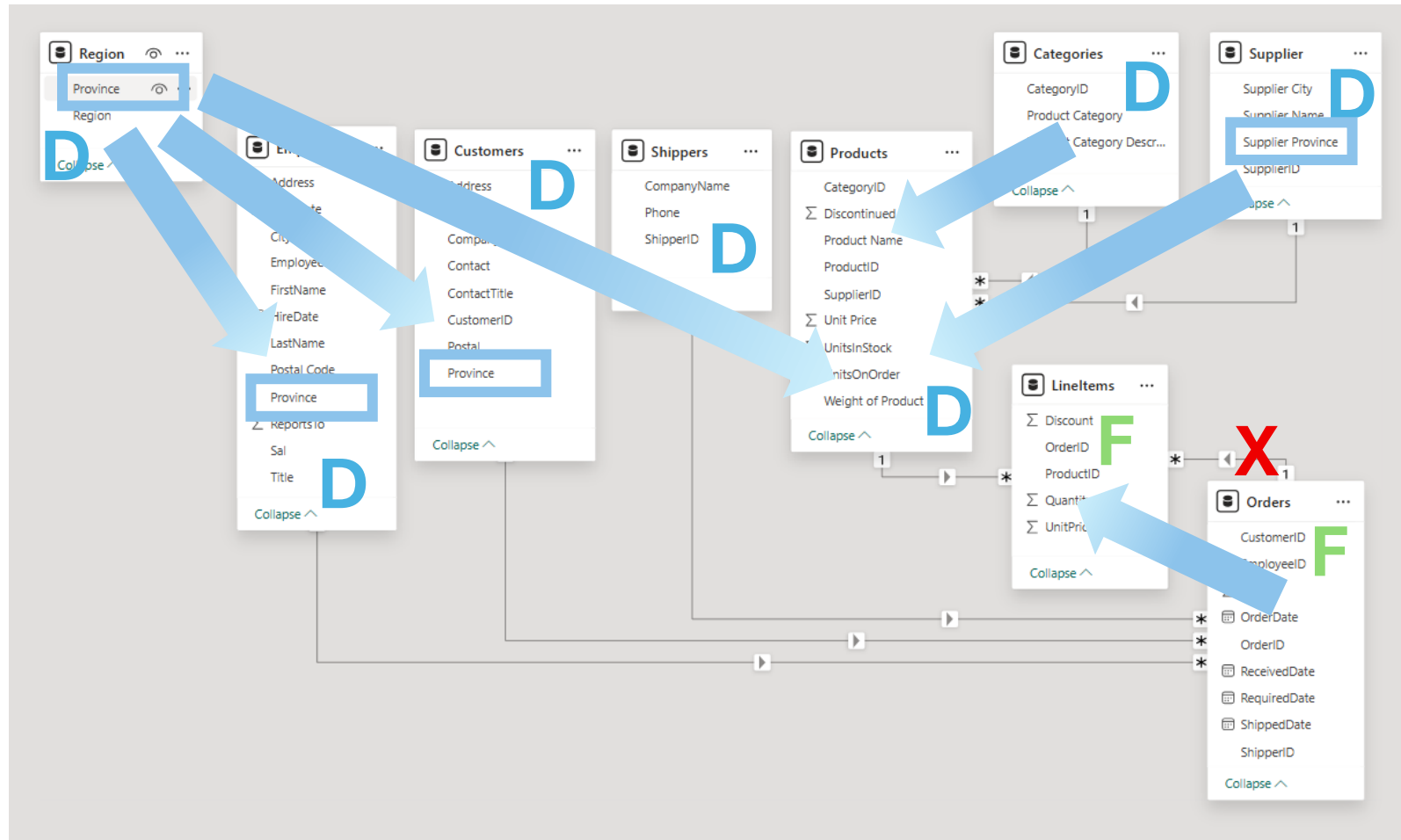
A Maple Company.xlsx



Timesheet.xlsx



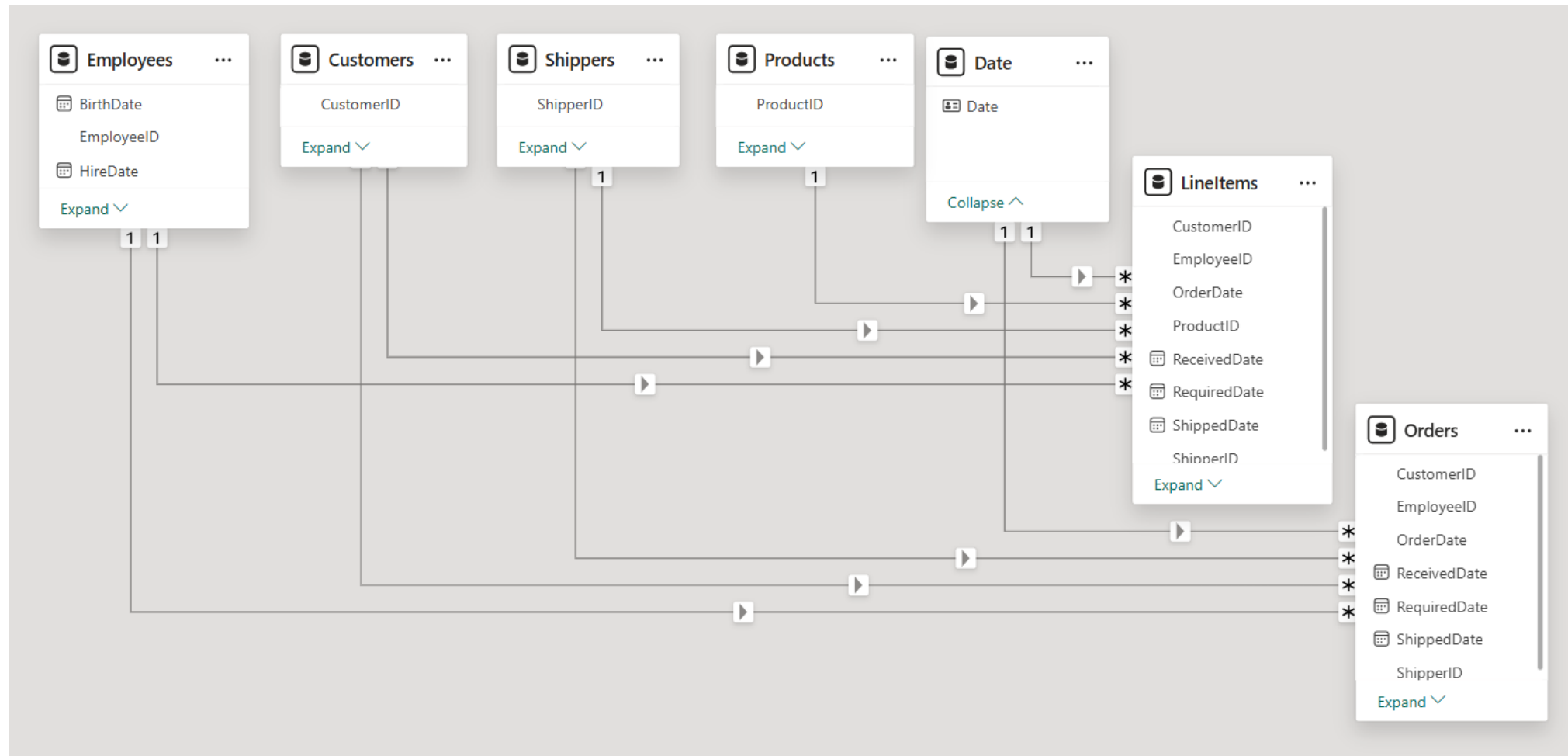
Northern Lights.xlsx



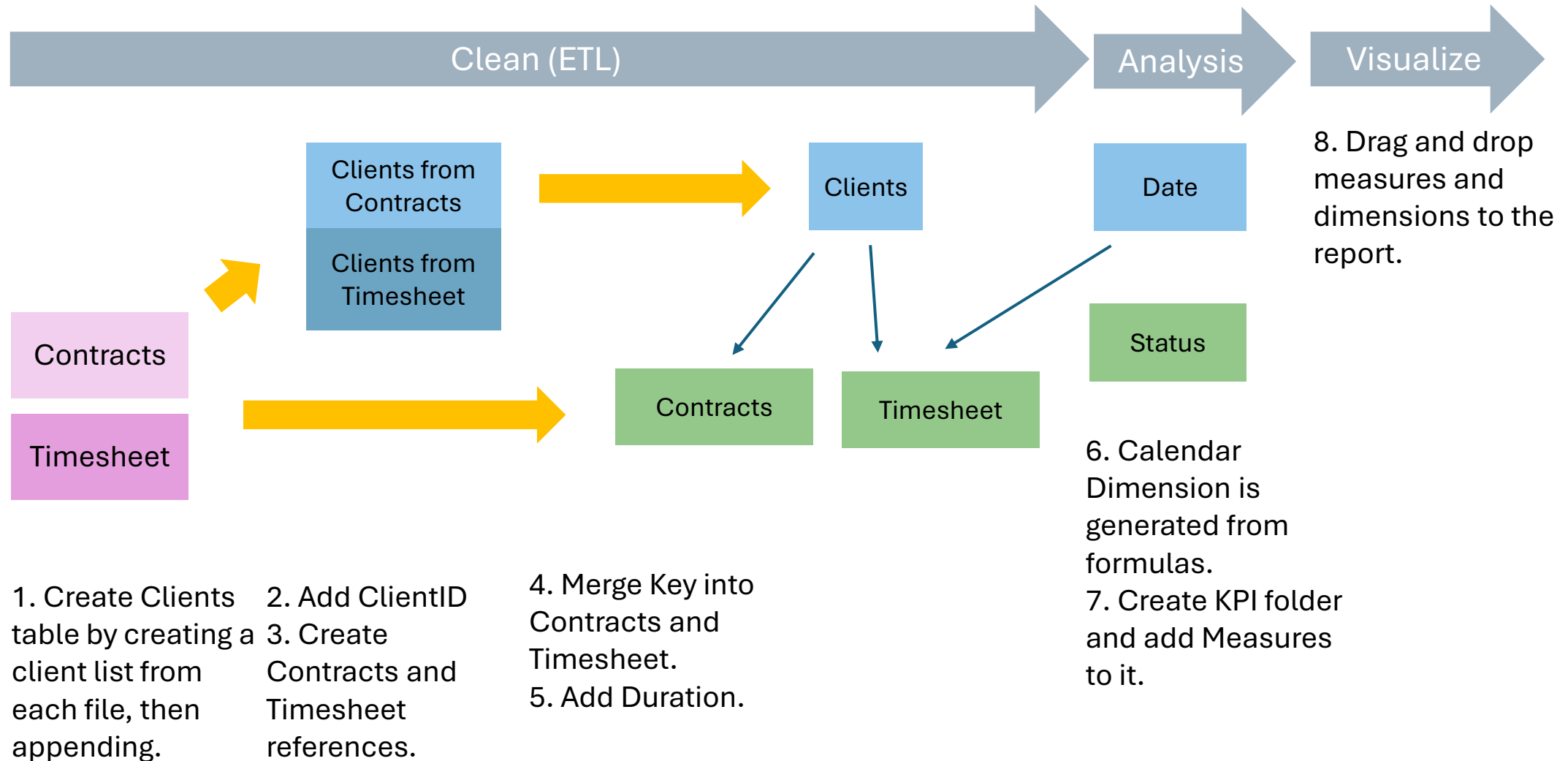
Six Merges:

Products <- Suppliers
Products <- Categories
Employees <- Region
Customers <- Region
Products <- Region
LineItems <- Orders

Northern Lights Completed



Budget.xlsx



Combine Data

Activity	Day	Person ID	Activity	Day	Person ID
Push up	Jan 4	1	Dance	Feb 4	2
Dance	Jan 7	1	Hike	Feb 15	2
Cook	Jan 9	3	Dance	Feb 20	3



Activity	Day	Person ID
Push up	Jan 4	1
Dance	Jan 7	1
Cook	Jan 9	3
Dance	Feb 4	2
Hike	Feb 15	2
Dance	Feb 20	3

Product ID	Product	Category ID	Category ID	Category
1	Cheese	4	4	Dairy
2	Rice	5	5	Dry Goods
3	Lentils	5	6	Produce



Product ID	Product	Category ID	Category
1	Cheese	4	Dairy
2	Rice	5	Dry Goods
3	Lentils	5	Dry Goods

Left Outer type merge.

Allocation

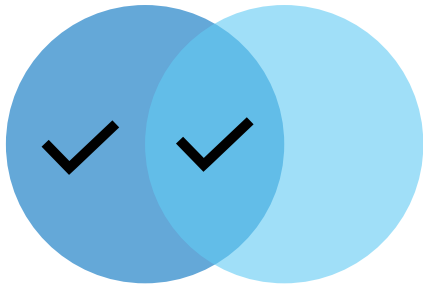
Orders		
Order ID	Date	Freight
1	Jan 1	30
2	Jan 5	40
3	Jan 10	55

LineItems					X	?	?	?
Order ID	Product	Quantity	Unit Price	Weight	Freight	Freight	Freight	Freight
1	Apples	5	1.20	300	30	10	5	5.29
1	Oranges	5	1.35	400	30	10	5	7.06
1	Bananas	20	0.75	250	30	10	20	17.65
2	Peaches	5	0.90	190	20	20	20	20
2	Bananas	5	0.75	250	20	20	20	20

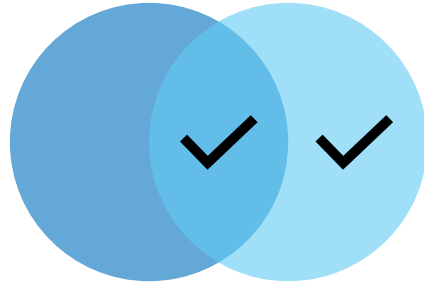
The LineItems is at a finer **Grain** than the Orders table.

Freight can be **Allocated** based on the number of Lines within the Order, the Total Quantity within the Order or by Total Weight of the order.

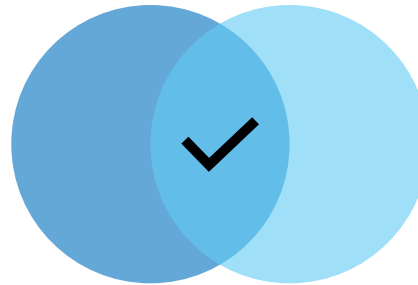
Join Types



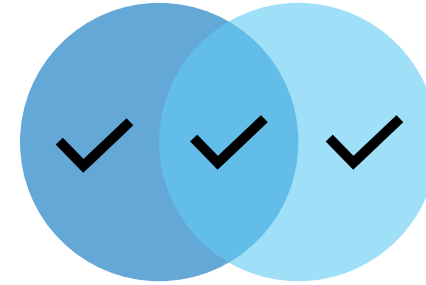
Left Outer



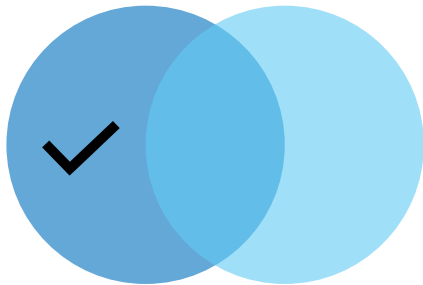
Right Outer



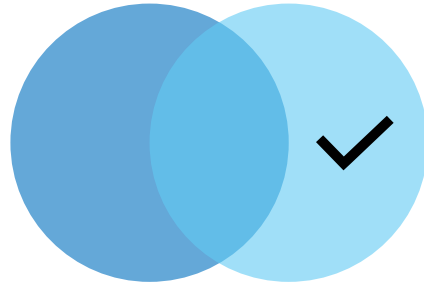
Inner



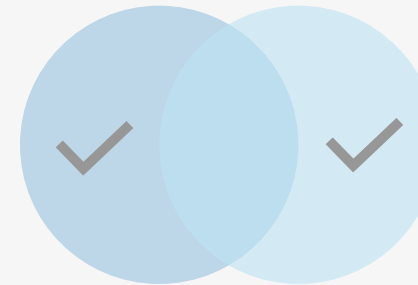
Full Outer



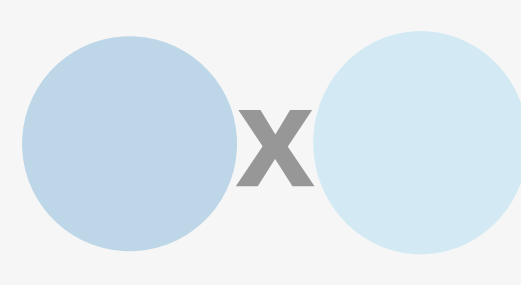
Left Anti



Right Anti



Outer Exclusive



Cartesian Product

DAX Cheat Sheet

Single Column	Expression	Date and Time	Advanced	Shortcuts
Sum Max, Min Average Count	Sumx Maxx, Minx Averagex Countx	CalendarAuto Year, Quarter Month, Day Hour, Minute Second Format Weekday DateDiff EDate Today, Now WeekNum DatesBetween	GenerateSeries DataTable {{ SelectColumns Distinct Values Summarize Filter SummarizeColumns Union	shift {enter} new line control +- font control [] tab selected control / comment selected control d highlight next control shift L highlight all alt up/down move selected control j formula bar alt shift up/down copy line control shift enter insert below control space IntelliSense French Keyboard [= Alt Gr [] Alt Gr] or Alt Gr 9 Alt 91 or Alt 93
Intermediate	Assorted		Text	
If, Coalesce Switch isBlank Related Calculate All Filter	CountRows DistinctCount Divide &, &&, Int Var, Return		Find, Left, Right, Len, Lower, Upper, Trim, Substitute, Replace	

DAX Expressions

Diagram illustrating the components of a DAX expression:

Name **Assignment Operator** **Computation**

Total Sales = SUMX(Sales, Sales[Quantity]*Sales[Unit Price])

Speed of Service = DATEDIFF(Sales[Invoice Date], Sales[Service Date], DAY)

Average Speed of Service =
AVERAGEX(
Sales,
DATEDIFF(
Sales[Invoice Date],
Sales[Service Date],
DAY
)
)

Measure

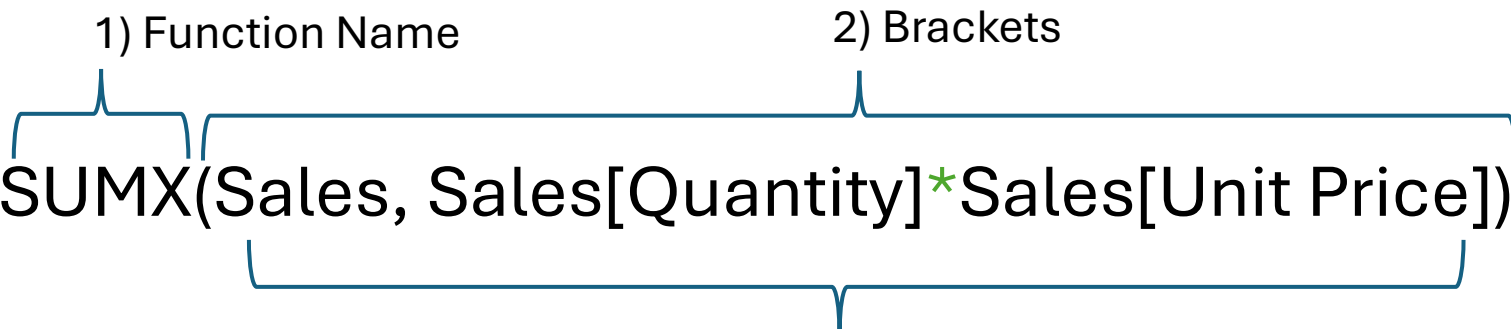
**Calculated
Column**

Functions and Operators

1) Function Name 2) Brackets

Total Sales = SUMX(Sales, Sales[Quantity]*Sales[Unit Price])

3) Arguments are comma-separated



Total Sales = SUM(Sales[Amount])

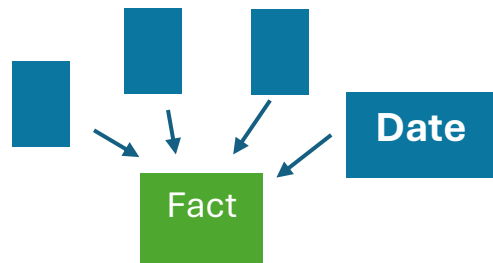
Total Transactions = COUNTROWS(Sales)

Total Invoices = DISTINCTCOUNT(Sales[Invoice No])

Largest Sale= MAX(Sales[Amount])

Location = Customers[Address] & ", " & Customers[City] & ", " & Customers[Country]

Date Dimensions



```
Date = CALENDARAUTO()
```

```
Year = year([Date])
```

```
Q = Quarter([Date])
```

```
Month = format([Date], "mmm")
```

```
Mont# = month([Date])
```

```
Date =
```

```
ADDCOLUMNS (
```

```
    CALENDARAUTO( )
```

```
    , "Year", format([Date], "YYYY")
```

```
    , "Quarter", format([Date], "Q")
```

```
    , "Month", format([Date], "M")
```

```
    , "Month#", month([Date])
```

```
)
```

```
Date = CALENDAR(DATE(2017, 01, 01), DATE(2018, 12, 31))
```

```
=List.Dates(#date(2017,01,01), 365*2, #duration(1,0,0,0)) // M
```

```
Date =
```

```
var _start = year(min(Sales[Invoice Date]))
```

```
var _stop = year(max(Sales[Invoice Date]))
```

```
var _date = CALENDAR (
```

```
    DATE ( _start, 1, 1 ),
```

```
    DATE ( _stop, 12, 31 )
```

```
)
```

```
return _date
```

```
Date Fiscal = // April 1st Start
```

```
var _start = min(Sales[Invoice Date])
```

```
var _stop = max(Sales[Invoice Date])
```

```
var _date = CALENDAR (
```

```
    if(
```

```
        month(_start) <= 3
```

```
        , DATE(year(_start) - 1 , 4, 1 )
```

```
        , DATE(year(_start), 4, 1 )
```

```
    )
```

```
    , if(
```

```
        month(_stop) <= 3
```

```
        , DATE(year(_stop), 3, 29 )
```

```
        , DATE(year(_stop) + 1, 3, 29 )
```

```
    )
```

```
)
```

```
return _date
```

Time Intelligence

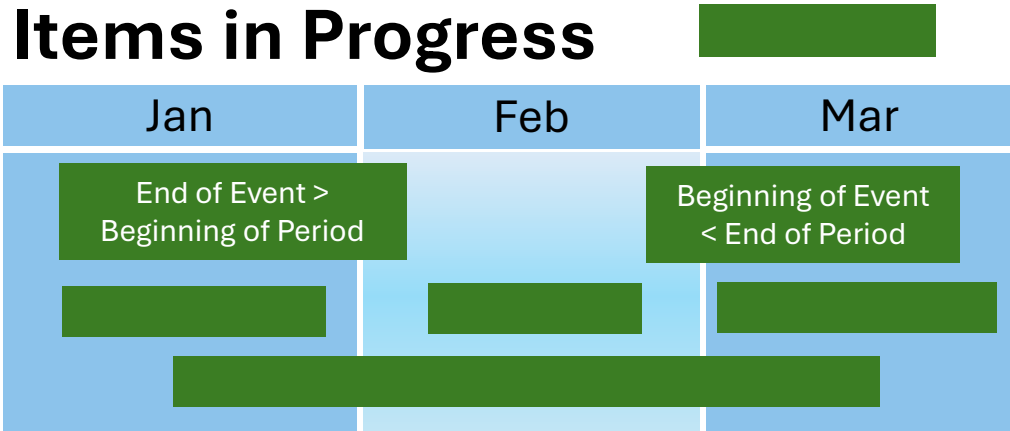
```
Average Speed of Service =
AVERAGEX(
    sales,
    DATEDIFF(
        Sales[ShippedDate],
        Sales[ReceivedDate],
        DAY
    )
)

Items in Progress =
VAR _periodStart = MIN('calendar'[Date])
VAR _endperiodEnd = MAX('calendar'[Date])
VAR _result =
    CALCULATE(
        SUM(Sales[Quantity])
        ,Sales[OrderDate] <= _endperiodEnd
        ,Sales[ShippedDate] > _periodStart
        || ISBLANK(Sales[ShippedDate])
        ,ALL('calendar')
    )
RETURN _result
```

Speed of Service

Distance in Days between two dates

Items in Progress



Activity ID	Activity	Start	Stop	Reps	Person ID	Location ID
1	Push up	Jan 4	Feb 4	4	1	2
2	Dance	Feb 27	Mar 25	10	1	1
3	Cook	Jan 5	Jan 27	15	3	1
4	Push up	Feb 10	Feb 20	4	1	2
5	Dance	Mar 5	Mar 25	10	1	1
6	Cook	Jan 15	Mar 20	15	3	1

Sharing Reports

Power BI Desktop



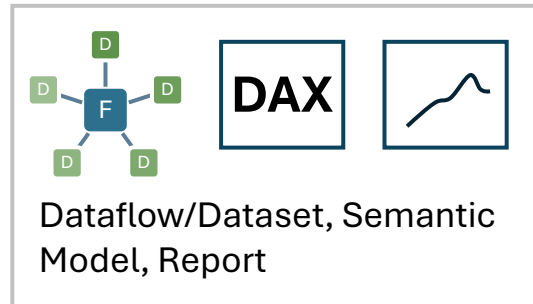
- ✓ PBIX
- ✓ PDF
- ✓ Snip

File/Save As/PBIX: email share,
OneDrive, SharePoint

File/Export/PDF

Snip, Hijack, Prt Sc: Copy/Paste
etc.

Power BI Service



Benefits

Scheduled Refresh
Access Control
Row Level Security
Deployment Pipeline

- ✓ Web, Print
- ✓ Power Point
- ✓ Workspaces
- ✓ Apps, Intranet
- ✓ Dashboards
- ✓ Scorecards, Alerts

Excel and Power BI

Excel Old School

Storage/Manipulation

Excel Formulas

VBA (Visual Basic for Applications, Macros)

SQL (Structured Query Language)

Excel Modern

M (Mashup/Model, Power Query)

DAX (Data Analysis Expressions, Power Pivot)

Power BI

M (Mashup/Model, Power Query)

DAX (Data Analysis Expressions, Power Pivot)

Improved publishing and report sharing

More slick visuals



generalBI

The Definitive Introduction to Power BI Desktop

Darcy Whyte

Instructor



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questions.

Please let me know how the
pace is for you.



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