
Build Super Tables From Operational Data

Training Session for Competency

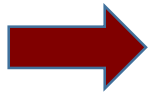
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Agenda:



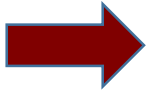
- ☐ **Purpose of the training session.**
- ☐ **Big picture.**
- ☐ **Steps to build super tables.**
- ☐ **Cleanse the data.**
- ☐ **Create aggregate variables.**
- ☐ **Getting help while building tables.**

Purpose:

To give all attendees an understanding of how data tables are built to the depth that anyone can actually set out to build their first super tables.

In a data-driven operation, not everyone needs to have the hands-on skills in building tables, but almost everyone must be able to participate in the running discussion of the issues of data in routine operations.

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There are **three truths** that, once you know of them, will send you down the path to build the super tables you always wanted but could never have

- Almost all operating systems allow data to be extracted in table format—rows and columns—as standard report.

When not,—e.g., status history in computerized maintenance management systems—the IT data specialists can give us an on-demand tool to do so .

- Individual data tables from any one or more systems or sources can be joined into one by any variable they have in common.

Only the data type (e.g., numeric, character) must match—or made to match.

- Bad data is rarely a deal killer:

- **“Cleansing”** the data often neutralizes the flaws.
- Bad data is most often the result of compliance failures in the source operational process—immediate enforcement is the fix.

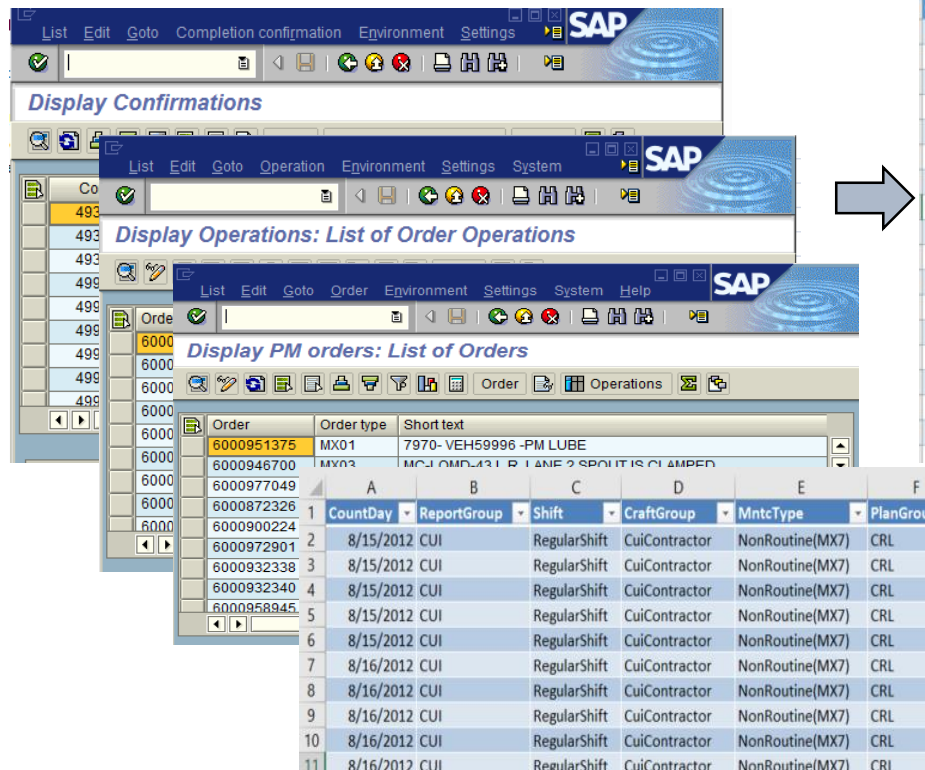
The first day of collecting good data soon becomes weeks, months and years of good data.

Why you would use **MS Access** to do your data work

- Your firm already has rights to Access by virtue of its MS Office license—you only need to request it, if not already installed on all computers.
- MS Excel and MS Access together have the functionality to build super tables the same way as all table-building software.
- All knowledge and skills learned to build super tables in Excel and Access transfer to other software (e.g., Tableau).
- Because standard query language (SQL) runs in the background of Access. . .
 - The need for SQL skills has been eliminated as an obstacle to incubating table-building skills across an organization.
 - The remaining necessary skills are largely those we all have from doing our current work with Excel and operating systems.

Imagine everyone up and down your halls who normally works with Excel also becoming able to work with data—talk about a power jump!!

The goal is to extract topic-specific data from sources and fabricate a **super table** as required to build one or more specified insight deliverables



The image shows a sequence of SAP screenshots. The top screenshot is 'Display Confirmations'. The middle screenshot is 'Display Operations: List of Order Operations'. The bottom screenshot is 'Display PM orders: List of Orders', which contains a table with 11 rows of order data. An arrow points from this table to the 'super table' on the right.

Order	Order type	Short text
6000951375	MX01	7970-VEH59996-PM LUBE
6000946700	MX03	MCU OMD-431 B LANE 2 SPOUT IS CLAMPED
6000977049		
6000872326		
6000900224		
6000972901		
6000932338		
6000932340		
6000958945		

	A	B	C	D	E	F
	CountDay	ReportGroup	Shift	CraftGroup	MntcType	PlanGroup
1						
2	8/15/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
3	8/15/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
4	8/15/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
5	8/15/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
6	8/15/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
7	8/16/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
8	8/16/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
9	8/16/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
10	8/16/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL
11	8/16/2012	CUI	RegularShift	CuiContractor	NonRoutine(MX7)	CRL

Cost center	OrderNoText	StepNoText	MntcType	CraftTy
70160	6000707049: MA-DCU-PU8818 Install max impeller & 15h	180; DCU PU8818-JSA & INSTALL PUMP	Proactive	Machini
70160	6000707049: MA-DCU-PU8818 Install max impeller & 15h	30; DCU PU8818-JSA & LO/TO MOTOR	Proactive	Electric
70160	6000707049: MA-DCU-PU8818 Install max impeller & 15h	60; DCU PU8818-OPERATION TO ENERGIZE MOTOR	Proactive	Machini
70160	6000707049: MA-DCU-PU8818 Install max impeller & 15h	80; DCU PU8818-LO/TO MOTOR	Proactive	Electric
70160	6000707049: MA-DCU-PU8818 Install max impeller & 15h	80; DCU PU8818-LO/TO MOTOR	Proactive	Electric
70160	6000812732: MC-DCU-Pull/Repair Dump Reg. on Jet Pump	40; DCU-Repair Dump Reg-INSTALL	Reactive	MultCra
70160	6000812732: MC-DCU-Pull/Repair Dump Reg. on Jet Pump	50; DCU-Repair Dump Reg-RECONNECT	Reactive	Instrum
70160	6000860441: MC-buff TK1830 to add nozzles	27; DCU-TK1830-CENTER PUNCH AND BUFF AREAS O	Proactive	MultCra
70160	6000860441: MC-buff TK1830 to add nozzles	27; DCU-TK1830-CENTER PUNCH AND BUFF AREAS O	Proactive	MultCra
70160	6000915285: MC-DCU-Bridge Crane AC unit installation	70; Crane to assist Electricians	Reactive	Electric
70160	6000915285: MC-DCU-Bridge Crane AC unit installation	70; Crane to assist Electricians	Reactive	Electric
70160	6000915285: MC-DCU-Bridge Crane AC unit installation	90; Motiva Inspector	Reactive	Electric
70160	6000926113: EL-DCU-MOV open/close switch replacement	70; EL-DCU-MOV open/close switch replacement	Reactive	Electric
70160	6000926113: EL-DCU-MOV open/close switch replacement	70; EL-DCU-MOV open/close switch replacement	Reactive	Electric
70160	6000929188: IM-DCU-35304 tensionometer no indication	20; M-DCU-35304 tensionometer no indication	Reactive	Instrum
70160	6000929188: IM-DCU-35304 tensionometer no indication	20; M-DCU-35304 tensionometer no indication	Reactive	Instrum
70160	6000937432: MA-DCU-Pu8871seal leaking	130; DCU PU8871- INSTALL PUMP	Reactive	Machini
70160	6000937432: MA-DCU-Pu8871seal leaking	130; DCU PU8871- INSTAL I PUMP	Reactive	Machini

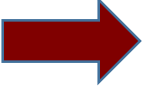
- The “**super table**” does not, cannot and never will exist in any one operating system.
- Building the super table in Excel is too laborious to be practical.

No one table has all needed variables to the envisioned insight deliverables.

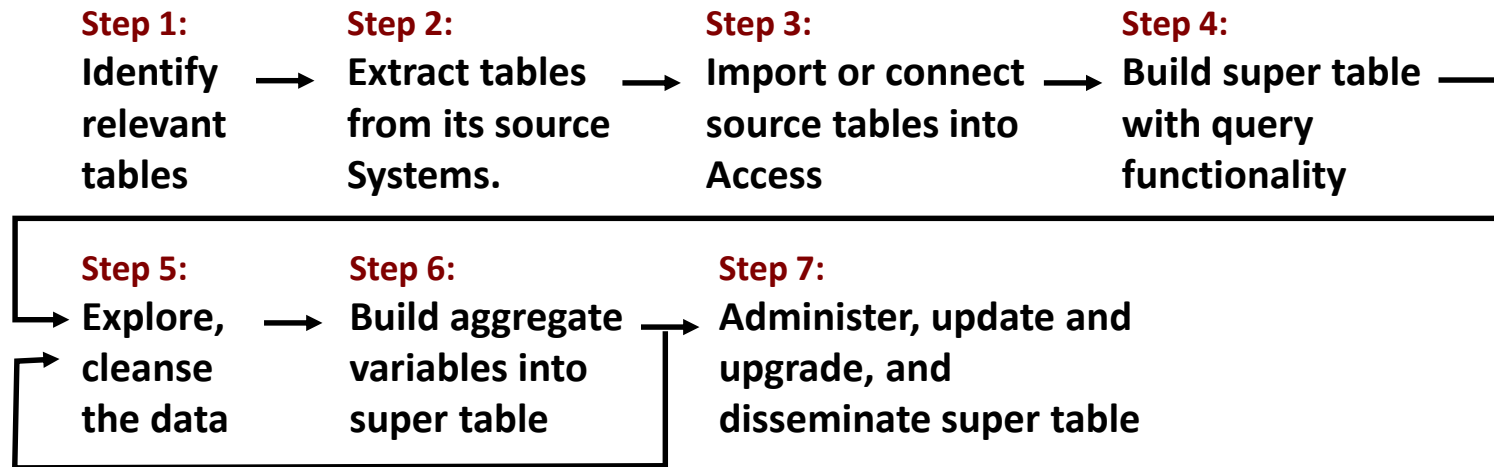
Definitions:

- Variables are columns.
- Cases, as rows, are individual records.

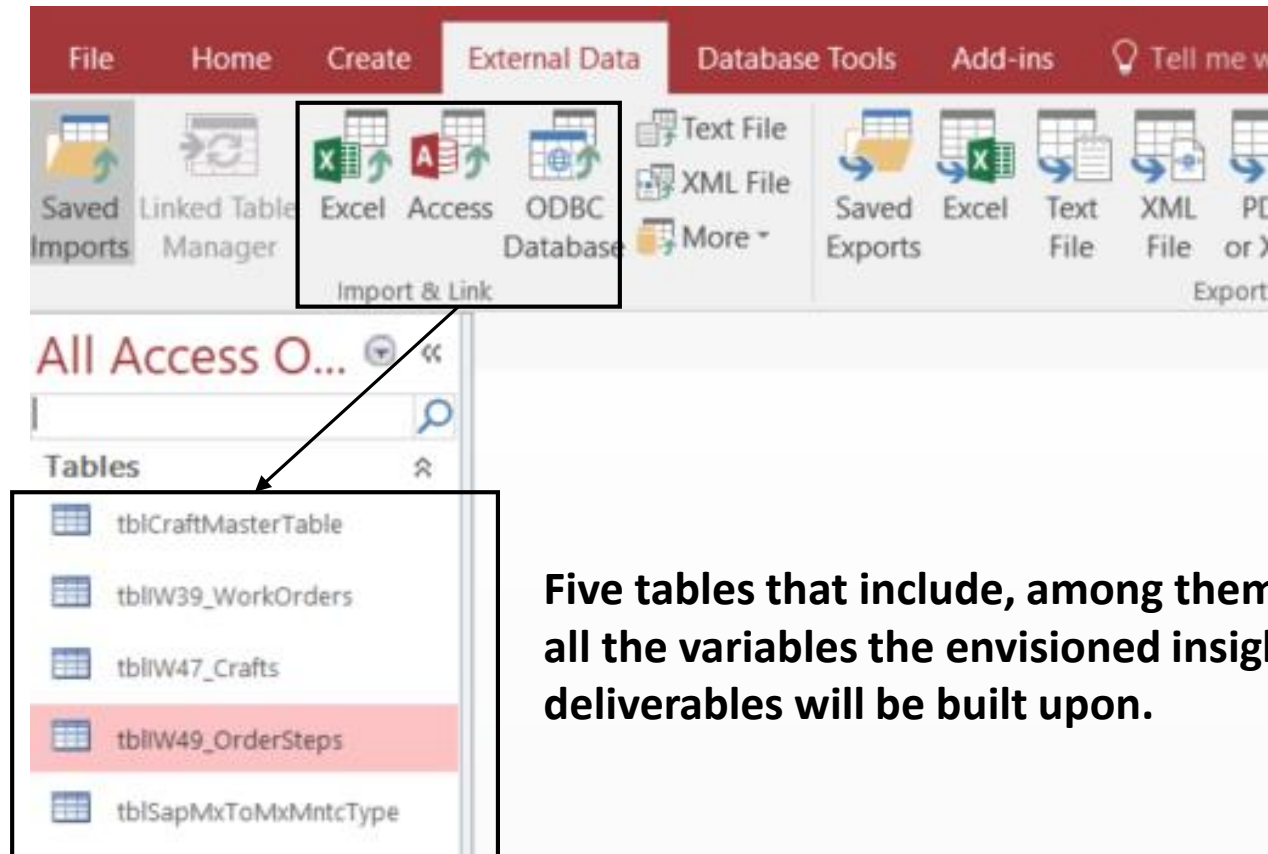
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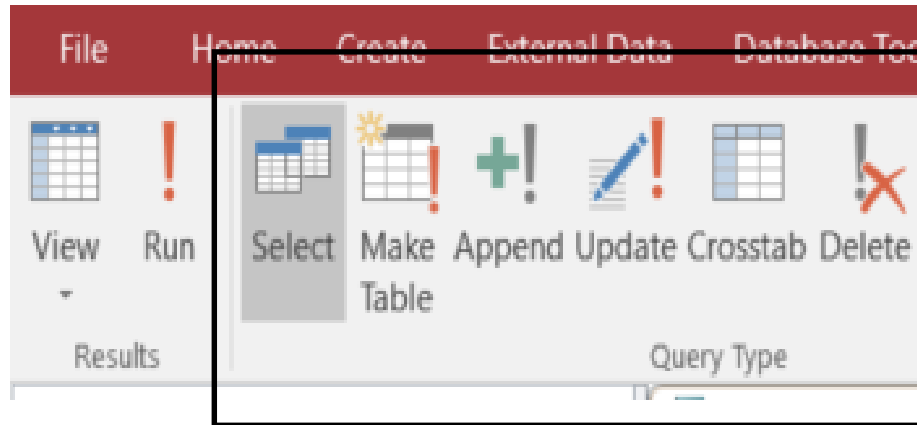
Building a super table takes a standard path



By importing from or connecting to their sources; individual tables are brought into a software—in this case Access—with which to build envisioned super tables



Queries come in types with respect to what they do—the central one being the select query



Type	What it does
Select	Build the super table of interest from one or more subtables.
Make table	Converts a select query to a table such as those pulled into Access.
Append	Adds rows of data to an existing subtable.
Update	Changes cases to variables in a subtable.
Delete	Removes cases to variables in a subtable.
Crosstab	Allows making long tables wide—e.g., a variable of months transformed to twelve months.

With the **select** query, the tables are joined (click and drag) by the variables they have in common; creating a grand table with all the shown imported variables

The screenshot shows the Microsoft Access Design view for a select query named **qryCraftsToOrderSteps**. The query is joined to four source data tables and one translation table. The tables and their fields are as follows:

Table	Fields	Type
tblIW39_WorkOrders	ID, Order, Order type, Short text, Priority, Priority2, Resp cost cntr, MaintActivType, User status, System status, Entered by, Planner group, Cost center, FunctLocation, Total plan cost, Total actcosts, Asset, Work center, Created on, Actual release, Actual start, Main WorkCtr	Source data table (1)
tblIW49_OrderSteps	ID, Order, Confirmation, Operation, Short text, Work center, Work, Actual work, Activity type, Vendor	Source data table (1)
tblIW47_Crafts	ID, Confirmation, Order, Operation, Order type, ActType (act), Actual work, FunctLocation, Employee(s), Personnel no, Actfinish date, Posting date, Planner group, Work ctr (act)	Source data table (1)
tblCraftMasterTable	ID, EmplNo, FullName, CraftSubType, CraftType, ResourceGrp, HRPositionTitle, Level	Source data table (2)
tblSapMxToMxMntcType	ID, Order Type, MntcType, SapDescription	Translation table (2)

Annotations in the image:

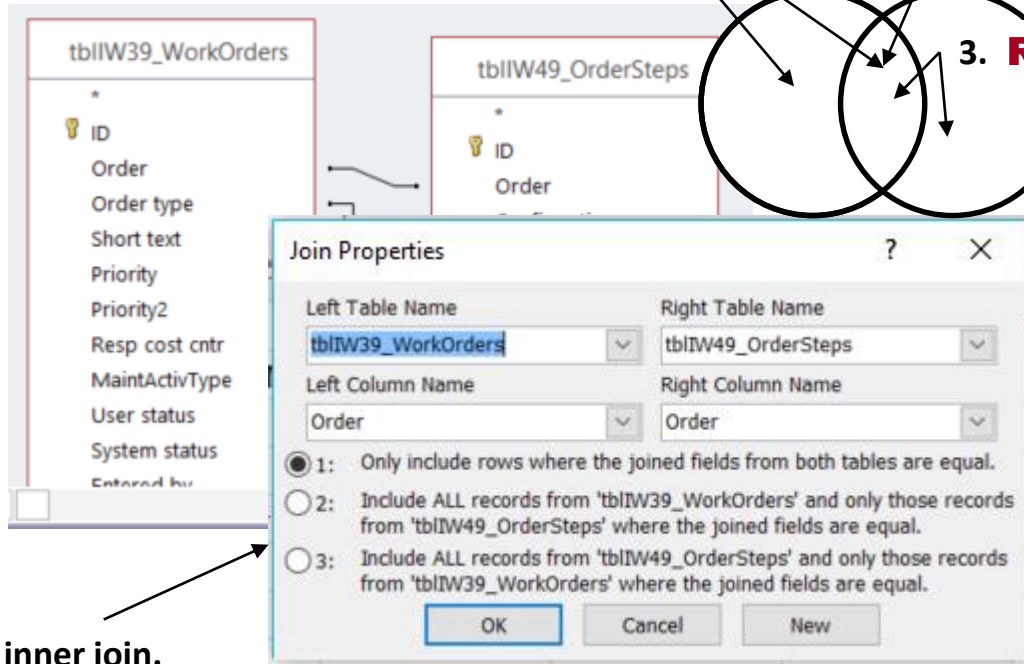
- Given name**: Points to the query name **qryCraftsToOrderSteps** in the top left corner.
- Joined by click and drag**: Points to the join lines connecting the tables.
- ① Source data table**: Points to the source data tables (tblIW39_WorkOrders, tblIW49_OrderSteps, tblIW47_Crafts).
- ② Translation table**: Points to the translation table (tblSapMxToMxMntcType).

Tables can be joined to have four different outcomes—Access allows three, but requires a work-around to get to a fourth

2. **Left Join:** All cases of the Order variable of tblIW39_WorkOrders be returned along with the collateral populated and unpopulated cases in tbl49-OrderSteps.

1. **Inner Join:** Both tables have populated the Order variable

3. **Right Join:** Opposite to left join.



Note:
Default is the inner join.

Suggestion:
Try all to see if you get is what you want.

Notice no reference to a fourth join—outer-join

4. **Outer-join:** Entirety of the Venn diagram. The work-around in Access is to do a right- or left-join and then append to it the empty (null) variable rows to the opposite join.

The created “raw” table can serve many purposes; but we typically shape super tables with respect to the particular insights we seek

Legend of Examples:

- [1] Dragged
- [2] Dragged, Named, Criteria
- [3] Dragged, Criteria
- [4] Named, Create
- [5] Named, Create, Sort

Super table built by click and drag, and expressions.

Become columns to the final super table

Field:	Cost center	OrderNoText: [tblSapMxToMxMntcType]	StepNoText: [tblSapMxToMxMntcType]	MntcType	CraftType	Hours: Actual work	DateComplete: Actfinish date	DaysAftCreatd: [Actfinish date]
Table:	tblIW39_WorkOrder			tblSapMxToMxMntcType	tblCraftMasterTable	tblIW49_OrderStep	tblIW47_Crafts	
Sort:			Ascending					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	70208 Or 70864			"Prevent" Or "Prevent"			Between #1/1/2012# And #1/1/2012#	
or:	[3]	[4]	[5]	[3]	[1]	[2]	[2]	[4]

Lets look at the **Field** line of the query view and the cases that arise most often—if you know them you are off and running

Field:	Cost center	OrderNoText: [tblI	StepNoText: [tbl	MntcType	CraftType	Hours: Actual work	DateComplete: Actfinish date	DaysAfrCreatd: [Ac
Table:	tblIW39_WorkO			tblSapMxToMxI	tblCraftMasterT	tblIW49_OrderStep	tblIW47_Crafts	
Sort:			Ascending					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	70208 Or 70864			"Prevent" Or "Pr			Between #1/1/2012# And #1/	
or:								

Expression case	Explanation
Cost center	Field has been dragged down. Notice Table line populates with the name of the source table.
Hours: Actual work	<ul style="list-style-type: none"> A field Actual work is dragged down and given a new name, Hours, follow by a colon. Notice table name is also automatic.
DaysAfrCreatd: [ActFinish date]-[Created on]	<ul style="list-style-type: none"> A calculation of two fields, ActFinish data and Created on. A variable need not be pulled into grid to be in a calculation. Calculation is given a name. Square brackets identify the code as a field.
OrderNoText: [tblIW39_WorkOrders].[Order] & " : " & [tblIW39_WorkOrders].[Short text]	<ul style="list-style-type: none"> Because two tables have a field of the same name; source tables are included in the expression with a period between the square brackets of the table and field. The & joins stings of fields and text. ": " places a colon and space between the fields, but can be any string of text.

Lets look at the **Sort, Show** and **Criteria** rows of the query

Field:	Cost center	OrderNoText: [tbl	StepNoText: [tbl	MntcType	CraftType	Hours: Actual work	DateComplete: Actfinish date	DaysAftrCreatd: [Ac
Table:	tblIW39_WorkO			tblSapMxToMxM	tblCraftMasterT	tblIW49_OrderStep	tblIW47_Crafts	
Sort:			Ascending					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	70208 Or 70864			"Prevent" Or "Pr			Between #1/1/2012# And #1/	
or:								

Grid row	Expression	Explanation
Sort	As shown	Select Ascending (default) or Descending.
Show	As shown	If check box is empty, will not show the field in the table.
Criteria	70208 Or 70864 Or 70428 Or 70160	Of all of the variable cases, Or reduces the table to the cases.
	Between #1/1/2012# And #1/3/2012#	<ul style="list-style-type: none"> Reduces table to cases falling between dates of interest—notice placement of # for dates. Pattern can be applied to numeric and character variables and expressions.
	Is Null, Is Not Null	Not shown, but is a key criteria for exploring data, especially for missing data.

We are largely familiar with the range of criteria because of our history with Excel. Use the webpage, <https://media.gcflearnfree.org/ctassets/topics/177/GCFAccessCriteriaGuide.pdf>, as a quick reference. You will know what to do.

Finally, let's understand **And/Or** logic and the **or** row of the query grid

Field:	Cost center	OrderNoText: [t	StepNoText: [tb	MntcType	CraftType	Hours: Actual work	DateComplete: Actfinish date	DaysAfrCreatd: [Ac	
Table:	tblIW39_WorkO			tblSapMxToMx	tblCraftMasterT	tblIW49_OrderStep	tblIW47_Crafts		
Sort:			Ascending						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:	70208 Or 70864			"Prevent" Or "Pr			Between #1/1/2012# And #1/		
or:									

- **Definitions of and/or.**
 - **Or:** A selection can be at least one of the list cases.
 - **And:** A selection must be all of the list of cases.
- **Columns in the grid are “And” to each other—e.g., for all selected cases of maintenance type between the desired dates for the cost centers of interest.**
- **If we want to create an “Or” between columns, it is necessary to place each or case in an or row of its own in the grid—e.g., different cost centers for a different date intervals.**

Recall translation tables as joined in the query; a powerful tool

1. Create a query with only the variable of interest from the source table, and set the Total line to Group By (to be shown in a later slide) to return a list table of the variable.
2. Import the list table to Excel or create a table in Access and create the translation variables you want.
3. Join the built table in a query.

Source list variable

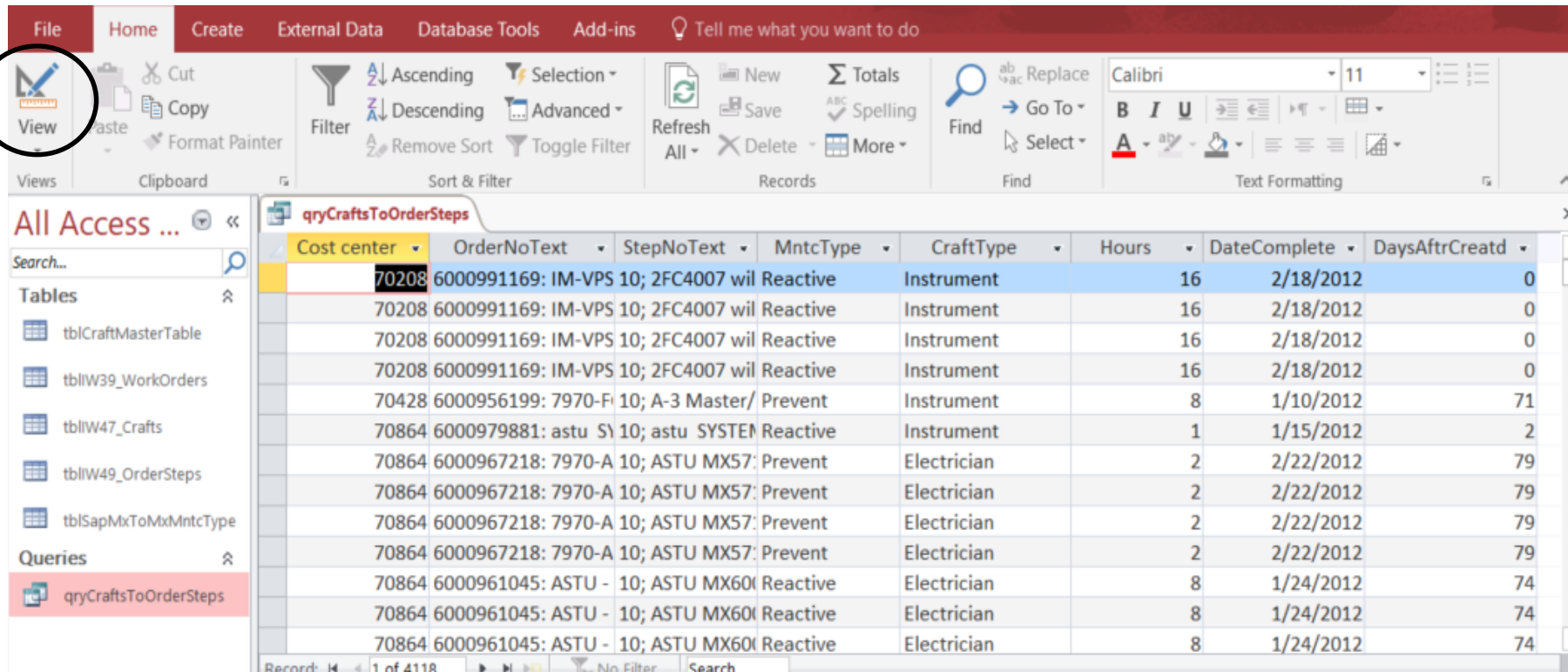
Translation variables—created

ID	Order Type	MntcType	SapDescription	Click to Add
1	MX01	Prevent	Sched Prevent Maint Order - w/o notif	
2	MX02	Prevent	Sched Prevent Maint Order - w/ notif.	
3	MX03	Proactive	Condition Based Pro-Active Maint Order	
4	MX04	Reactive	Corrective Maint Order	
5	MX05	Admin	Administrative Maint Order	
6	MX06	Project	Project Order	
7	MX07	NonRoutine	Non Routine Maint Order	
8	MX08	Turnaround	Turnaround Maint Order	
9	MX09	OpsSupport	Maint. Support to Operations Order	
10	MX10	Proratable	Proratables Order	
11	MX11	Remediate	Remediation Order	
12	MX12	LossDamage	Loss & Damage Order	
13	OP01	Operations	Scheduled Operations Activity Order	
14	OP02	Operations	Non Maintenance Procurement Order	
15	OP03	Operations	Recoverables Order	
16	VR01	VarCost	Variable Cost Order	
17	IT01	InfoTech		

Note:

Translation tables can be pulled into any super table to which they are applicable, thus, they should be maintained at a location all data users can reach to.

The materializing super table is viewed and explored back and forth between building and table—a hugely insightful process in its own right



Cost center	OrderNoText	StepNoText	MntcType	CraftType	Hours	DateComplete	DaysAftrCreatd
70208	6000991169: IM-VPS	10; 2FC4007 wil	Reactive	Instrument	16	2/18/2012	0
70208	6000991169: IM-VPS	10; 2FC4007 wil	Reactive	Instrument	16	2/18/2012	0
70208	6000991169: IM-VPS	10; 2FC4007 wil	Reactive	Instrument	16	2/18/2012	0
70208	6000991169: IM-VPS	10; 2FC4007 wil	Reactive	Instrument	16	2/18/2012	0
70428	6000956199: 7970-F	10; A-3 Master/	Prevent	Instrument	8	1/10/2012	71
70864	6000979881: astu S	10; astu SYSTEM	Reactive	Instrument	1	1/15/2012	2
70864	6000967218: 7970-A	10; ASTU MX57: Pre	Prevent	Electrician	2	2/22/2012	79
70864	6000967218: 7970-A	10; ASTU MX57: Pre	Prevent	Electrician	2	2/22/2012	79
70864	6000967218: 7970-A	10; ASTU MX57: Pre	Prevent	Electrician	2	2/22/2012	79
70864	6000967218: 7970-A	10; ASTU MX57: Pre	Prevent	Electrician	2	2/22/2012	79
70864	6000961045: ASTU -	10; ASTU MX60	Reactive	Electrician	8	1/24/2012	74
70864	6000961045: ASTU -	10; ASTU MX60	Reactive	Electrician	8	1/24/2012	74
70864	6000961045: ASTU -	10; ASTU MX60	Reactive	Electrician	8	1/24/2012	74

Notice that translation variables make table clear to all ultimate users, as well as, better suited to include in presentation platforms such as Pivots

A screenshot of the Microsoft Excel ribbon. The 'Data' tab is highlighted in white, while the other tabs (File, Home, Insert, Page Layout, Formulas, Review, View) are in a dark green color. The 'Data' tab is currently selected.

From Access

Select Table

Name	Description	Modified	Created	Type
qryCraftsToOrderSteps		5/5/2018 5:53:56 PM	5/4/2018 12:47:32 PM	VIE
tblCraftMasterTable		5/4/2018 12:34:27 PM	5/4/2018 12:34:27 PM	TAE
tblIW39_WorkOrders		5/4/2018 12:47:32 PM	5/4/2018 12:32:12 PM	TAE
tblIW47_Crafts		5/4/2018 12:47:32 PM	5/4/2018 12:32:57 PM	TAE
tblIW49_OrderSteps		5/4/2018 12:47:32 PM	5/4/2018 12:33:37 PM	TAE
tblSapMxToMxMntcType		5/4/2018 12:34:27 PM	5/4/2018 12:34:27 PM	TAE

File Home Page Layout Formulas Data Review View Developer JMP Design Tell me what you want to do									
PivotTable Recommended PivotTables Tables									
Pictures Online Pictures Illustrations									
Store My Add-ins - Bing Maps People Graph Add-ins									
Recommended Charts Charts									
PivotChart 3D Map - Tours									
Line Column Win/Loss Sparklines									
Slicer Timeline Filters									
Hyperlink Links									
Text Box Header & Footer									
A1									
A	B	C	D	E	F	G	H		
Cost center	OrderNoText	StepNoText	MntcType	CraftType	Hours	DateComplete	DaysAftCrCreatd		
70208	6000991169: IM-VP54 IM 2FC4007 Will Not Close Off	10; 2FC4007 will not close off	Reactive	Instrument	16	2/18/2012	0		
70208	6000991169: IM-VP54 IM 2FC4007 Will Not Close Off	10; 2FC4007 will not close off	Reactive	Instrument	16	2/18/2012	0		
70208	6000991169: IM-VP54 IM 2FC4007 Will Not Close Off	10; 2FC4007 will not close off	Reactive	Instrument	16	2/18/2012	0		
70208	6000991169: IM-VP54 IM 2FC4007 Will Not Close Off	10; 2FC4007 will not close off	Reactive	Instrument	16	2/18/2012	0		
70428	6000956199: 7970-FCU- A-3 Chromatograph Maint.	10; A-3 Master/Slaves-Chk Sample Sys/Run Chr	Prevent	Instrument	8	1/10/2012	71		
70864	6000979881: astu SYSTEM STATUS	10; astu SYSTEM STATUS	Reactive	Instrument	1	1/15/2012	2		
70864	6000967218: 7970-ASTU-MX571 PM INSPECTION EXT	10; ASTU MX571 REVIEW JSA & LOCK OUT	Prevent	Electrician	2	2/22/2012	79		
70864	6000967218: 7970-ASTU-MX571 PM INSPECTION EXT	10; ASTU MX571 REVIEW JSA & LOCK OUT	Prevent	Electrician	2	2/22/2012	79		
70864	6000967218: 7970-ASTU-MX571 PM INSPECTION EXT	10; ASTU MX571 REVIEW JSA & LOCK OUT	Prevent	Electrician	2	2/22/2012	79		
70864	6000967218: 7970-ASTU-MX571 PM INSPECTION EXT	10; ASTU MX571 REVIEW JSA & LOCK OUT	Prevent	Electrician	2	2/22/2012	79		
70864	6000961045: ASTU - MX600 SPOT 6-2 REPLACE ROPES	10; ASTU MX600 LO/TO	Reactive	Electrician	8	1/24/2012	74		
70864	6000961045: ASTU - MX600 SPOT 6-2 REPLACE ROPES	10; ASTU MX600 LO/TO	Reactive	Electrician	8	1/24/2012	74		
70864	6000961045: ASTU - MX600 SPOT 6-2 REPLACE ROPES	10; ASTU MX600 LO/TO	Reactive	Electrician	8	1/24/2012	74		
70864	6000961045: ASTU - MX600 SPOT 6-2 REPLACE ROPES	10; ASTU MX600 LO/TO	Reactive	Electrician	8	1/24/2012	74		
70864	6000961045: ASTU - MX600 SPOT 6-2 REPLACE ROPES	10; ASTU MX600 LO/TO	Reactive	Electrician	8	1/24/2012	74		
70864	6000982569: MA-ASTU- U8512 STRAINER PLUGGED	10; ASTU PU8512 PULL STRAINER PLUGGED	Reactive	Machinist	14	1/23/2012	0		

The super table can be made available to any insight deliverable—Pivots and analytics—by connection or import

If make connection direct to query in Access, then can update the Pivot when source tables are updated or query is updated.

The screenshot shows the Microsoft Excel interface with the 'Data' tab selected. The 'Refresh All' button in the 'Data' tab is highlighted. The PivotTable Fields task pane is open on the right, showing a list of fields. The 'OrderNoText' and 'StepNoText' fields are highlighted. The PivotTable Fields task pane also shows sections for 'Drag fields between areas below' with 'Filters', 'Columns', 'Rows', and 'Values' areas.

The fields of the super table appear in the list of fields, to be dragged to the pivot areas for interactive slice-dice, drill-down and formatting

- A power of a super table is to give Pivots multiple pieces of information as a single-line field.
- In this case, order and step ID with their description—as a result of using the concatenation criteria, &.

For periodic insight deliverables, the tables to the query are updated with the **Append** query, thence, running the super table's query

Append

Update Crosstab

Delete

Union

Pass-Through

Data Definition

Show Table

Builder

Insert Rows

Delete Rows

Builder

Insert Columns

Delete Columns

Return: All

Totals

Parameters

Property

Table Na

Query Type

Query Setup

Show/Hide

Query1

tblIW39_WorkOrdersUpdate

ID

Order

Order type

Short text

Priority

Append

Append To

Table Name: tblIW39_WorkOrders

Current Database

Another Database:

File Name:

Browse...

OK

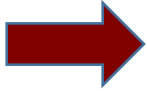
Cancel

Field:	Order	Order type	Short text	Priority
Table:	tblIW39_WorkOrdersUpdate	tblIW39_WorkO	tblIW39_WorkO	tblIW39_WorkO
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				
or:				

Priority

Field:	Order	Order type	Short text	Priority
Table:	tblIW39_WorkOrdersUpdate	tblIW39_WorkO	tblIW39_WorkO	tblIW39_WorkO
Sort:				
Append To:	Order	Order type	Short text	Priority
Criteria:				
or:				

Agenda:

- ☐ Purpose of the training session.
- ☐ Big picture.
- ☐ Steps to build super tables.
-  ☐ **Cleanse the data.**
- ☐ Create aggregate variables.
- ☐ Getting help while building tables.

Comments on bad data and cleansing

- The cleansing step is also a de facto evaluation of the source operational processes for compliance and weaknesses. Accordingly, cleansing reveals opportunities for impactful process improvements.
- The occurrence of bad data may be fading as firms update their operating systems and they, in turn, better control for work flow, format, and omission.
- When flow, format and omission are not enforced by old systems, replaced by new, the cleansing process may be a one-off exercise to the pre-modern era data.

There are five types of bad data in a table—the good news is that there are methods to deal with each if it is poison to the final insight deliverable

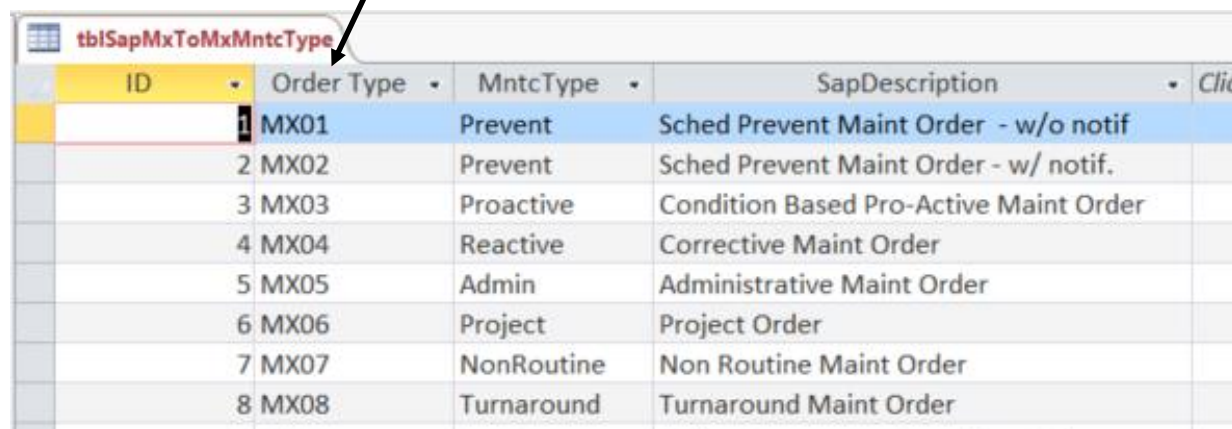
Type	Strategy
Duplicate cases	Seek cases with duplicate query—see herein recommend literature or online YouTube for details and demonstration.
Empty cells	<ul style="list-style-type: none">▪ Form table with all permutation of empty cells—use or rows in grid and use Pivots to form table of cases and counts.▪ Evaluate the ramifications of loss of information to insight deliverable of remaining empty.▪ Decide a strategy.<ul style="list-style-type: none">○ Decide to ignore for various statistical logic.○ Use ML/AI models applied to good cases to predict or classify what should be.○ Likely models are one of three regressions (linear, logistic, Poisson) and trees. (1)
Miss-classifications	<ul style="list-style-type: none">▪ Essentially an equivalent case of empty cells for categorical variables.▪ Likely models are logistic regression and trees. (1)
Miss-formatted	<ul style="list-style-type: none">▪ Build translation tables for each bad-data case to a variable (see slide to come).▪ Attach to super tables and use translated, rather than source dirty variable.
Outliers (numerical)	<ul style="list-style-type: none">▪ Use aggregate functionality of the “Total” row (explained in later slide) and build an outlier test variable (explained in later slide) into the super table.▪ Locate outliers filterer on test and determine if interesting or bad. . .<ul style="list-style-type: none">○ If interesting, is new insight and retained in super table.○ If bad, remove case or impute as equivalent case to empty cells.

(1) See discussion of indicative insight deliverables in the section titled, “The primary types of insight deliverable” to the training session titled, “The First Step to Becoming a Data-Driven Operation.” <https://analytics4strategy.com/training-sessions>

Translation tables; the easiest and maybe the most helpful of cleansing methods

1. As previously shown, create a translation table for the variables of concern and translations for each case and pull into the super table query.
2. Run the query with **Is Null** criteria to the translation variables of concern—the returned table will be the cases with bad or unanticipated cases.
3. Correctly classify any found cases of bad or unanticipated data in the translation table—when super table is run all translation data will be clean or accounted for.

Variable of concern—e.g., a case of Myo1 is bad data (format, spelling) and a new type appearing for the first time may be unanticipated data.



ID	Order Type	MntcType	SapDescription
1	MX01	Prevent	Sched Prevent Maint Order - w/o notif
2	MX02	Prevent	Sched Prevent Maint Order - w/ notif.
3	MX03	Proactive	Condition Based Pro-Active Maint Order
4	MX04	Reactive	Corrective Maint Order
5	MX05	Admin	Administrative Maint Order
6	MX06	Project	Project Order
7	MX07	NonRoutine	Non Routine Maint Order
8	MX08	Turnaround	Turnaround Maint Order

Translation variables that would return as empty cells are bad or unanticipated cases. Updating the translation table is the cleansing action.

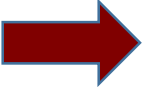
You may wish to use the **Update** query to directly cleanse source variables rather than translation variables

Field:	Cost center	OrderNoText: [tl	StepNoText: [tl
Table:	tblIW39_WorkO		
Update To:			
Criteria:	70208 Or 70864		
or:			

Process

1. Set filters in Criteria row with a select query.
2. Run and check that cases to be updated are as intended.
3. Make changes by entry into the '**Update To**' row.
4. Run to make changes.

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For our next trick we add a row—Total—to the design grid by clicking the summation icon in the ribbon

The screenshot shows the Microsoft Access design grid interface. The ribbon at the top includes the 'Totals' icon, which is a summation symbol (Σ) with the word 'Totals' below it. An arrow points from this icon to the 'Total' row in the design grid. The design grid has columns for 'Field', 'Table', 'Sort', 'Show', and 'Criteria'. The 'Total' row is highlighted with a black border. The 'Table' row shows the following tables: tblIW39_WorkOrders, tblIW47_Crafts, tblSapMxToMx, tblCraftMasterT, and tblC.

Field:	Cost center	DateComplete:	MntcType	CraftType	Craft
Table:	tblIW39_WorkOrders	tblIW47_Crafts	tblSapMxToMx	tblCraftMasterT	tblC
Total:	Group By	Group By	Group By	Group By	Cou
Sort:		Ascending			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:		Between #1/1/2	"Prevent" Or "Pr		
or:					

Click the icon adds the 'Total' row of the query grid.

We can create new variables that aggregate the measurables of groups upon none or more categorical or binned variables

qryCraftsToOrderStepsVersionTotals

Grouped on four variables

Four aggregate variables to each group in the data

Field:	Cost center	DateComplete:	MntcType	CraftType	CraftCount: Craf	HourSum: Actua	HoursAvg: Actua	HoursStdDev: A
Table:	tblIW39 WorkO	tblIW47 Crafts	tblSapMxToMxM	tblCraftMasterT	tblCraftMasterT	tblIW49 OrderS	tblIW49 OrderS	tblIW49 OrderS
Total:	Group By	Group By	Group By	Group By	Count	Sum	Avg	StDev
Sort:		Ascending						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		Between #1/1/2	"Prevent" Or "Pr					

Groupings are created across selected variables

Aggregation upon groups by: sum, average, standard deviation, variance, count, min-max and first-last.

- A table of aggregation variables is often formed with the super table as the source and then joined back to the super table.
- Each case within a group will include the created aggregation—clearing the way for all sorts of insight and additional cleansing.

How to join the aggregation variables to the super table query—one way

1. Build the aggregate variables query.
2. Create—in both the super table query and aggregate variables query—a variable by concatenation (&) of the grouped variables.

Name: [Cost center]&[DateComplete]&[MntcType]&[CraftType]

3. Convert the aggregate variables query to a table with the “Make Table” query.
4. Pull the aggregate variables table into the super table query and join by the concatenated group variables.

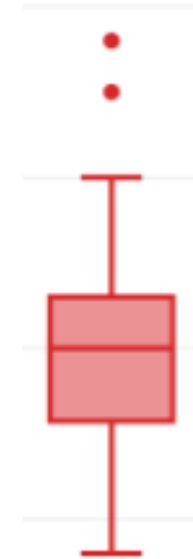
To search for outliers, we can create variables of outlier factors in the super table—examples are Z-Score Standardize and Min-Max Normalize

$$\text{Z-Score Standardize} = \frac{\text{Case} - \text{Average}}{\text{StdDev}}$$

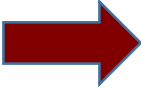
Investigate if $-3 > \text{Factor} > 3$

$$\text{Min-Max Normalize} = \frac{\text{Case} - \text{Min}}{\text{Max} - \text{Min}}$$

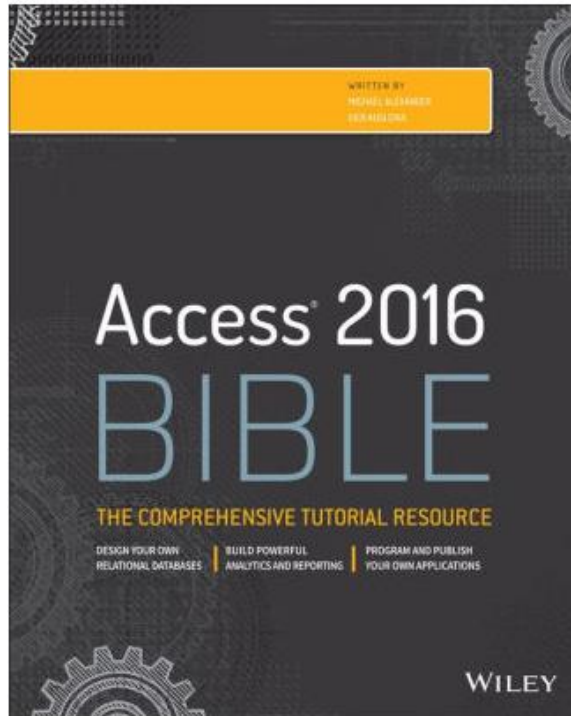
Investigate with
box plots



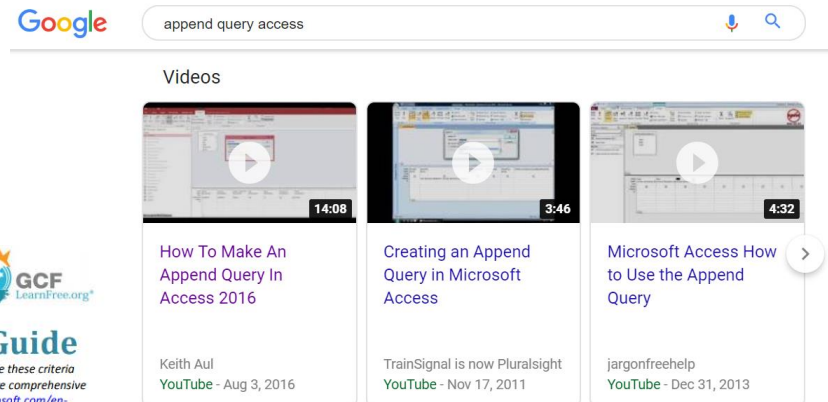
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You can start building tables with what has been shown and you will have fun, but you do not leave the session without help at your elbow



- Reading chapters 8 through 13 will take you through everything there is to know about building and exploring super tables.
- On line, every subject in the slides and book can be found explained and demonstrated as a YouTube video, blog or article.



Query Criteria Quick Reference Guide

Below, you'll find a guide containing 20 of the most common criteria used in Access queries. While these criteria are all fairly simple, each one can help you carry out meaningful searches of your data. For a more comprehensive guide to criteria, consult Microsoft Office's official [Examples of Query Criteria](http://office.microsoft.com/en-us/access-help/examples-of-query-criteria-HA01006611.aspx) (<http://office.microsoft.com/en-us/access-help/examples-of-query-criteria-HA01006611.aspx>).

When entering the criteria, write them exactly as they are written in the second column, replacing **x** with your search term, or in the case of dates, replacing **mm/dd/yyyy** with the desired date.

✱ Simple Criteria for All Data Types

Criteria Name	Write it like...	Function
Equals	"x"	Searches for values equal to x
Does Not Equal	Not in ("x")	Searches for all values