

SNIA Emerald Spec V4.0 Draft (emphasis on changes)

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Data Center Storage
Stakeholder Meeting

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Emerald 4.0 Draft - Overview

- Minor changes (not identified here)
 - ◆ Definitions added & updated
 - ◆ Editorial & ISO formatting
- Sustentative changes (details follow)
 - ◆ Taxonomy has been revised
 - ◆ COM testing

Taxonomy Sets

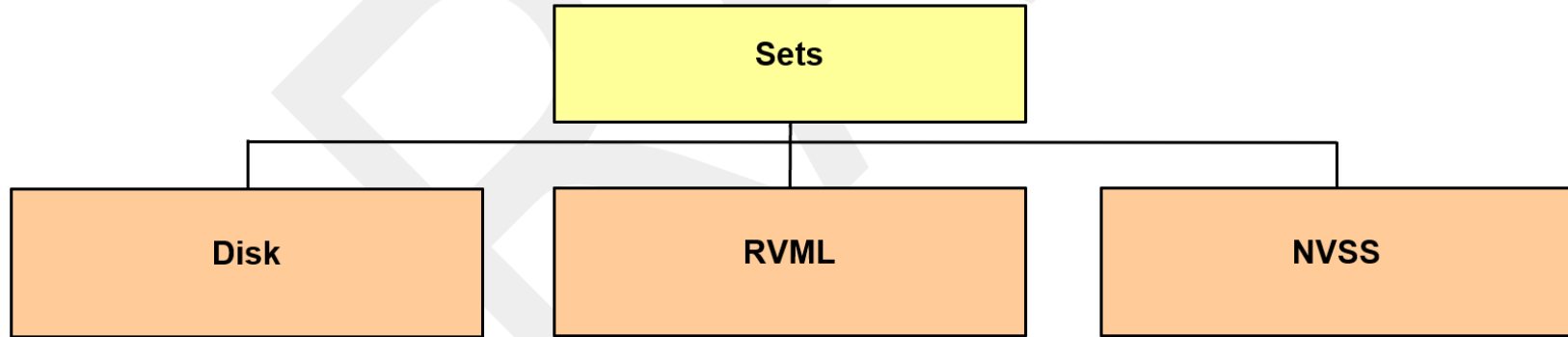


Figure 1 – Taxonomy Overview

Taxonomy sets define broad groupings of storage products that share similar system characteristics. Products in different sets are generally not comparable in performance or power efficiency characteristics.

Taxonomy Categories

Set					
Disk		RVML		NVSS	
Category					
Online	<u>Near-Online</u>	Removable Media Library	Virtual Media Library	Disk Access	Memory Access

Taxonomy categories define broad market segments within a Set that can be used to group products that share common functionality or performance requirements, and within which meaningful product comparisons can be undertaken. This document defines six broad taxonomy categories.

Attribute	Category: Disk Set Online						
	Classification: Online						
	1 ^a	1.5	2	3	4	5	6
Access Pattern	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential
MaxTTFD	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms
Media Type	Magnetic disk	Magnetic disk	Magnetic disk	Magnetic disk	Magnetic disk	Magnetic disk	Magnetic disk
Access Paradigm	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object
Multi-host Shareability	Not Specified	Ability to share with 1 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts
Consumer/ Component	Yes	No	No	No	No	No	No
Storage Controller	Optional	Optional	Required	Required	Required	Required	Required
Storage Protection	Optional	No	Required	Required	Required	Required	Required
No SPOF	Optional	Optional	Optional	Optional	Required	Required	Required
Stable Storage Support	Optional, unless Required by protocol	Optional, unless Required by protocol	Optional, unless Required by protocol	Required	Required	Required	Required
Non-Disruptive Serviceability	Optional	Optional	Optional	Optional	Optional	Required	Required
FBA/CKD Support	Optional	No	Optional	Optional	Optional	Optional	Required
System Capacity ^b	≥ 1	≥ 4	≥ 4	≥ 12	> 100	> 400	> 400

^a No test procedure for this Classification is provided by this document.

^b There is no upper limit on the number of drives in any Classification.

Disk Set Online Category



The Disk Set consists of storage products based on rotating media devices, typically magnetic disks.

The Disk Set Online Category defines the features and functionalities for an online, random-access, rotating media-based storage product.

Products in this profile may provide any combination of block, file, or object interfaces.

This Table defines the requirements for the taxonomy classifications (Disk Set Online Online 1, etc.) defined in this category.

Disk Set Near-Online Category

Attribute	Category: Disk Set Near-Online						
	Classification: Near-Online						
	1 ^a	1.5 ^b	2	3	4 ^b	5	6
Access Pattern	Random/ Sequential		Random/ Sequential	Random/ Sequential		Random/ Sequential	Random/ Sequential
MaxTTFD	> 80 ms		> 80 ms	> 80 ms		> 80 ms	> 80 ms
Media Type	Magnetic disk		Magnetic disk	Magnetic disk		Magnetic disk	Magnetic disk
Access Paradigm	Block, File, Object		Block, File, Object	Block, File, Object		Block, File, Object	Block, File, Object
Multi-host Shareability	Not Specified		Ability to share with 2 or more hosts	Ability to share with 2 or more hosts		Ability to share with 2 or more hosts	Ability to share with 2 or more hosts
Consumer/ Component	Yes		No	No		No	No
Storage Controller	Optional		Optional	Required		Required	Required
Storage Protection	Optional		Optional	Required		Required	Required
No SPOF	Optional		Optional	Optional		Optional	Required
Stable Storage Support	Optional, unless Required by protocol		Optional, unless Required by protocol	Required		Required	Required
Non-Disruptive Serviceability	Optional		Optional	Optional		Optional	Required
FBA/CKD Support	Optional		Optional	Optional		Optional	Optional
System Capacity ^c	≥ 1		≥ 4	≥ 12		> 100	> 1 000
^a No test procedure for this Classification is provided by this document. ^b Classification is not defined; no test procedure is provided by this document. ^c There is no upper limit on the number of drives in any Classification.							

The Disk Set consists of storage products based on rotating media devices, typically magnetic disks.

The Disk Set Near-Online category defines the features and functionalities for a near-online, random-access rotating media-based storage product. Products in this profile employ MAID or FCAS architectures as well as any combination of block, file, or object interfaces. This Table defines the requirements for this taxonomy classifications (Disk Set Near-Online Near-Online 1, etc.) defined in this category

RVML Set Removable Library Category

Attribute	Category: RVML Set Removable Library						
	Classification: Removable						
	1	1.5 ^a	2	3	4 ^a	5	6
Access Pattern	Sequential		Sequential	Sequential		Sequential	Sequential
MaxTTFD	≤ 5 min		≤ 5 min	≤ 5 min		≤ 5 min	≤ 5 min
Media Type	Magnetic tape, optical disk		Magnetic tape, optical disk	Magnetic tape, optical disk		Magnetic tape, optical disk	Magnetic tape, optical disk
Access Paradigm	Block		Block	Block		Block	Block
Robotics	Prohibited		Required	Required		Required	Required
No SPOF	Optional		Optional	Optional		Optional	Required
Non-disruptive Serviceability	Optional		Optional	Optional		Optional	Required
System Capacity	Not Specified		≤ 4	≥ 5 ^b		≥ 25 ^b	≥ 25 ^b
^a Classification is not defined; no test procedure is provided by this document. ^b There is no upper limit on the number of drives.							

This category defines the features and functionalities for storage products that rely on automated or manual media loaders (e.g., tape or optical libraries). This Table defines the requirements for the taxonomy classifications defined in this category.

Note: In this document, the Category name RVML Set Removable Media Library Category name is often expressed as simply Removable Media Library Category.

RVML Set Virtual Media Library Category

Attribute	Category: RVML Set Virtual Media Library						
	Classification: Virtual						
	1	1.5 ^a	2	3	4 ^a	5	6
Access Pattern	Sequential		Sequential	Sequential		Sequential	Sequential
MaxTTFD	≤ 80 ms		≤ 80 ms	≤ 80 ms		≤ 80 ms	≤ 80 ms
Media Type	Magnetic disk, Solid State Storage		Magnetic disk, Solid State Storage	Magnetic disk, Solid State Storage		Magnetic disk, Solid State Storage	Magnetic disk, Solid State Storage
Access Paradigm	Block		Block	Block		Block	Block
Storage Protection	Optional		Optional	Required		Required	Required
No SPOF	Optional		Optional	Optional		Optional	Required
Non-Disruptive Serviceability	Optional		Optional	Optional		Optional	Required
System Capacity	≤ 12		> 12 ^b	> 48 ^b		> 96 ^b	> 96 ^b
^a Classification is not defined; no test procedure is provided by this document. ^b There is no upper limit on the number of drives.							

This operational profile defines the features and functionalities for sequential-access storage products that rely on non-removable storage media to provide a Virtual Media Library. This Table defines the requirements for the taxonomy classifications (RVML Set Virtual Media Library Virtual 1, etc.) defined in this category.

Note: In this document, the Category name RVML Set Virtual Media Library Category name is often expressed as simply Virtual Media Library Category.

NVSS Set Disk Access Category

Attribute	Category: NVSS Set Disk Access						
	Classification: Online						
	1 ^a	1.5	2	3	4	5	6
Access Pattern	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential	Random/ Sequential
MaxTTFD	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms	≤ 80 ms
Media Type	Solid State Storage	Solid State Storage	Solid State Storage	Solid State Storage	Solid State Storage	Solid State Storage	Solid State Storage
Access Paradigm	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object	Block, File, Object
Multi-host Shareability	Not Specified	Ability to share with 1 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts	Ability to share with 2 or more hosts
Consumer/ Component	Yes	No	No	No	No	No	No
Storage Controller	Optional	Optional	Required	Required	Required	Required	Required
Storage Protection	Optional	Not integrated	Required	Required	Required	Required	Required
No SPOF	Optional	Optional	Optional	Optional	Required	Required	Required
Stable Storage Support	Optional, unless Required by protocol	Not integrated	Optional, unless Required by protocol	Required	Required	Required	Required
Non-Disruptive Serviceability	Optional	Optional	Optional	Optional	Optional	Required	Required
FBA/CKD Support	Optional	Not integrated	Optional	Optional	Optional	Optional	Required
System Capacity	consumer	JBOD	very small	small	medium	large	mainframe

The NVSS Set consists of storage products based on non-volatile Solid State Storage.

The NVSS Set Disk Access Category defines the features and functionalities for an online, random-access, Solid State Storage-based disk access storage product. A storage product offers disk access if it provides data access using a storage paradigm, i.e., open, close, read, and write.

Products in this profile may provide any combination of block, file, or object interfaces. This Table defines the requirements for the taxonomy classifications (NVSS Set Disk Access Online 1, etc.) defined in this category.

^a No test procedure for this Classification is provided by this document.

NVSS Set Memory Access Category

The NVSS Set consists of storage products based on non-volatile Solid State Storage.

The NVSS Set Memory Access Category defines the features and functionalities for an online, random-access, Solid State Storage-based memory access storage product. A storage product offers memory access if it provides host access to storage using memory primitives, e.g., load and store.

Products in this profile provide a memory interface.

Note: Currently there is no Test Methodology defined for this Category

Classification Attributes

Classifications in all Sets and Category are distinguished by a set of attributes. This sub clause specifies the requirements for a product that has each of the attributes.

Attributes are defined in Emerald V4.0. Only the following is identified here:

For the NVSS Set Disk Access Classification, System Capacity is specified qualitatively as one of:

- consumer: A system marketed primarily for personal, family, household, or small-business purposes.
- JBOD: A single enclosure providing no storage protection.
- very small: An entry level system with relatively small capacity and limited expandability.
- small: An entry level system with relatively higher capacity and more expandability than the very small system.
- medium: A higher capacity system that may have higher expandability than the small capacity system and with significantly more capabilities than the small systems.
- large: A system with very high capacity and greater expandability compared to the medium and small systems intended for large Enterprises.
- mainframe: A large system intended for Mainframe applications.

An NVSS Set Disk Access Classification storage product meeting the System Capacity attribute shall meet the qualitative description given.



Random Block Access and File Access Capacity Optimization Test

Generating Data Sets

Each data set will be created in a directory named by the user located on the product under test.