



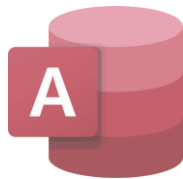
**Power BI**



Power BI



Excel



Access



Power  
Automate



Power Apps



SQL

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# Darcy Whyte

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L1: The Definitive Introduction to Power BI Desktop

L2: Power BI Practitioner

L3: Power BI Master

Power BI Finance

Power BI Process Management

Power BI Risk Management

Power BI Time Intelligence

...



**Power BI**

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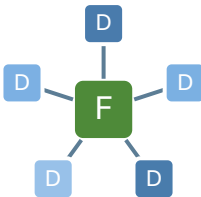
# What is Power BI?



Data



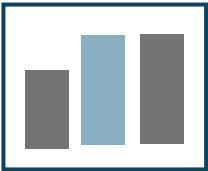
Clean



Analyze



Visualize



Share



Insight

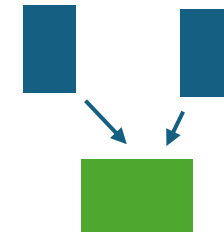


# Data

Person Dimension		
Person ID	First	Cell
1	Yoko	123
2	Cher	567
3	Ned	777

Activity Fact					
Activity ID	Activity	Day	Rep	Person ID	Loc ID
1	Push up	Jan 4	4	1	2
2	Dance	Jan 7	10	1	1
3	Cook	Jan 9	15	3	1

Location	
Loc ID	Name
1	Home
2	Work
3	Park



Normalized

Table, Record, Field, Relationship, One to Many, Snowflake, Entities, Efficient Storage/Retrieval  
Professionally built systems tend to use normalized data (snowflake).

Activity Flat	
First	Cell
Yoko	123
Yoko	123
Ned	777

Typically created by office workers and system extracts.

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

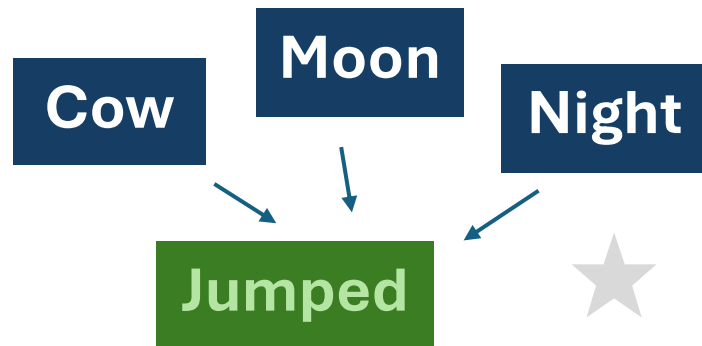
A summary, often created with Pivot.

Denormalized

# Dimension and Fact Tables



The **cow**  
**jumped** over  
the **moon**.



## Dimension

Categories, Reference  
Tables, Descriptive  
Context



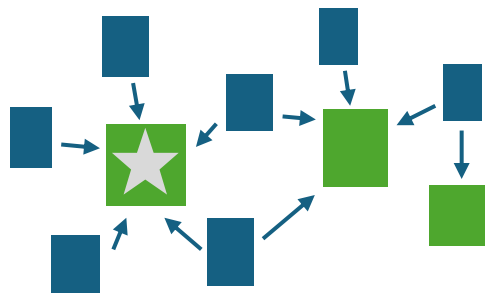
## Fact

Quantitative data about a  
process, measurements,  
observations, transactions

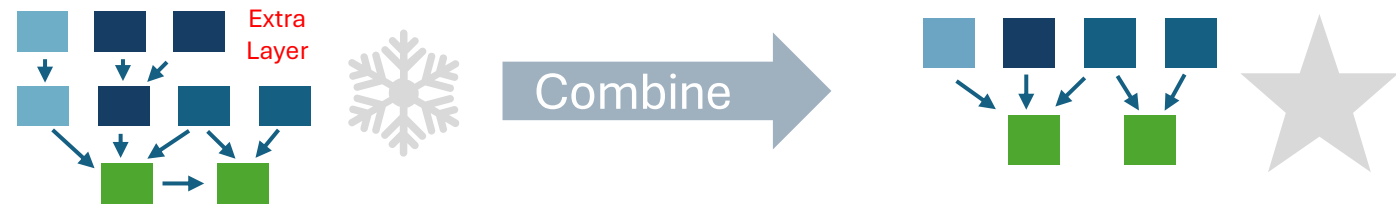
# Dimensional Modelling

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

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



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



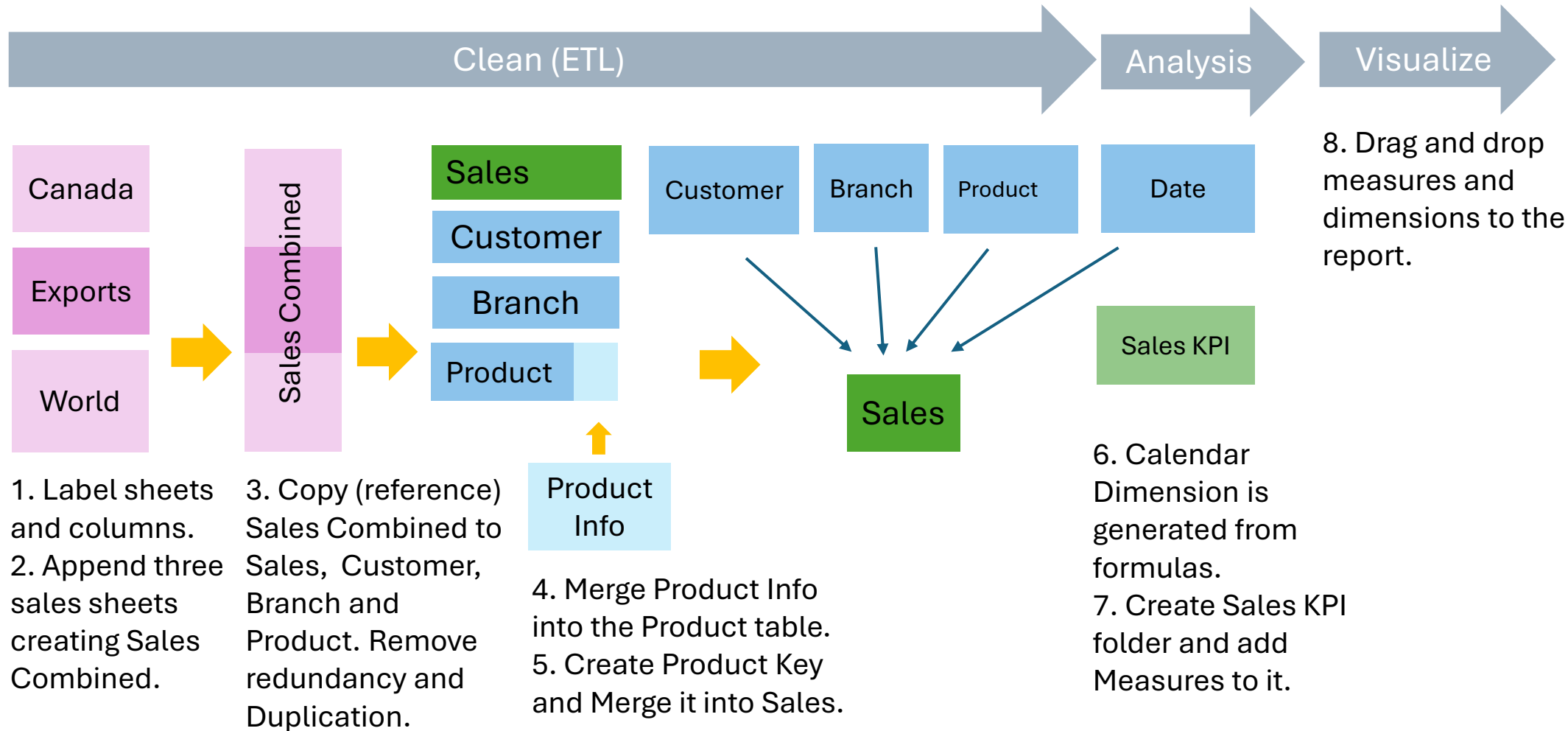
**Flat Files:** Normalize by breaking tables apart.



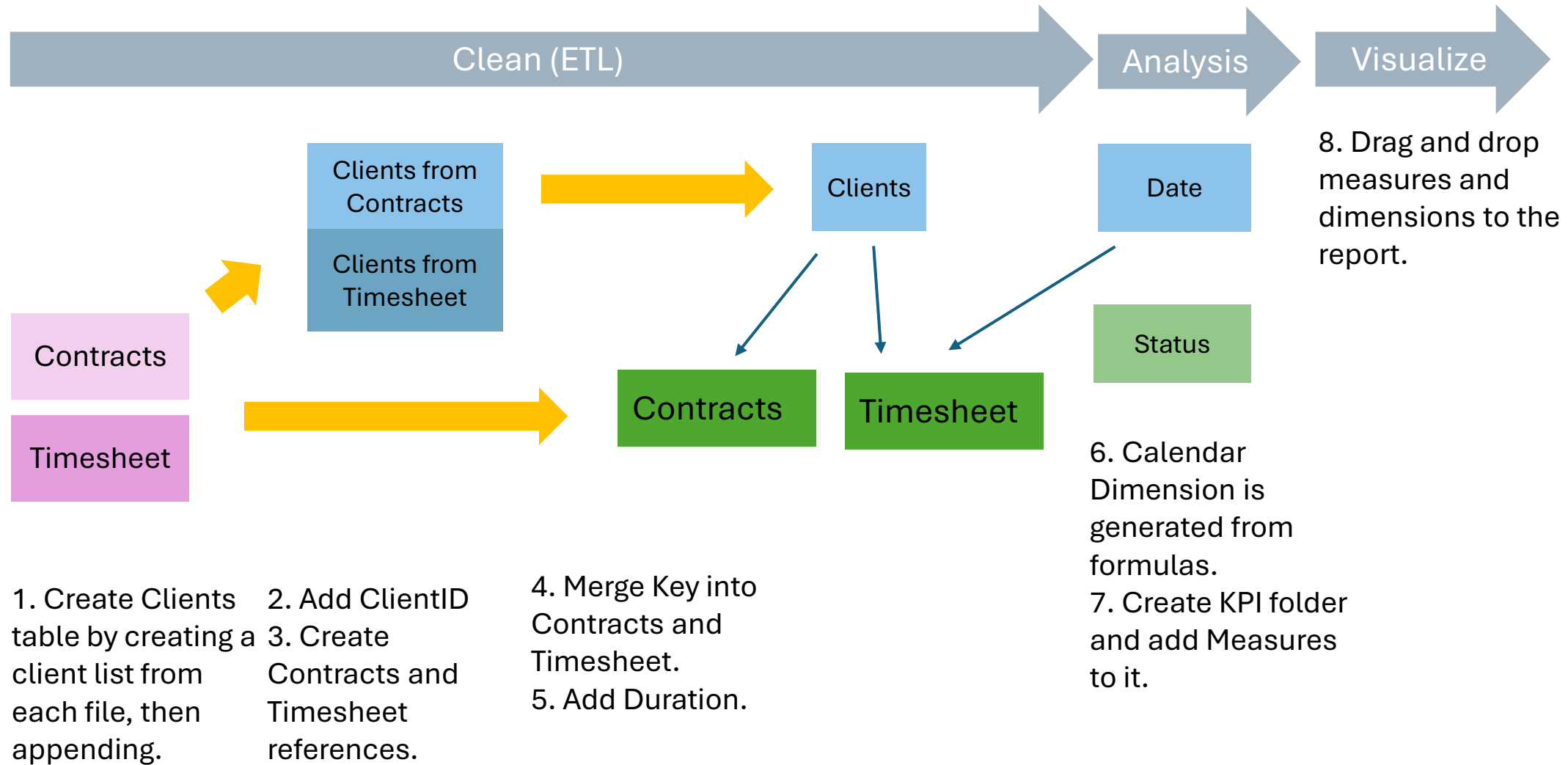
**Cross Tabs:** Unpivot to become a fact or flat table.



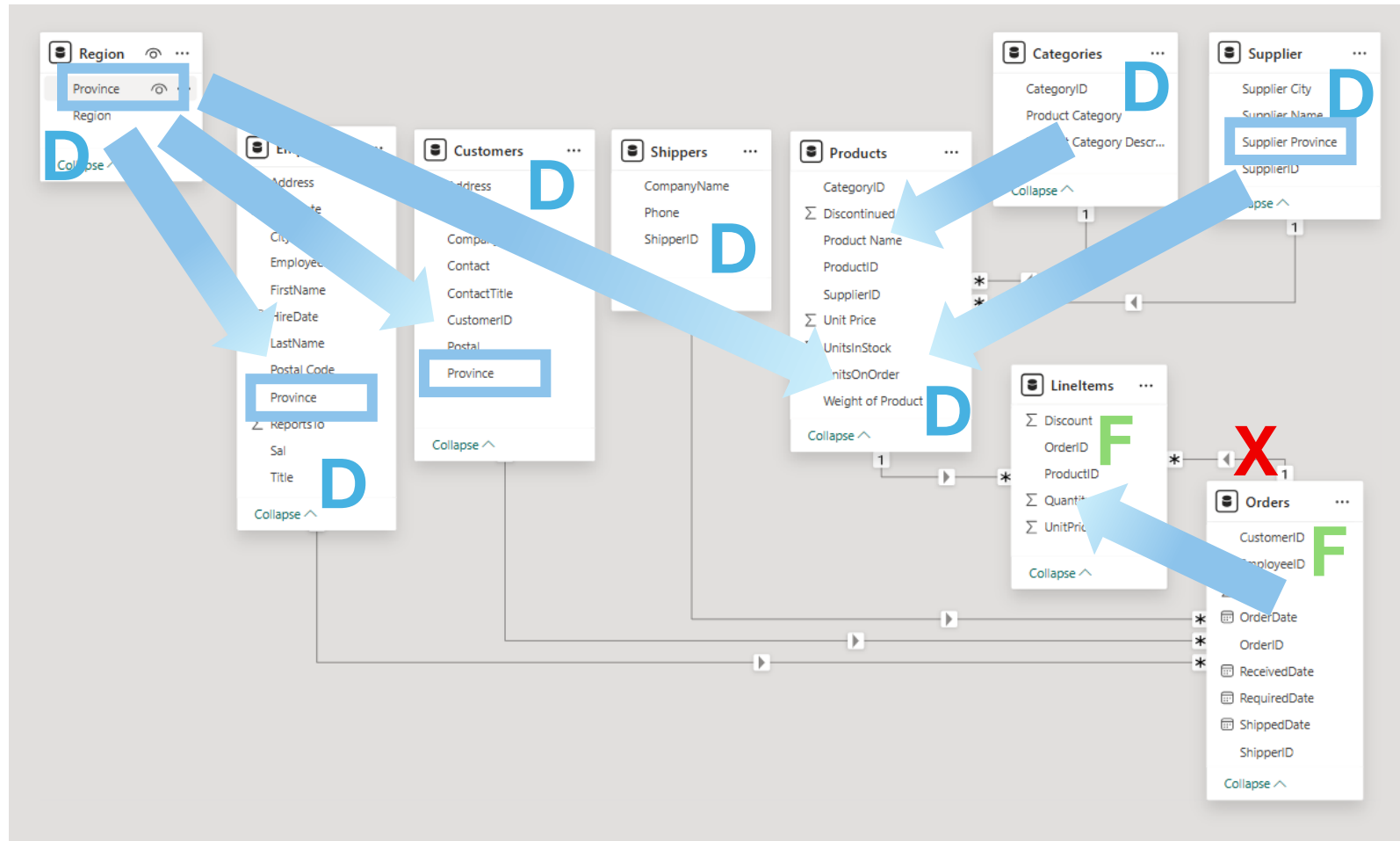
# A Maple Company.xlsx



# Timesheet.xlsx



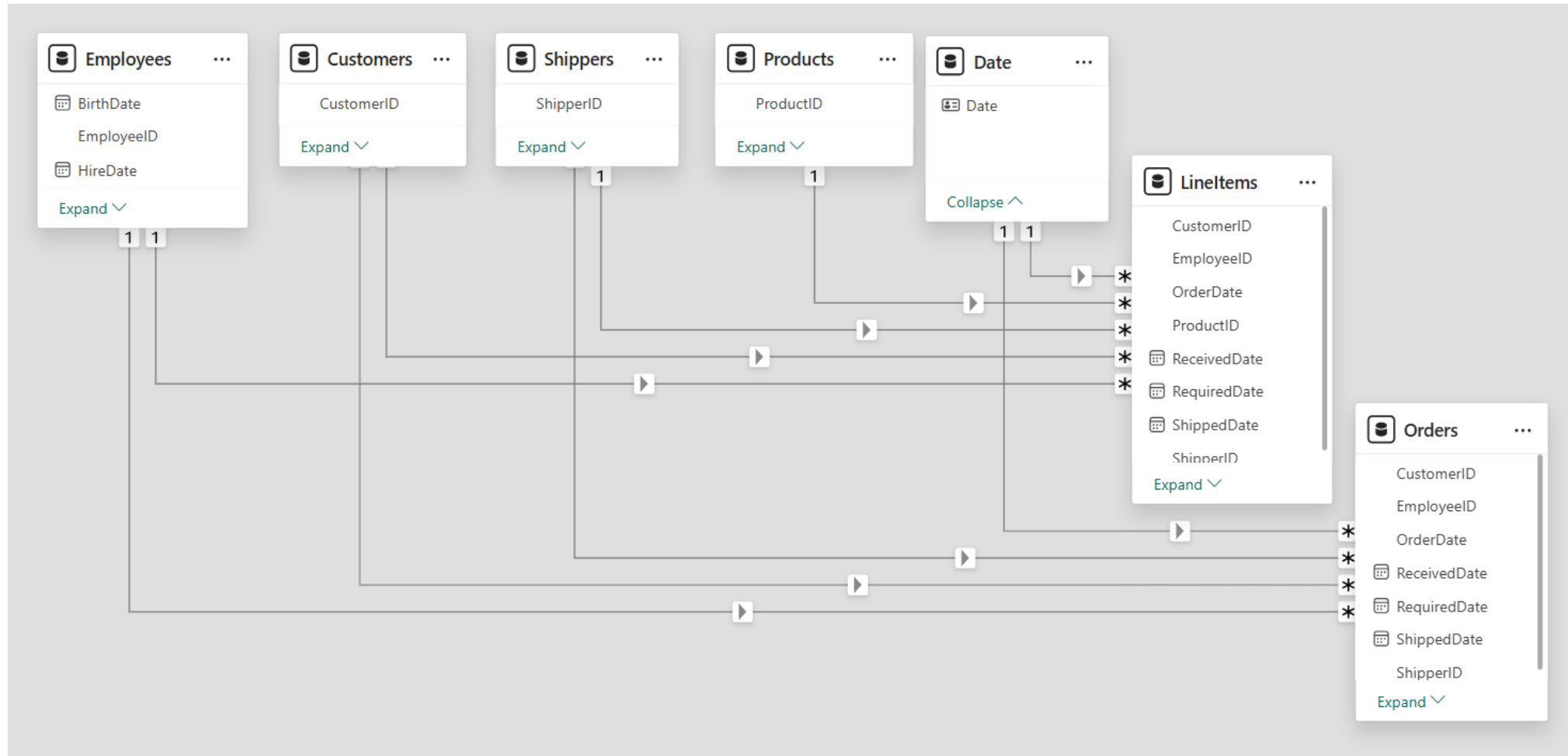
# Northern Lights.xlsx



## Six Merges:

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

# Northern Lights Completed



# Combine Data

Activity	Day	Person ID
Push up	Jan 4	1
Dance	Jan 7	1
Cook	Jan 9	3

Activity	Day	Person ID
Dance	Feb 4	2
Hike	Feb 15	2
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

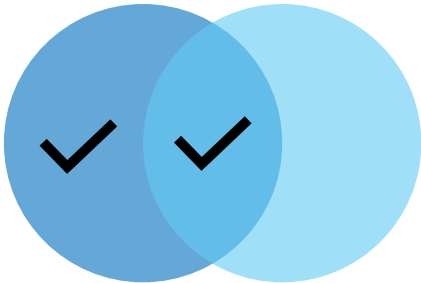
Product ID	Product	Category ID
1	Cheese	4
2	Rice	5
3	Lentils	5

Category ID	Category
4	Dairy
5	Dry Goods
6	Produce

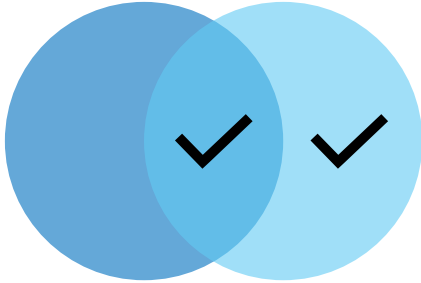


Product ID	Product	Category ID	Category
1	Cheese	4	Dairy
2	Rice	5	Dry Goods
3	Lentils	5	Dry Goods

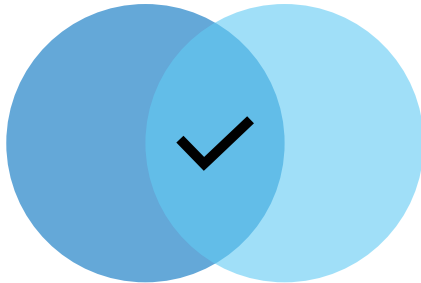
# Join Types



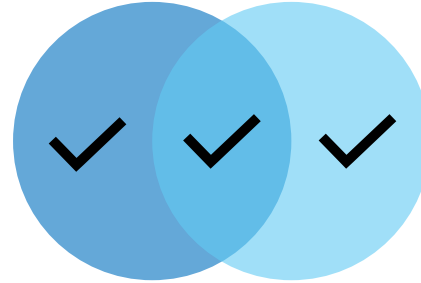
Left Outer



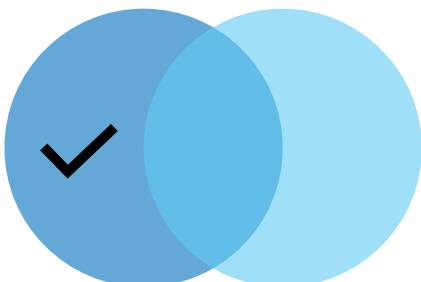
Right Outer



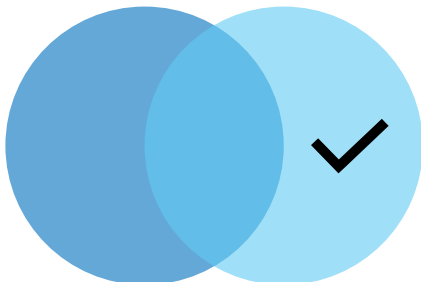
Inner



Full Outer



Left Anti



Right Anti

Outer Exclusive

Cartesian Product

# DAX Cheat Sheet

## Single Column

Sum  
Max, Min  
Average  
Count

## Expression

Sumx  
Maxx, Minx  
Averagex  
Countx

## Date and Time

CalendarAuto  
Year, Quarter  
Month, Day  
Hour, Minute  
Second  
Format  
Weekday  
DateDiff  
EDate  
Today, Now  
WeekNum  
DatesBetween

## Text

Find, Left, Right,  
Len, Lower,  
Upper, Trim,  
Substitute,  
Replace

## Shortcuts

shift {enter} new line  
control [ ] tab selected  
control / comment selected  
alt up/down move selected  
control d highlight next  
control shift L highlight all  
control +/- font size  
control j open close 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

## Intermediate

If, Coalesce  
Switch  
isBlank  
Related  
Calculate  
All  
Filter

## Assorted

CountRows  
DistinctCount  
Divide  
&, &&, ||  
Int  
Var, Return

# DAX Expressions

Name      Assignment Operator      Computation

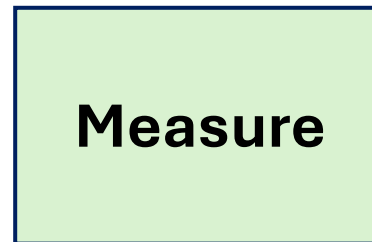
Total Sales = SUMX(Sales, Sales[Quantity]\*Sales[Unit Price])

A diagram illustrating the components of a DAX expression. The expression 'Total Sales = SUMX(Sales, Sales[Quantity]\*Sales[Unit Price])' is shown. Brackets above the text identify three parts: 'Name' (Total Sales), 'Assignment Operator' (=), and 'Computation' (SUMX(Sales, Sales[Quantity]\*Sales[Unit Price])).

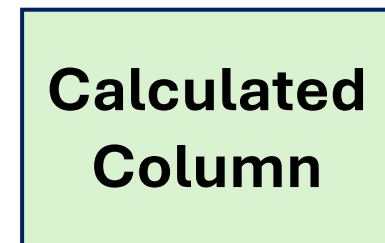
Speed of Service = DATEDIFF(Sales[Invoice Date], Sales[Service Date], DAY)

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

**Measure**

A green rectangular box with a black border containing the word 'Measure' in bold black text. A blue line points from the 'Average Speed of Service' expression to this box.

**Calculated Column**

A green rectangular box with a black border containing the words 'Calculated Column' in bold black text. A blue line points from the 'Speed of Service' expression to this box.

# 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])

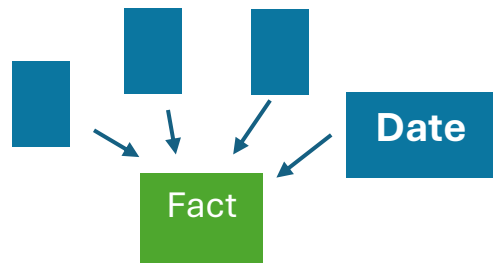
Total Transactions = COUNTROWS(Sales)

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

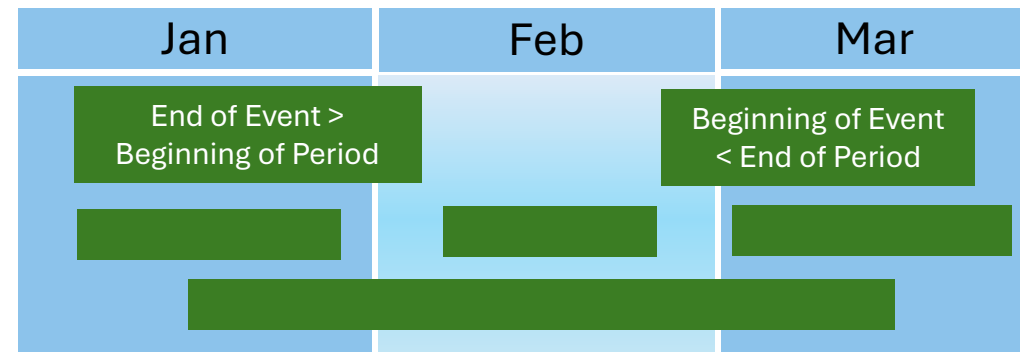
```
Average Speed of Service =  
AVERAGEX(  
    sales,  
    DATEDIFF(  
        Sales[ShippedDate],  
        Sales[ReceivedDate],  
        DAY  
    )  
)
```

```
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

# 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.

# Sharing Reports

## Power BI Desktop



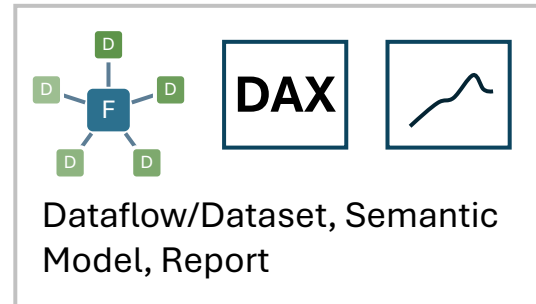
- ✓ PBIX
- ✓ PDF
- ✓ Snip

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

File/Export/PDF

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

## Power BI Service



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

### Benefits

Scheduled Refresh  
Access Control  
Row Level Security  
Deployment Pipeline



# Power BI Desktop Introduction

**Instructor**  
**Darcy Whyte**

