

The Use Of Encryption For Sanitization: A Case Study

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- Protect Sensitive Data
 - Government, Military secrets, Corporate IP, Client database
- Avoid Data Breach
 - Medical records / social security numbers / financial records
- Citizens' Right To Be Forgotten
 - Social media posts, chat-rooms, photos
- General Data Protection Regulation (GDPR)
 - Know exactly where specific data is located

Why Sanitize?



 ..and be able to securely and demonstrably eradicate all copies of that data on demand





Sanitization (NIST Purge) & Erasure Verification

- NIST 800-88 r1
 - Replaced DoD standard
 - Defines 3 sanitization levels: Clear, Purge, Destroy
 - Purge:
 - Hinder subsequent attempts to recover purged data
 - Be media-agnostic
 - Allow re-use of the media

Includes reading ALL blocks, processing the physical data against controller-specific elements (e.g. ECC, XOR, bit / byte-striping) and searching for test byte patterns

- - Can any purged user data be recovered even at the deepest "bit-level" of the physical media? CERTIFICATE

Flash Memory Summit 2019 Santa Clara, CA





NIST = National Institute of Standards and Technology



Purge Sanitization Methods (closed-source 3rd party SSD design)

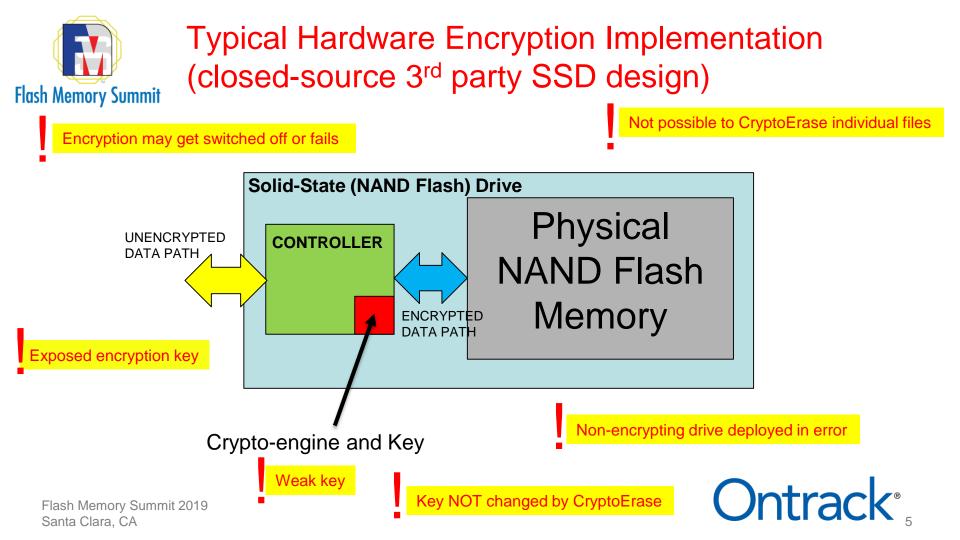


- Flash Block Erase all NAND cells programmed to set level
 - Not optimal for Flash -
 - · drives which store firmware metadata
 - Some areas of NAND may not be completely erased (e.g. if defective)
 - Can only be done by controller (we do not have direct access to Flash)

CryptoErase – utilizes hardware encryption (shred DEK (Data Encryption Key))

- Thorough, includes hidden, active and blocks marked "bad", defective blocks
- Very fast no need to update every NAND block
- Can be done both outside and inside the drive..

Q: What are the potential drawbacks of using SSD hardware encryption inside the drive alone?





Case Study – Fabric-Attached NetApp[®] Storage (FAS) ONTAP Secure-Purge

- **ONTAP Secure-Purge function:-**
 - Meets 800-88 r1 purge sanitization guidelines •
 - Non-disruptive •
 - Ensures that "scrubbed" deleted data will not be recoverable at physical ٠ level
 - Allows scrubbing of individual deleted files ٠
 - Remediates data "spillage" / data contamination ٠
 - Utilizes cryptographic erase •
 - Encryption managed outside the drive and optionally enabled inside FIPS-140 certified encrypting drive hardware
 - Key-management and block-level encryption



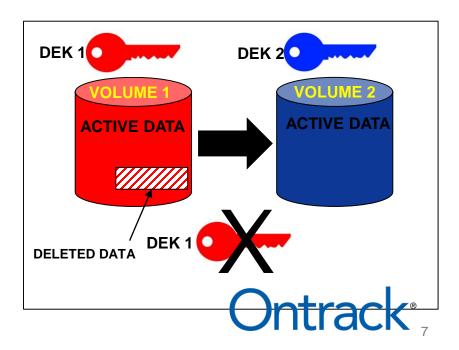


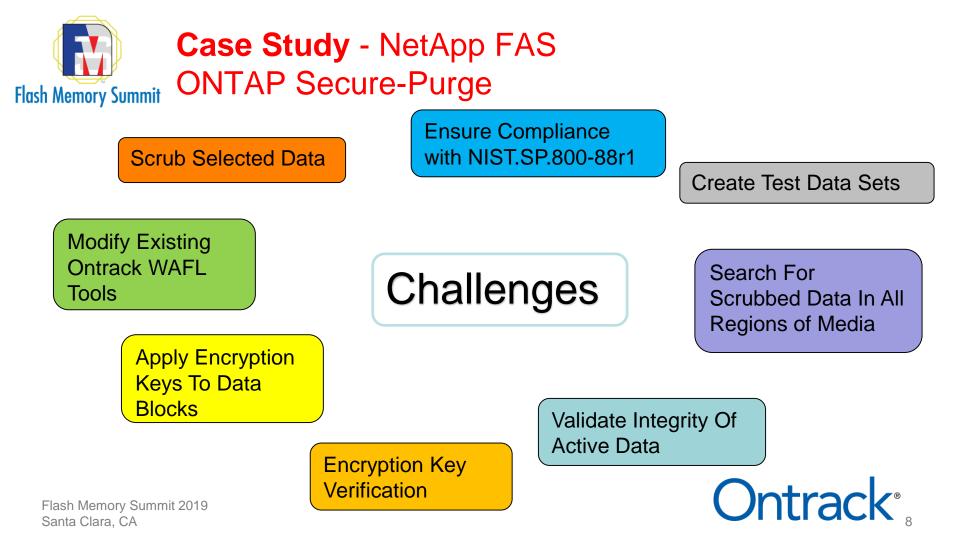
Case Study - NetApp FAS ONTAP Secure-Purge

- Scenario:-
 - Need to selectively delete and purge a specific data set / file from an encrypted volume on a Flash array...
- ONTAP Secure Purge overview:-
 - Delete the target data / set file from volume encrypted with DEK 1
 - 2. Create a new encrypted volume with new encryption DEK 2
 - 3. Copy only blocks belonging to **active** files / data sets to new volume
 - 4. Destroy DEK 1



NetApp AFF-A300 FAS 12 x 960GB SSD







Case Study - NetApp FAS ONTAP Secure-Purge

- Conclusions
 - Use of 3rd party closed-source SSD hardware encryption carries with it some risks external encryption is better
 - NetApp's secure-purge process had wiped the encryption key from the system and the scrubbed data was not recoverable
 - The data sanitization process used was effective; NetApp's software was functioning properly, and Ontrack was able to verify the results independently
 - The Secure-Purge function meets the needs of those who require secure non-disruptive deletion of individual files

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F1He1p #9D6EFC9 935F5A16 BFA595CE 8737030H 6CH36C27 5C8A7660 38F44012 8F138AB3 184EFA10 B529BE51 E4603FEF 4603FEF54 48899A2C 3F77E44F	4F52525: F2Search (42519.3 e 4 *9:42,0 E342528 IEEEBC8 5AF634E1 99E84.14 E5D169F1 AF5051 79E84.14 B3851FF 182506 797150CR 797150CR 797150CR 797150CR 797150CR	F3360 To £7360 To £077,656 of BB824C2F 48558855 5C590 CRC 500 CRC 40814580 30685187 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 26878737 2777777 26878737 26878737 2777777 268784305 39381770 189844700 189844805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 189244805 <	1,875,385 7F4337E4 64957823 64957E2C 888F9702 E53E95CE 554024F5 38081427 44916519 7F277485 2C581945 7F277485 2C581945 7F277485 2C6814ACB 88187248 88187248 88187248 818748 8187248 8187248 8187248 8187248 8187248 8187248 8187248 8187248 8187248 8187248 818758 818	008 14025109.1 1956B6E3 1766F400 E3141CF3 82DF0EAC 6022079E 008BB89A 008BB89A 008BB89A 008BB89A 008BB89A 008BB89A 0058B84 5555FCM 55555FCM 5555FCM 555	0x00 B9826C155 9943E796 6570431D 28400797 CB25CCE8 740F918E 240C8570 24629F58A D2904E51 B5254255 92125633 92125633 92125633 92125638 921256380 22584059 120774689 22584018E F7312F04 57445887	dit 35041 1 	F8Print BB of 0		0356 ×0208 ×0208 ×1 f f f f f f f f	·Cp@% · ·i ·% · · · · 1D
F1He1p 49D6EFC29 935F5416 BFA595068 873703096 6CR36C224 SC847660 38E44012 8F188883 8E44012 8F188883 8E44012 8F188883 104EE710 104EE710 104E57	4F525255 F2Search F2Search F2Search E342528 IEEEBC81 59F634E 99E8414 E5D169F E5D169F E5D169F E4F066 93831FF 99B1600 E296687 10C3F0E 79719CA 79BAAC00 B882E4A 00C6C64 1256024 1469309 70887F0	F3Go To 2077,656 077,656 off 48558855 CSD00C00 48558855 CSD00C00 3 6DE5187 24854857 26874857 3 6DE5187 26874874 3 6285487 2687497 2687497 2687497 2687497 2687497 2687497 2687497 2687493 3 6984087 20454053 93089407 1 93076767 9 10896067 9 10896067	1,875,985, 	008 19568663 1766F400 23141CF3 820F0EAC 60220792 0088BA9A 30545025 2555FCAA 5EF58022 E769387F 01600F98 AC6C57AA DA150070 21600F98 AC6C57AA DA150070 24500503 F421A108 E0750HA7 2880DE1C7 39740088	9x01 B9826C15 9943E796 65708310 28406C797 C825CE2 240C8570 240C8570 240C8570 240C8570 240C8570 225502 2469F58A D290RE51 B5258255 92125633 84839099 2E98048 25284255 92125633 8483909 2E98048 5254255 92125633 8483909 2E98048 5254255 92125633 8483909 2E98048 5254255 92125633 8483909 2E98048 5254255 1277689 12776	dit 350411 I 	F8Print BB of 0 		0356 ×0208 ×0208 ×1 + - - - - - - - - - - - - - - - - - -	Cp@% · · i · % · · · · 1D
F1He1p # Deltes 6 935F5A16 BFA595CC 8737D30H 6CR36C2P 5C877666 38E44D12 8F183RB3 1H4EEA10 B529BE51 E4603FEE DB8BA566 F6EC3AFT B5CDFF54 48B39A2C 3F77E44F F02F6CA5 2766F18C F3630678	4F52525: F2Ssarch H22Sarch H22Sarch H22Sarch H25H52	F3GoTo F3GoTo correst 18824C2F 44558855 c5090C60C 40814385 40814385 360E5187 360E5187 263E267 263E267 360E5187 263E267 263E27 263E37 62627 270757 28984205 19054962 91059600 91059600 95744448	1.875,385, 	008 14025109 1 19568663 1766F400 5314105 3 820F0640 60220792 00888094 30545027 5E555064 5FE50806 5FE50806 5FE50806 5FE50805 5FE00806 5FE50805 904507 90570407 93740088 c4843764	9x00 9943E796 65708310 24640C797 0255CE3 0255CE3 0255CE3 0259CE3 02908E51 02908E51 02908E51 02908E53 02908E53 02908E53 02908E53 02908E53 02908E53 02908E53 02125645887 0212564587 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 021256587 021256587 021256587 021256587 021256587 021256587 021256587 021256587 021255587 021255587 021255587 021	dit 5041 1 8.M. 	F8Print BB of 0		0356 .v0208 .v. f. f. f. f. f. t. t. t. t. t. t. c. t. t. t. t. t. t. t. t. t. t. t. t. t.	Cp@%
F1He1p 49D6EFC9 935F5416 BFA595CB 87370306 6CR36C29 5C847660 38844012 8F138AB3 144EF110 B529BE51 E4603FEF 40B34C25 D88BA566 F6C33AF7 B5CDFF54 48899A20 3F77E44F F02F6C45 CF3306A2B 97C60573 77C645 F02F6C45 F02F77 F02F6C45 F	4F52525: F2Search #22sarch =9:42,0 =9:42,0 =9:42,0 =1EEEc8 58F634E1 9505451 9505451 9505451 9505451 9505451 9505451 9505451 9719054 1256024 10	F3Go1o 207654 77,556 of 8882422F 48558855 50500CRC 40814586 5055187 40814580 5026757 40814580 5026757 5026757 5026757 50276775 50276775 50276775 50276775 50276775 5028658 403811770 50276775 5028658 403811770 5028658 502865 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 502865 5028658 5028658 5028658 5028658 5028658 502865 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 5028658 502865 5028658 502865 50285 502865 50285 502865 502865 50285 502865 502865 50285 502865 502865 502865 502865 50285 502865 502865 50285 502865 50285 50285 50285 50285 50285 50285 500	1,875,985 - 6,774,837,68 - 405,89,05 - 6,899,762,62 - 6,899,762,62 - 5,849,24,75 - 9,808,14,27 - 9,808,14,27 - 9,808,14,27 - 9,808,14,27 - 1,247,84 - 1	008 14025109 1 19568663 1766F400 5314105 3 820F0640 60220792 00888094 30545027 5E555064 5FE50806 5FE50806 5FE50806 5FE50805 5FE00806 5FE50805 904507 90570407 93740088 c4843764	9x00 9943E796 65708310 24640C797 0255CE3 0255CE3 0255CE3 0259CE3 02908E51 02908E51 02908E51 02908E53 02908E53 02908E53 02908E53 02908E53 02908E53 02908E53 02125645887 0212564587 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 02125645887 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 0212564587 021256587 021256587 021256587 021256587 021256587 021256587 021256587 021256587 021255587 021255587 021255587 021	dit 350411 I 2. 	F8Print BB of 0 	×0DF9 0 / 0 /7. U@2.6 	0356 .v0208 .v. f. f. f. f. f. t. t. t. t. t. t. c. t. t. t. t. t. t. t. t. t. t. t. t. t.	Cp@%
F1He1p 49D6EFC9 935F5A16 BFA595CC 8737030h 6CR366C2 5C877666 38E44012 8F183AB3 144E410 8529B531 44693FE D8884564 8520FF54 48899A2C 3F77E44F F02F6CR3 870724 F02F6CR5 2766F18C F3306A22 97EC0573 323F400573 323F400573 323F400573 323F400573 323F400573 323F400573 323F400574 323F400573 323F400573 323F400573 323F400573 323F400574 323F40574 323F40574 323F40574 323F55757 323F5575 323F5757 32757577 32757577 32757577 32757577 32757577 32757577 327575777 32757577 32757777 327577777777777777777777777777777777777	4F52525: F2Ssarcb H221A354 =9:42.0 E342528 IEEEBC81 5AF634E1 99E84.14 E5D169F1 4F19911; 7161774 R4F19911; 7161774 R4F19911; 7161774 R4F19911; 7161774 R4F19911; 7161774 R4F19911; 7161774 R4F1911; 716174 R4F1911; 7063R4 79719054 R451254 R45	F3GoTo F3GoTo correst 18824C2F 44558855 c5090C60C 40814385 40814385 360E5187 360E5187 263E267 263E267 360E5187 263E267 263E27 263E37 62627 270757 28984205 19054962 91059600 91059600 95744448	1.875,385 7Fe337En 40589236 6699FCECC 8088F9702 E58E95CE 554024F5 3808E1227 40916519 27503955 27503955 27503955 22651064 818677578 22651062 27503955 22659050 292695082 26290824 276264082 27626408 276	008 14025109 1 19568663 1766F400 53141CF3 820F06F4C 60220792 0088B49A 30545027 5E55FCAA 5FF58026 5FF58026 5FF58026 5FF58026 5FF58026 5FF58026 5FF58026 5FF58026 5FF58026 5F55806 5F55806	9x00 9 9x3276 99432796 6770R310 2R40C797 02825C158 02825C158 02825C158 02825C158 0290R551 0290R551 0290R551 0290R551 0290R551 0290R551 0290R551 0290R551 0290R551 021256 02156 0215	iit 350411 I 	F8Print BB of 0 		0356 .v0208 .v. f. f. f. f. f. t. t. t. t. t. t. c. t. t. t. t. t. t. t. t. t. t. t. t. t.	Cp@%





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