VBA Final Project Report
Brittany M. Coon

Executive Summary

For my project, I was automating parts of a Quality Assurance (QA) Checklist for my work. The QA Checklist is very long and those who go through it often do not thoroughly check everything. My project automates some of the checks and identifies errors and potential errors. It does not change the data; it just highlights it so that the person who is validating the data can learn from the errors to avoid them in the future. The data goes array by array when it is running its checks. This is important because it allows us to identify which arrays have errors more easily.

Implementation documentation

When building my solution, I added my macros to an existing file that contains other macros. The user form was already built and it had its own tab on the ribbon. I added to what was existing to stay consistent with the current way the existing macros are used.

The 15 checks I automated are in the following table:

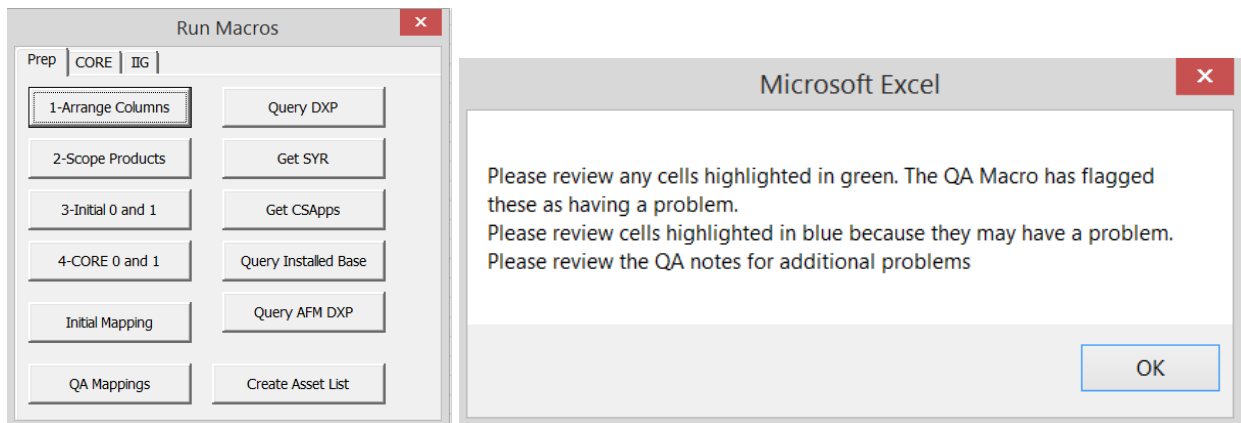| Task Description	Reason Included
Drive Count and Capacity are formulas	If these are not formulas, then the drive count and capacity of the array can be off. Additionally, it affects the software licensing, so if it is incorrect it can cause the licensing to be wrong.
The Drive Count of mapped Symmetrix, VNX, Celerra/NAS, Clariion and Centera TLAs matches SYR Reported Drives	SYR is a dial-home site we use to validate our data. Checking the total drives against what SYR reports can alert us to a potential error or discrepancy.
VMAX TLAs are not missing Enginuity licenses	Enginuity is the OE license for Symmetrix arrays. Because of this, it is required to be on the array. We need to ensure that it is there.
VNX 5500+ and all even-numbered TLAs are not missing Performance and/or High Capacity licenses	Performance and High Capacity licenses are the OE licenses for VNX arrays. However, a few models do not require them. We need to

	identify where it is missing, but not skip models that don't have them.
Storage-based TLAs have Min # of Drives and Total Slots specified	Most arrays are storage based so they have drives and capacity. These need to have a minimum and maximum number of drives specified.
Only TLA records have Min # of Drives and Total Slots specified	Only the top line in the array should have minimum and maximum drives specified. If the other lines have it, it can cause errors.
The Drive Count for storage-based TLAs is between the Min # of Drives and Total Slots	The drives on the array need to fall within the minimum and maximum number of drives. If it doesn't fall in that range, it can be a configuration error or an indicator that something is incorrectly associated.
Each array map has the same New TLA Serial Number	This helps with grouping the array correctly in the final deliverable.
SW Install Dates do not pre-date the TLA's Install Date by more than 4 months	Software should not be installed more than four months before the hardware. If it is, this needs to be noted and validated.
The TLA SO Date pre-dates or is the same as the SO Date of any upgrade SOs	The sale of the original array needs to occur before the sale of any upgrade. If the upgrade occurs first, it can be an indicator of incorrect association.
The earliest Install Date pre-dates or is the same as the SO Date for each SO	The purchase date needs to occur before the install date. If it is installed before it is purchased it can be an indicator of data issues.
Unit of Measure is filled in, consistent with Model Numbers and accurately reflects Model Descriptions of TLAs and SW	Having Unit of Measure correct is important because we use it to categorize how software is licensed.
Software Type is filled in, consistent with Model Numbers and accurately reflects Model Descriptions	The accuracy of Software Type is important because we use this for grouping similar software and determining the licensing in our final deliverable.
Drive Type is filled in, consistent with Model Numbers and accurately reflects records containing or not containing drives	Drive Type accuracy is important because we use it to classify drives and calculate the capacity of the arrays.
Count is filled in with 1	Our conversion macros will not work if this isn't a 1 so this aids in those working.

I have included some screenshots of the data before and after I run the macros. Then, I'll explain where the errors are and how it is fixed.

In the above spreadsheet, there are errors in the rectangular bars. Most of the data is incorrect but some is missing. The top-left box is flagged because those values should be greater than zero. The two with a line connecting are incorrect because the values aren't matching. The next three columns have boxes where the data is incorrect. The next two columns have missing data and inconsistent values.

In the spreadsheet pictured above, you can see there are additional issues above including drives that don't fall between the minimum and maximum drives, drives on non-TLA lines, and missing OE Licenses. There are other issues that are present in the first picture; they weren't highlighted again here.

In this spreadsheet, there are a few issues. The first is the missing OE license for VNX arrays. The other issues all relate to the dates. Some software was installed more than four months before the hardware, some components were installed before they were purchased, and some of the upgrades were purchased before the main array.

Following are the process for running the macro and the same sheets after the macro has been run. You will be able to see highlighting and additional notes. The macros do not change any of the values for a couple of reasons. The first is we need the person who created the data to analyze the data and learn from their mistakes. Second, we need them to validate that the macro found a real error and take appropriate, sometimes complex steps to fix it.

To run the QA Macros, the user goes to the Macros tab and clicks the open user interface button. Next, they go to the Prep tab of the user form and then they click the QA Mappings button. After the macros are run, a dialog box appears informing users of the things that the macro has done and what they mean.

FILE   HOME   INSERT   PAGE LAYOUT   FORMULAS   DATA   REVIEW   VIEW   DEVELOPER   Macros

Open User
Interface

Run Macros

Prep | CORE | IIG

1-Arrange Columns	Query DXP
2-Scope Products	Get SYR
3-Initial 0 and 1	Get CSApps
4-CORE 0 and 1	Query Installed Base
Initial Mapping	Query AFM DXP
QA Mappings	Create Asset List

Microsoft Excel

Please review any cells highlighted in green. The QA Macro has flagged these as having a problem.
Please review cells highlighted in blue because they may have a problem.
Please review the QA notes for additional problems

OK

The next three screen shots are the same section of the workbook that was captured previously. They show what the worksheet looks like after the macro has been run. If any changes are made and the macros are run again, the highlighting will be removed and issues that still exist will be flagged.

Here the issues are highlighted in green. The missing minimum and maximum drives and missing count are highlighted. Additionally, data that appears incorrect, such as the unit of measure, software type, drive type, and array serial number are highlighted for review. Finally, the difference between the dial-home information and the total drives is noted.

The following screenshot shows an additional issue with minimum and maximum drives not on the TLA line. Additionally two notes were made in the QA column, one for the missing

OE License and the other for the discrepancy with the drives not falling between the minimum

and maximum number of drives.

On this screenshot, the errors in the data have been highlighted. Additionally, notes have

been made for the missing VNX OE License, and notes have been made for the date problems

identified.

One additional note, certain model families have arrays that have capacity and arrays that

do not. Because there is too much diversity in the model numbers the potential errors are

highlighted in blue, which should signal a need for closer examination and review.

	Min #	Total S	Drives	Single	Annua	EOSL	Drive C	Capaci	SYR Re	Unit of	Softwa	Drive T	QA Cor	AD Cor	Model	Count	LOB	Produc	New Tl	TLA Se	Unique	Contra	Array C	Sales C	Model	Item D	Produc	Produc	Contra
1191	0	0	0	0	4717.44	-	0	0	-	FRAME	Isilon - En	Non-Drive	-				CORE		SN400-301248-0233		6379I5			30115336	201-0253	EAB11-PO	ISILON	SOFTWAR	1
1193	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV5421200093	CNV5421236301S				30115337	851-0170	Switch IB	ISILON	HARDWAF	1
1195	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV54212000 2F	CNV4212363015				30115337	851-0170	Switch IB	ISILON	HARDWAF	1
1197	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV542120006C	CNV5421263791S				30115336	851-0170	Switch IB	ISILON	HARDWAF	1
1199	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV542120005F	CNV5421263791S				30115336	851-0170	Switch IB	ISILON	HARDWAF	1
1201	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV14211000EA	CNV14211 62121S				64532438	851-0170	Switch IB	ISILON	HARDWAF	1
1203	0	0	0	0	558.4	-	0	0		SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV14211000A9	CNV14211 62121S				64532438	851-0170	Switch IB	ISILON	HARDWAF	1
1205	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV14211000A1	CNV14211 69221S				64532479	851-0170	Switch IB	ISILON	HARDWAF	1
1207	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			CNV1441100283	CNV14411 69221S				64532479	851-0170	Switch IB	ISILON	HARDWAF	1
1209	0	0	0	0	2869	-	0	0	-	NODE	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			A114800001L	A1148000 62121S				64532438	851-0066	IQ ACCELE	ISILON	HARDWAF	1
1211	0	0	0	0	2869	-	0	0	-	NODE	HARDWAF	Non-Drive		Sales Order not found in EMC s	CORE			A114800005L	A1148000 62121S				64532438	851-0066	IQ ACCELE	ISILON	HARDWAF	1
1213	0	0	0	0	2869	-	0	0	-	NODE	HARDWAF	Non-Drive	-			CORE			A132500004L	A132500030207482I50				30207482	851-0066	IQ ACCELE	ISILON	HARDWAF	1
1214	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500004L	30207482I50				30207482	851-0154	CABLE, IB	ISILON	HARDWAF	2
1215	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500004L	30207482I50				30207482	800-0012	PWRCRD,	ISILON	HARDWAF	1
1216	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500004L	30207482I50				30207482	800-0010	PWRCRD,	ISILON	HARDWAF	1
1218	0	0	0	0	2869	-	0	0	-	NODE	HARDWAF	Non-Drive	-			CORE			A132500002L	A132500030207482I50				30207482	851-0066	IQ ACCELE	ISILON	HARDWAF	1
1219	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500002L	30207482I50				30207482	851-0154	CABLE, IB	ISILON	HARDWAF	2
1220	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500002L	30207482I50				30207482	800-0012	PWRCRD,	ISILON	HARDWAF	1
1221	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			A132500002L	30207482I50				30207482	800-0010	PWRCRD,	ISILON	HARDWAF	1
1223	36	36	4	400	17520.91	-	4	1600	-	NODE	HARDWAF	Non-SATA		Sales Order not found in EMC s	CORE			SX400-301409-0030	SX400-30 30409482I50				30409482	X400-SAT/	X400-96T+	ISILON	HARDWAF	1
1224	0	0	32	3000	0	-	32	96000	-		HARDWAF	SATA	-			CORE			SX400-301409-0030	30409482I50				30409482	611-0076	96TB HDD	ISILON	HARDWAF	1
1225	0	0	0	0	0	-	0	0	-		HARDWAF	Non-Drive	-			CORE			SX400-301409-0030	30409482I50				30409482	612-0021	96GB RAM	ISILON	HARDWAF	1

Serial Numbers for Macros | **Scoping** | Sheet1 | Sales Order Numbers for Macros | Product Ref Sheet | EA Format R ...

One final thing to be aware of is the macro looks for the break between the arrays to function. It doesn't matter how many spaces are between the arrays, it will handle it. The macros also stop running once it reaches the end of the mappings because the last row was defined at the start of the macro.

Lessons Learned

The major thing I learned was how difficult it can be to make a robust program. In the past, all programs I created had a pretty well defined input and expected output. However, for this project, my macros have to be able to handle a variety of different data correctly. It was a challenge thinking of all situations that commonly occur and how to handle them. I also learned more about the code we already have existing; it was interesting incorporating that code into what I was creating. I changed how I was doing a couple of things to handle the existing code better. The final thing I learned was how the project can change as you develop it. Originally, I was planning on having several QA macros that you went through step-by-step. However, the way I set up my project allowed me to do them all at the same time without having an issue. I wasn't expecting the project to end up being structured the way it was, but it ended up being the most efficient way to do it.

Assistance

I received some assistance from one of my coworkers. Because this is for work, I built my project in a workbook with other code. We have class modules already built that we can call on. My coworker pointed some of them out and had me change some of my code to include them. This increased efficiency and reduced the number of things that are hardcoded. He also helped me with some of the logic of the project. I would talk to him about what I was planning on doing and how I was going to do it. He would point out any flaws in my logic or potential errors I might hit. After I finished coding, he tested it and pointed out a few errors he encountered and I fixed them.