

VBA Final Project Report

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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

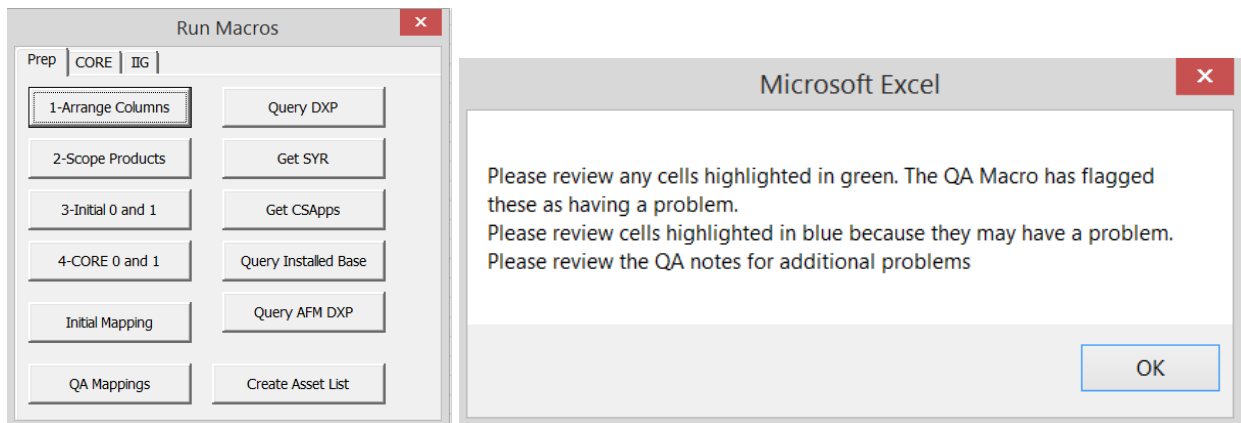
	identify where it is missing, but not skip models that don't have them.
Storage-based TLAs have Min # of Drives and Total Slots specified	Most arrays are storage based so they have drives and capacity. These need to have a minimum and maximum number of drives specified.
Only TLA records have Min # of 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.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	
	Min #	Total #	Drives	Single	Annual	EOSL	Drive C	Capacity	SVR Rel	Unit of	Software	Drive T	QA Col	AD Col	Model	Count	LOB	Product	New TL	TLA Sel	Uniquel	Contra	Array C	Sales C	Model	Item D	Product	Product	Contra	
2	0	0	0	0	0	0	0	0	0	30	FRAME	HARDWA Non-Drive					1	CORE	HK192600484	HK192600	64216200H				64216200	58-3D	VMAX DEL	SYMMETR HARDWA	1	
3	0	0	1	600	272.97		62	37200			CAPACITY	HARDWA Non-Drive					1	CORE	HK192600484						64216200	58-FE800	VMAX 4G	SYMMETR HARDWA	62	
4	0	0	1	600	271.02		70	45600			CAPACITY	HARDWA Non-SATA					1	CORE	HK192600484						64216200	NF41500	VMAX 4G	SYMMETR HARDWA	70	
5	0	0	1	2000	218.27		60	120000			CAPACITY	HARDWA SATA					1	CORE	HK192600484						64216200	NA47200	VMAX 4G	SYMMETR HARDWA	60	
6	0	0	200	901.92			17	3400			CAPACITY	HARDWA Non-SATA							HK192600484						64216200	NF41200	VMAX 4G	SYMMETR HARDWA	17	
7	0	0	1	2000	218.22		3	18000			CAPACITY	HARDWA SATA							HK192600484						64216200	NA47200	VMAX 4G	SYMMETR HARDWA	9	
8	0	0	0	0	238		0	0				HARDWA Non-Drive							HK192600484						64216200	58-DE-SP	VMAX 5B	SYMMETR HARDWA	4	
9	0	0	0	0	357		0	0				HARDWA Non-Drive							HK192600484						64216200	58-DE13	VMAX 155	SYMMETR HARDWA	16	
10	0	0	0	0	18758.25		0	0				HARDWA Non-Drive							HK192600484						64216200	58-64-BAT	VMAX 8A1	SYMMETR HARDWA	1	
11	0	0	0	0	532		0	0				HARDWA Non-Drive							HK192600484						64216200	58-FE800	VMAX 8B1	SYMMETR HARDWA	2	
12	0	0	0	0	425.8		0	0				HARDWA Non-Drive							HK192600484						64216200	58-FE800	VMAX 8B1	SYMMETR HARDWA	2	
13	0	0	0	0	1437.75		0	0				HARDWA Non-Drive							HK192600484						64216200	58-AD004	VMAX 4G	AD SYMMETR HARDWA	1	
14	0	0	0	0	0		0	0				HARDWA Non-Drive							HK192600484						64216200	58-PCBL3	50A 3PH	D SYMMETR HARDWA	2	
15	0	0	0	0	0		0	0				HARDWA Non-Drive							HK192600484						64216200	58-ACON	ADPTR AC	SYMMETR HARDWA	4	
16	0	0	0	0	1912.05		0	0				HARDWA Non-Drive							HK192600484						64216200	58-DB	DH VMAX 18	SYMMETR HARDWA	1	
17	0	0	0	0	0		0	0				HARDWA Non-Drive							HK192600484						64216200	58-CONF	VMAX CO	SYMMETR HARDWA	1	
18	0	0	0	0	0		0	0			FRAME	1A10207A	Non-Drive						30064136524						30064136	457-100-4	ENGINUIT	SYMMETR SOFTWARE	1	
19	0	0	0	0	110.6		0	0				CAPACITY	ENGINUIT	Non-Drive					30064136524						30064136	456-102-5	ENGINUIT	SYMMETR SOFTWARE	38	
20	0	0	0	0	0		0	0			FRAME	Symm Pac	Non-Drive						30064136524						30064136	457-000-7	SYMM PAI	SYMSOFT SOFTWARE	1	
21	0	0	0	0	457.2		0	0				CAPACITY	Symm Pac	Non-Drive					30064136524						30064136	456-005-7	SYMM PAI	SYMSOFT SOFTWARE	38	
22	0	0	0	0	0		0	0			FRAME	SymmP	Non-Drive						30064136524						30064136	457-100-4	ADV FAST	SYMMETR SOFTWARE	1	
23	0	0	0	0	219.6		0	0				CAPACITY	Adv FAST	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	38	
24	0	0	0	0	0		0	0				SRDS	SymmP	Non-Drive					30064136524						30064136	457-100-5	RMT SYNC	SRD	SOFTWARE	1
25	0	0	0	0	396		0	0				CAPACITY	SRDS	Non-Drive					30064136524						30064136	456-102-8	RMT SYNC	SRD	SOFTWARE	38
26	0	0	0	0	0		0	0			FRAME	SymmP	Non-Drive						30064136524						30064136	456-005-7	SYMM PAI	SYMSOFT SOFTWARE	1	
27	0	0	0	0	565.6		0	0				CAPACITY	Adv FAST	Non-Drive					30064136524						30064136	457-100-4	ENGINUIT	SYMMETR SOFTWARE	1	
28	0	0	0	0	110.6		0	0				CAPACITY	ENGINUIT	Non-Drive					30064136524						30064136	456-102-5	ENGINUIT	SYMMETR SOFTWARE	47	
29	0	0	0	0	49.70004		0	0				CAPACITY	ENGINUIT	Non-Drive					30064136524						30064136	456-102-5	ENGINUIT	SYMMETR SOFTWARE	112	
30	0	0	0	0	4103.4		0	0				FRAME	Symm Pac	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	112	
31	0	0	0	0	457.2		0	0				CAPACITY	Symm Pac	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	47	
32	0	0	0	0	228.6		0	0				CAPACITY	Symm Pac	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	112	
33	0	0	0	0	3310.92		0	0				FRAME	Adv FAST	Non-Drive					30064136524						30064136	457-100-4	ADV FAST	SYMMETR SOFTWARE	1	
34	0	0	0	0	219.6		0	0				CAPACITY	Adv FAST	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	47	
35	0	0	0	0	109.8		0	0				CAPACITY	Adv FAST	Non-Drive					30064136524						30064136	456-102-6	ADV FAST	SYMMETR SOFTWARE	112	
36	0	0	0	0	3961.6		0	0				FRAME	SRDS	Non-Drive					30064136524						30064136	457-100-5	RMT SYNC	SRD	SOFTWARE	1
		Serial Numbers for Macros	Scoping	Sheet1	Sales Order Numbers for Macros	Product Ref Sheet	EA Format Ref																							

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.

VMAX 10K cats SUITE NON-SATA 1TB																														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	
1	Min #	Total #	Drives	Single	Annual	EOSL	Drive C	Capacity	SVR Rel	Unit of	Software	Drive T	QA Col	AD Col	Model	Count	LOB	Product	New TL	TLA Sel	Uniquel	Contra	Array C	Sales C	Model	Item D	Product	Product	Contra	
83	0	0	1	600	336.75	4632	0	0	0	0	FRAME	HARDWA Non-Drive						CORE	HK198701603	HK198701	30540323H				30540323	BA-SYS1E	VMAX 10H	SYMMETR HARDWA	1	
84	0	0	0	0	472.5	0	0	0	0	0	CAPACITY	HARDWA Non-SATA						CORE	HK198701603						30540323H	AF415600	VMAX 10H	SYMMETR HARDWA	50	
85	0	0	1	600	336.75	132	79200	4	2400	0	CAPACITY	HARDWA Non-SATA						CORE	HK198701603						30540323H	AF415600	VMAX 10H	SYMMETR HARDWA	132	
86	0	0	0	0	472.5	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-DE15E	VMAX 10H	SYMMETR HARDWA	16	
87	0	0	0	0	563.25	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-FE800	VMAX 10H	SYMMETR HARDWA	2	
88	0	0	0	0	15750	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-96E	EP VMAX 10H	SYMMETR HARDWA	2	
89	0	0	0	0	704.25	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-FE800	VMAX 10H	SYMMETR HARDWA	2	
90	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-PW40I	VMAX 10H	SYMMETR HARDWA	2	
91	0	0	0	0	4632	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-SYS2E	VMAX 10H	SYMMETR HARDWA	1	
92	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-3UR	VMAX 10H	SYMMETR HARDWA	16	
93	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701603						30540323H	BA-CONF	VMAX 10H	SYMMETR HARDWA	1	
94	0	0	0	0	565.6	0	0	0	0	0	FRAME	ENGINUIT	Non-Drive					CORE	30540323S	457-100-4	VMAX 10H	SYMMETR SOFTWARE			30540323					1
95	0	0	0	0	86.1	0	0	0	0	0	CAPACITY	ENGINUIT	Non-Drive					CORE	30540323S						30540323	456-104-3	VMAX 10H	SYMMETR SOFTWARE	110	
96	0	0	0	0	2032.9	0	0	0	0	0	FRAME	Symm MGR	Non-Drive					CORE	30540323S						30540323	457-101-0	VMAX 10H	SYMMETR SOFTWARE	1	
97	0	0	0	0	149.4	0	0	0	0	0	CAPACITY	Symm MGR	Non-Drive					CORE	30540323S						30540323	456-104-3	VMAX 10H	SYMMETR SOFTWARE	110	
98	0	0	0	0	1800	0	0	0	0	0	FRAME	BAS SRD	Non-Drive					CORE	30540323S						30540323	457-101-0	VMAX 10H	SYMMETR SOFTWARE	1	
99	0	0	0	0	297	0	0	0	0	0	CAPACITY	BAS SRD	Non-Drive					CORE	30540323S						30540323	456-104-3	VMAX 10H	SYMMETR SOFTWARE	110	
100																														
101	0	0	1	600	336.75	4632	0	0	0	0	FRAME	HARDWA Non-Drive						CORE	HK198701529	HK198701	30540332H				30540332	BA-SYS1E	VMAX 10H	SYMMETR HARDWA	1	
102	0	0	0	0	472.5	0	0	0	0	0	CAPACITY	HARDWA Non-SATA						CORE	HK198701529						30540332H	AF415600	VMAX 10H	SYMMETR HARDWA	50	
103	0	0	1	600	336.75	160	96000	4	2400	0	CAPACITY	HARDWA Non-SATA						CORE	HK198701529						30540332H	AF415600	VMAX 10H	SYMMETR HARDWA	160	
104	0	0	0	0	472.5	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-DE15E	VMAX 10H	SYMMETR HARDWA	16	
105	0	0	0	0	563.25	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-FE800	VMAX 10H	SYMMETR HARDWA	2	
106	0	0	0	0	15750	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-96E	EP VMAX 10H	SYMMETR HARDWA	2	
107	0	0	0	0	704.25	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-FE800	VMAX 10H	SYMMETR HARDWA	2	
108	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-PW40I	VMAX 10H	SYMMETR HARDWA	2	
109	0	0	0	0	4632	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-SYS2E	VMAX 10H	SYMMETR HARDWA	1	
110	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-3UR	VMAX 10H	SYMMETR HARDWA	16	
111	0	0	0	0	0	0	0	0	0	0		HARDWA Non-Drive						CORE	HK198701529						30540332H	BA-CONF	VMAX 10H	SYMMETR HARDWA	1	
112	0	0	0	0	565.6	0	0	0	0	0	FRAME	ENGINUIT	Non-Drive					CORE	30540332S						30540332					1
113	0	0	0	0	86.1	0	0	0	0	0	CAPACITY	ENGINUIT	Non-Drive					CORE	30540332S						30540332	457-101-0	VMAX 10H	SYMMETR SOFTWARE	1	
114	0	0	0	0	2032.9	0	0	0	0	0	FRAME	Symm MGR	Non-Drive					CORE	30540332S						30540332	456-104-3	VMAX 10H	SYMMETR SOFTWARE	126	
115	0	0	0	0	149.4	0	0	0	0	0	CAPACITY	Symm MGR	Non-Drive					CORE	30540332S						30540332	456-104-3	VMAX 10H	SYMMETR SOFTWARE	126	
116	0	0	0	0	1800	0	0	0	0	0	FRAME	BAS SRD	Non-Drive					CORE	30540332S						30540332	457-101-0	VMAX 10H	SYMMETR SOFTWARE	1	
117	0	0	0	0	297	0	0	0	0	0	CAPACITY	BAS SRD	Non-Drive					CORE	30540332S						30540332	456-104-3	VMAX 10H	SYMMETR SOFTWARE	126	
118																														
119																														
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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.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC							
1	Min #	Total S	Drives	Single	Annual	EOSL	Drive C	Capacit	SYR Re	Unit of	Software	Drive T	QA Cor	AD Cor	Model	Count	LOB	Product	New TI	TLA Ser	Uniquet	Contra	Array C	Sales C	Model	Item Di	Product	Product	Contra							
2	0	0	0	0	0	0	0	0	0	240	FRAME	HARDWA	Non-Drive	Total Drive count exceeds												1	CORE	HK192600484	HK1926000	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H
3	0	0	1	600	272.97	-	62	37200	-	-	CAPACITY	HARDWA	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
4	0	0	1	600	273.02	-	76	45600	-	-	CAPACITY	HARDWA	Non-SATA	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
5	0	0	1	2000	218.27	-	60	120000	-	-	CAPACITY	HARDWA	SATA	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
6	0	0	1	200	901.92	-	17	3400	-	-	CAPACITY	HARDWA	Non-SATA	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
7	0	0	1	2000	218.22	-	9	18000	-	-	CAPACITY	HARDWA	SATA	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
8	0	0	0	0	238	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
9	0	0	0	0	357	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	Cats	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
10	0	0	0	0	18758.25	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	Cats	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
11	0	0	0	0	532	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	Cats	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
12	0	0	0	0	425.6	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
13	0	0	0	0	14397.95	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
14	0	0	0	0	0	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
15	0	0	0	0	0	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
16	0	0	0	0	1912.05	-	0	0	-	-	HARDWA	Non-Drive	-	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
17	0	0	0	0	0	-	0	0	-	-	FRAME	HARDWA	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
18	0	0	0	0	110.6	-	0	0	-	-	CAPACITY	ENGINEUT	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
19	0	0	0	0	0	-	0	0	-	-	FRAME	Symm Pac	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
20	0	0	0	0	457.2	-	0	0	-	-	CAPACITY	Symm Pac	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
21	0	0	0	0	0	-	0	0	-	-	FRAME	SymmVP	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
22	0	0	0	0	219.6	-	0	0	-	-	CAPACITY	Adv FAST	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
23	0	0	0	0	0	-	0	0	-	-	SRDFS	Uj	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
24	0	0	0	0	396	-	0	0	-	-	CAPACITY	SRDFS	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
25	0	0	0	0	0	-	0	0	-	-	FRAME	SymmVP	Non-Drive	-	-	1	CORE	HK192600484	HK192600484	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
26	0	0	0	0	565.6	-	0	0	-	-	FRAME	ENGINEUT	Non-Drive	-	-	1	CORE	2	OSRBA02	3050413520	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
27	0	0	0	0	110.6	-	0	0	-	-	CAPACITY	ENGINEUT	Non-Drive	-	-	1	CORE	2	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
28	0	0	0	0	47.7004	-	0	0	-	-	CAPACITY	ENGINEUT	Non-Drive	-	-	1	CORE	3	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
29	0	0	0	0	4163.4	-	0	0	-	-	FRAME	Symm Pac	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
30	0	0	0	0	457.2	-	0	0	-	-	CAPACITY	Symm Pac	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
31	0	0	0	0	228.6	-	0	0	-	-	CAPACITY	Symm Pac	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
32	0	0	0	0	3332.92	-	0	0	-	-	FRAME	Adv FAST	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
33	0	0	0	0	219.6	-	0	0	-	-	CAPACITY	Adv FAST	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
34	0	0	0	0	109.8	-	0	0	-	-	CAPACITY	Adv FAST	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
35	0	0	0	0	3981.6	-	0	0	-	-	FRAME	SRDFS	Non-Drive	-	-	1	CORE	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H	64216200H							
36																																				

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

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	
1	Min	C	Total S	Drives	Single	Annual	EOSL	Drive C	SVR Re	Unit of	Software	Drive T	QA Cot	AD Cot	Model	Count	LOB	Product	New T	TLA Set	Unique	Contra	Array C	Sales V	Model	Item Z	Product	Prod	Contra	C	
82	0	200	1560	0	0	0	4632	0	0	-	FRAME	HARDWAL Non-Drive	OS License SVR did not dial back for this Set				CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-SYSIE	VMAX	10K	SYMMETR	HARDWAI	1	1
83	0	0	0	0	1	600	336.75	0	0	-	CAPACITY	HARDWAL Non-SATA					CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-AF1500U	VMAX	10K	SYMMETR	HARDWAI	50	1
84	0	10	16	0	1	600	336.75	132	79200	-	CAPACITY	HARDWAL Non-SATA					CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-AF1500U	VMAX	10K	SYMMETR	HARDWAI	132	1
85	0	0	0	0	1	600	336.75	0	0	-	CAPACITY	HARDWAL Non-SATA				2400	CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-AF1500U	VMAX	10K	SYMMETR	HARDWAI	4	1
86	0	0	0	0	0	0	472.5	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-DEISE	VMAX	10K	SYMMETR	HARDWAI	2	1
87	0	0	0	0	0	0	563.25	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-FEBOU	VMAX	10K	SYMMETR	HARDWAI	2	1
88	0	0	0	0	0	0	15750	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-NEE	EP VMAX	10K	SYMMETR	HARDWAI	2	1
89	0	0	0	0	0	0	704.25	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-FEBOU	VMAX	10K	SYMMETR	HARDWAI	2	1
90	0	0	0	0	0	0	0	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-FV40U	VMAX	10K	SYMMETR	HARDWAI	2	1
91	0	0	0	0	0	0	4632	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-SYSIE	VMAX	10K	SYMMETR	HARDWAI	2	1
92	0	0	0	0	0	0	0	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-JUR	VMAX	10K	SYMMETR	HARDWAI	16	1
93	0	0	0	0	0	0	0	0	0	-	HARDWAL Non-Drive						CORE	HK19E701003		HK19E701003	30540323H			30540323	BA-COINV	VMAX	10K	SYMMETR	HARDWAI	1	1
94	0	0	0	0	0	0	565.6	0	0	-	FRAME	ENGINUIT Non-Drive					CORE	HK19E701003		HK19E701003	30540323H			30540323	457-101-0	VMAX	10K	SYMMETR	SOFTWARE	1	1
95	0	0	0	0	0	0	86.1	0	0	-	CAPACITY	ENGINUIT Non-Drive					CORE	HK19E701003		HK19E701003	30540323S			30540323	456-104-3	VMAX	10K	SYMMETR	SOFTWARE	110	1
96	0	0	0	0	0	0	2052.9	0	0	-	FRAME	SYMM MG Non-Drive					CORE	HK19E701003		HK19E701003	30540323S			30540323	457-101-0	VMAX	10K	SYMMETR	SOFTWARE	1	1
97	0	0	0	0	0	0	149.4	0	0	-	CAPACITY	SYMM MG Non-Drive					CORE	HK19E													

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ				
1	Capacity	SYN	REV	UNIT	OF	Self	Drive	T	GA	Col	Model	Count	LOC	Product	Serial	Unit	Uniq	Conv	Array	Sal	Model	Rev	Prod	Sal	Model	Rev	Prod	Sal	Model	Rev	Prod	Sal	Model	Rev	Prod	Sal	Model	Rev	Prod
571	7200	-	FRAME	HARDWAI	NON-SATA	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30297456	VNX02D-VNXK5200	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/22/2014	Install	1.2																
572	600	CAPACITY	HARDWAI	NON-SATA	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30297456	V4-2510-E-VXK	6000	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/22/2014	Install	1.2																
573	12000	-	FRAME	HARDWAI	NON-SATA	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30127293	V4-2510-E-VXK	6000	VXNK	HARDWAI	2	12/15/2013	1/13/2017	ACTIVE	10/1/2013	-	Install	1.2															
574	0	-	FRAME	HARDWAI	NON-Drive	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30297456	VX02D-VXNK8	4-P	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/22/2014	Install	1.2															
575	0	-	FRAME	HARDWAI	NON-Drive	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30297456	C13-250V-250V	PWR	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/22/2014	Install	1.2															
576	0	-	FRAME	HARDWAI	NON-Drive	OE	Licent	it appears that the customer pi	CORE	APM00135082284	APM00135082284	30297456	VX02D-VXNK8	2-K	VXNK5200	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/22/2014	Install	1.2														
577	0	-	FRAME	CAPACITY	VXNK	-	PER	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	VX02D-VXNK8	OE	VXNK	HARDWAI	1	12/15/2013	12/14/2016	ENTRE	-	12/19/2013	Install	1.4															
578	0	-	FRAME	VXNK	-	LOC	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	VX02D-VXNK8	OE	VXNK5200	VXNK	SOFTWARE	1	12/15/2013	12/18/2016	ACTIVE	12/13/2013	12/19/2013	Install	1.2															
579	0	-	FRAME	VXNK	-	REN	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	VX02D-VXNK8	OE	VXNK5200	VXNK	SOFTWARE	1	12/15/2013	12/18/2016	ACTIVE	12/13/2013	12/19/2013	Install	1.2															
580	0	-	FRAME	VXNK	-	VXNK	-	LOC	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	UNISE-VXNK5200	VXNK	SOFTWARE	1	12/15/2013	12/18/2016	ACTIVE	12/13/2013	12/19/2013	Install	1.2															
581	0	-	FRAME	VXNK	-	OE	Non-Drive	CORE	APM00135082284	045101000	30297456	VX02D-VXNK8	OE	VXNK5200	VXNK	SOFTWARE	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	12/19/2013	Install	1.2															
582	0	-	FRAME	RP	-	Local	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	456-104-R	RP	SE	RECOVER	SOFTWARE	1	12/15/2013	4/14/2014	ABANDON	12/13/2013	12/15/2013	Install	1.2															
583	0	-	FRAME	RP	-	Remic	Non-Drive	CORE	APM00135082284	APM00135082284	30297456	456-104-R	RP	SE	RECOVER	SOFTWARE	1	12/15/2013	4/14/2014	ABANDON	12/13/2013	12/15/2013	Install	1.2															
584	7200	-	FRAME	HARDWAI	NON-SATA	Software	it appears that the customer pi	CORE	APM00135082283	APM00135082283	30297499	VX02D-VXNK5200	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/19/2014	Install	1.2																	
586	600	CAPACITY	HARDWAI	NON-SATA	OE	Licent	it appears that the customer pi	CORE	APM00135082283	APM00135082283	30297499	V4-2510-E-VXK	6000	VXNK	HARDWAI	1	12/15/2013	1/13/2017	ACTIVE	12/13/2013	1/19/2014	Install	1.2																
587																																							

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.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC																						
	Min # C	Total S	Drives	Single	Annual	EOSL	Drive C	Capaci	SYR Re	Unit of	Softwa	Drive T	QA Col	AD Cor	Model	Count	LOB	Produc	New TI	TJA Sel	Unique	Contra	Array C	Sales C	Model	Item D	Produc	Contra																							
1191	0	0	0	0	4717.44	-	0	0	-	FRAME	Isilon - En	Non-Drive	-	-	-	-	CORE	SN400	301248-0233	-	6379IS	-	-	30115336	301-0233	EA811-PO	ISILON	SOFTWARE	1																						
1192	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV542120009J	CNV54212	3630IS	-	-	30115337	851-0170	Switch IB	ISILON	HARDWAI	1																							
1193	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV542120002F	CNV54212	3630IS	-	-	30115337	851-0170	Switch IB	ISILON	HARDWAI	1																							
1194	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV542120006C	CNV54212	6379IS	-	-	30115336	851-0170	Switch IB	ISILON	HARDWAI	1																							
1195	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV542120005F	CNV54212	6379IS	-	-	30115336	851-0170	Switch IB	ISILON	HARDWAI	1																							
1196	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV142110005A	CNV14211	6212IS	-	-	64532438	851-0170	Switch IB	ISILON	HARDWAI	1																							
1197	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV14211000A9	CNV14211	6212IS	-	-	64532438	851-0170	Switch IB	ISILON	HARDWAI	1																							
1198	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV14211000A1	CNV14211	6922IS	-	-	64532479	851-0170	Switch IB	ISILON	HARDWAI	1																							
1199	0	0	0	0	558.4	-	0	0	-	SWITCH	HARDWAI	Non-Drive	-	-	-	-	CORE	CNV1441100283	CNV14411	6922IS	-	-	64532479	851-0170	Switch IB	ISILON	HARDWAI	1																							
1200	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A114800001L	A11480000	6212IS	-	-	64532438	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1201	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A114800005L	A11480000	6212IS	-	-	64532438	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1202	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500004L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1203	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500004L	A13250000	30207482IS	-	-	30207482	851-0154	CABLE IB	ISILON	HARDWAI	2																							
1204	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500004L	A13250000	30207482IS	-	-	30207482	800-0012	PWRCRD	ISILON	HARDWAI	1																							
1205	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500004L	A13250000	30207482IS	-	-	30207482	800-0010	PWRCRD	ISILON	HARDWAI	1																							
1206	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1207	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0154	CABLE IB	ISILON	HARDWAI	2																							
1208	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0012	PWRCRD	ISILON	HARDWAI	1																							
1209	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0010	PWRCRD	ISILON	HARDWAI	1																							
1210	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1211	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0154	CABLE IB	ISILON	HARDWAI	2																							
1212	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0012	PWRCRD	ISILON	HARDWAI	1																							
1213	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0010	PWRCRD	ISILON	HARDWAI	1																							
1214	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1215	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0154	CABLE IB	ISILON	HARDWAI	2																							
1216	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0012	PWRCRD	ISILON	HARDWAI	1																							
1217	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0010	PWRCRD	ISILON	HARDWAI	1																							
1218	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1219	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0154	CABLE IB	ISILON	HARDWAI	2																							
1220	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0012	PWRCRD	ISILON	HARDWAI	1																							
1221	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	800-0010	PWRCRD	ISILON	HARDWAI	1																							
1222	0	0	0	0	2869	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	A132500002L	A13250000	30207482IS	-	-	30207482	851-0066	IQ ACCELE	ISILON	HARDWAI	1																							
1223	36	36	4	400	17520.91	-	4	1600	-	NODE	HARDWAI	Non-SATA	-	-	-	-	CORE	SK400	301409-0030	SK400	301	30409482IS	-	-	30409482	X400-SAT	X400-96T	ISILON	HARDWAI	1																					
1224	0	0	32	3000	0	-	32	96000	-	NODE	HARDWAI	SATA	-	-	-	-	CORE	SK400	301409-0030	SK400	301	30409482IS	-	-	30409482	611-0076	96TB HDD	ISILON	HARDWAI	1																					
1225	0	0	0	0	0	-	0	0	-	NODE	HARDWAI	Non-Drive	-	-	-	-	CORE	SK400	301409-0030	SK400	301	30409482IS	-	-	30409482	612-0021	96GB RAM	ISILON	HARDWAI	1																					
Serial Numbers for Macros																															Scoping			Sheet1			Sales Order Numbers for Macros			Product Ref Sheet			EA Format RA...								

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.