



SoftRAID: High Performance Storage

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1. **SoftRAID features**
2. **What's new in SoftRAID and at OWC**
3. **Upcoming Features and Products**





1. SoftRAID features

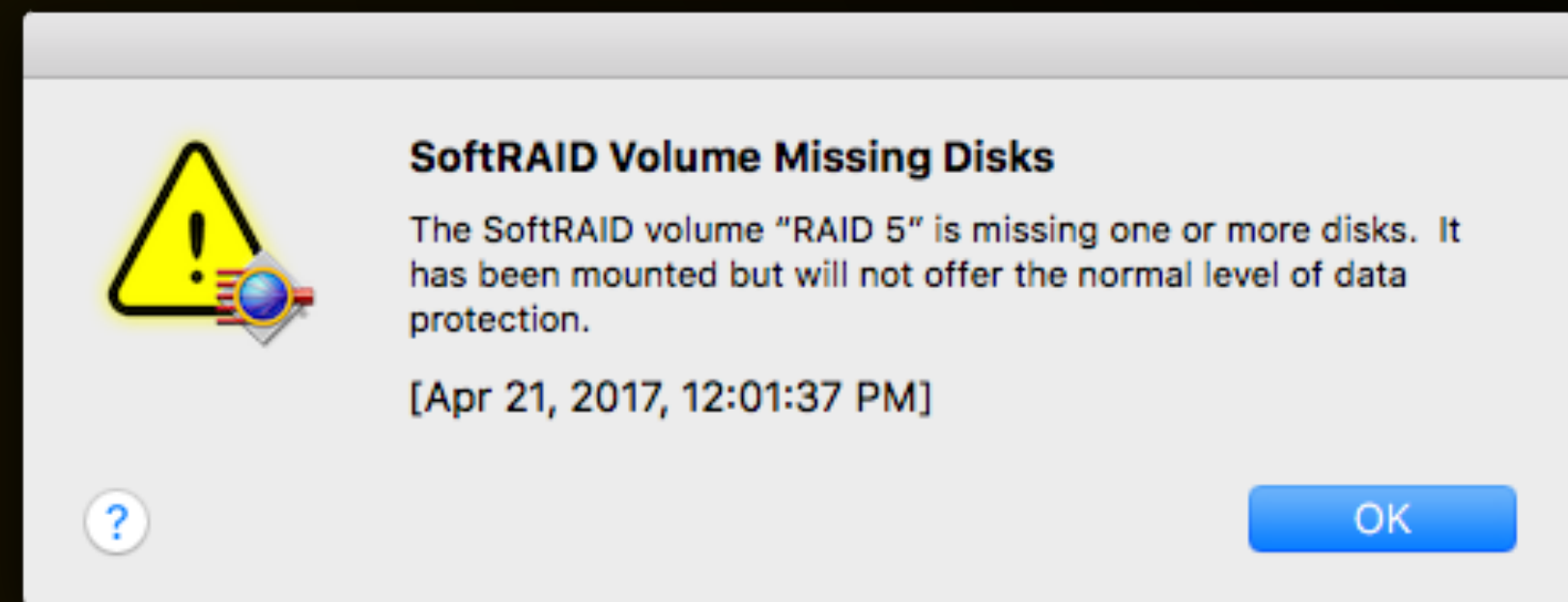
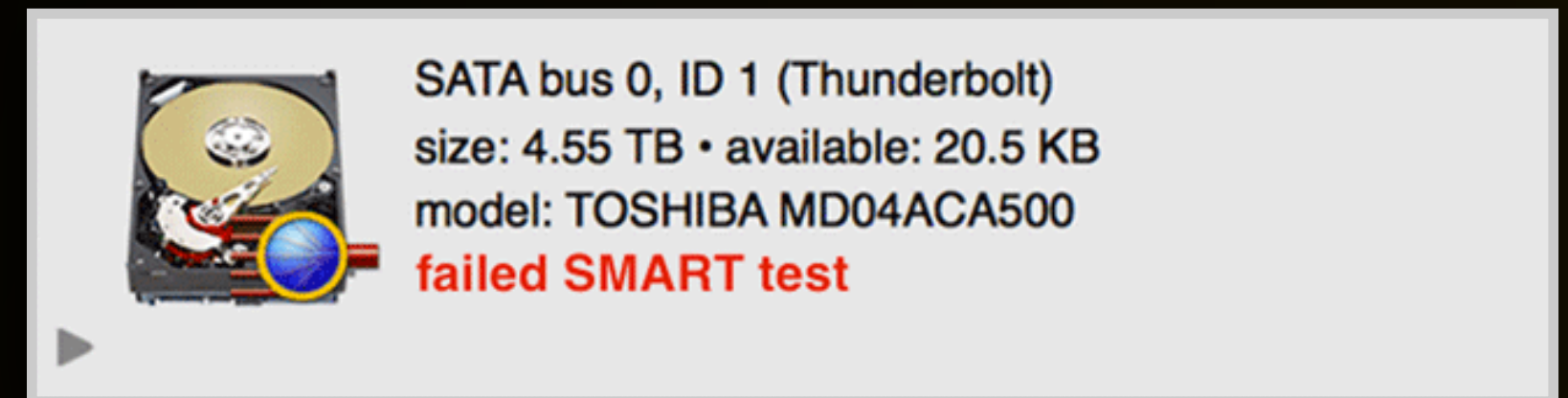
SoftRAID Protects Your Data



Before you use a disk



While using your disks



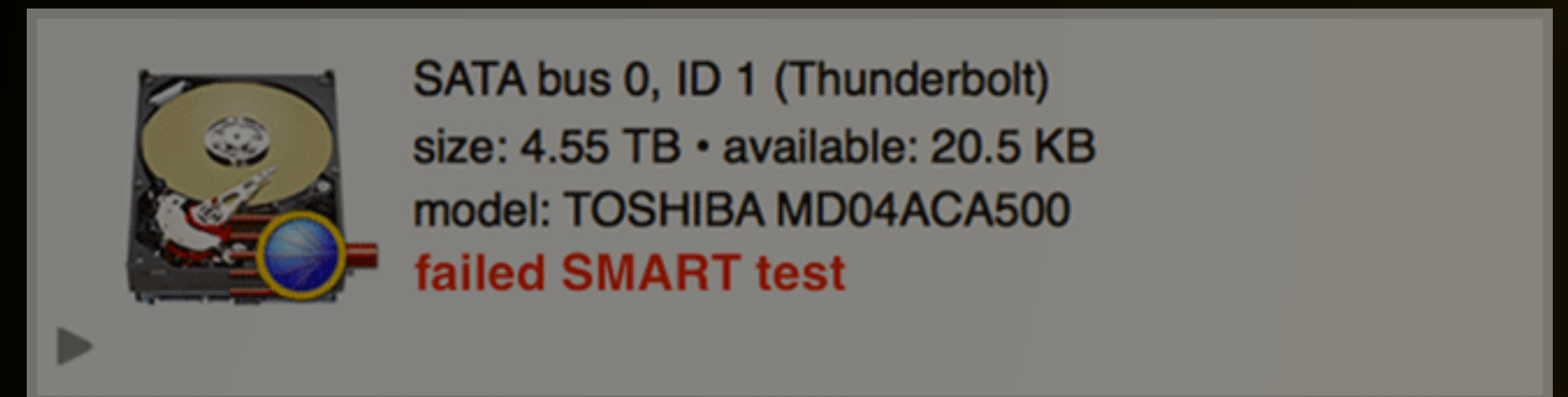
After a disk drive fails

SoftRAID Protects Your Data



Before you use a disk

• *While using your disks*



• *After a disk drive fails*

Certifying a disk with SoftRAID



SATA bus 0, ID 0 (Thunderbolt)
size: 6 TB • available: 0 bytes
model: TOSHIBA MD04ACA600
certifying, pass 2 of 3 - writing pattern • 0 errors
current offset: 23,622,320,128 • time remaining: 30:07:11



SoftRAID Protects Your Data



Before you use a disk

- *While using your disks*



- *After a disk drive fails*

Monitoring disks with SoftRAID



Barracuda • SATA bus 0, ID 1 (Thunderbolt)

size: 2 TB • available: 512 bytes

model: ST2000DM001-9YN164

disk failure predicted

SoftRAID ID: 063F39F66A7E92C0 • disk identifier: disk2

total bytes: 2,000,398,934,016

format: GPT (for Intel)

SN: W240BZMC • firmware: CC4B

SMART status: passed test • **failure predicted**

reallocated sectors: 20608 • unreliable sectors: 360

i/o requests: 153,674 • i/o errors: 0 • hours of use: 99

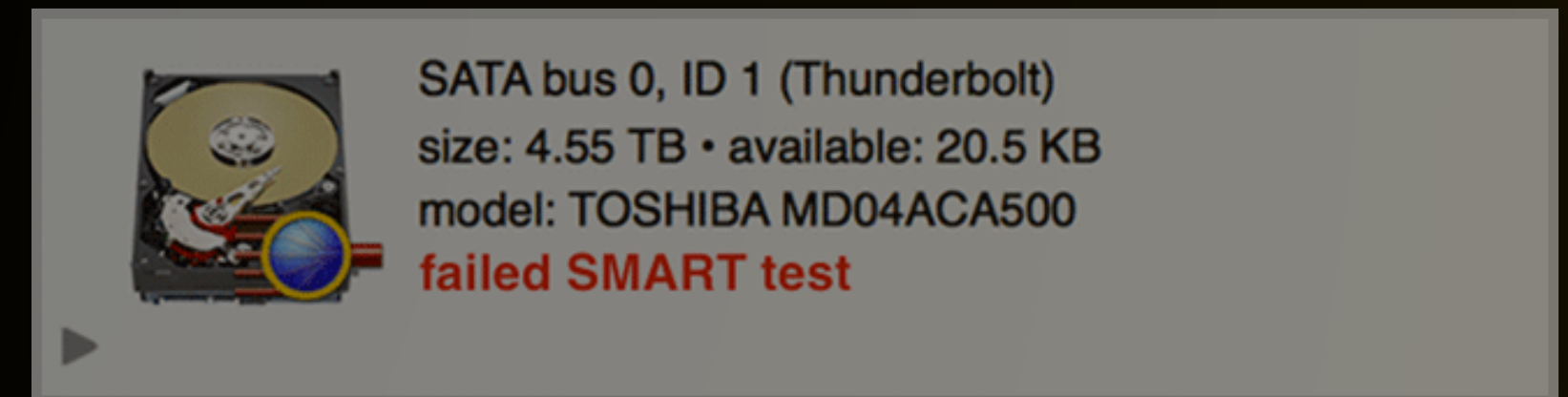


SoftRAID Protects Your Data



- *Before you use a disk*

- *While using your disks*



- *After a disk drive fails*



2. What's new in SoftRAID and at OWC

OWC in Belgium

- Products ship directly from Belgium
- Warranty replacements and repairs
- Customer Support



OWC in Taiwan

- Hardware design team
- Manage manufacturing and parts
- Better relationship with vendors
- Investigate hardware issues





SoftRAID 5.8

- **Compatibility with Mac OS 10.15**
- **Support for two new ThunderBay minis**
- **Fixes memory leak which affected very long operations**



Statistics from 116,000 disks

- Collected SMART data and disk usage statistics every 7 days using SoftRAID Monitor over the past year
- User must opt in to data collection
- All data is anonymous
- Starting to analyze data for disk failure information



Statistics from 116,000 disks

(Percentage of disks predicted to fail)

SMART Attribute:	% of Disks:
Reallocated Sectors	1.58%
Uncorrectable Errors	0.65%
Unreliable Sectors	0.99%
Total = Predicted to Fail:	3.22%



Statistics from 116,000 disks

(Disks predicted to fail by manufacturer)

Brand:	% of Disks:
Hitachi	7.6%
Seagate	5.1%
WD	3.1%
Toshiba	2.6%



3. Upcoming Features and Products



SoftRAID version 6

- Two levels of functionality, SoftRAID and SoftRAID Pro
- Full support for APFS and Encrypted APFS volumes
- Additional volume types: RAID 6 and RAID 6+
- Accelerated parity calculation using SIMD instructions
- Currently in beta - Will ship early 2020





Parity Calculation on RAID 5

3

Disk 1
(data)

1

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)





Corrupted data on RAID 5 detected

2

Disk 1
(data)

1

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)

$7 \neq 6$

6

Calculated Parity

On Disk Parity \neq Calculated Parity



Parity Calculation on RAID 6

1

Disk 1
(data)

3

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)

DP

Disk 6
(diagonal parity)





Corrupted data on RAID 6 detected

1

Disk 1
(data)

2

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)

DP

Disk 6
(diagonal parity)

$7 \neq 6$

On Disk Parity \neq Calculated Parity

6

Calculated Parity



Locating the disk with corruption

(Corrupted disk not found)

1

Disk 1
(data)

2

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)

DP

Disk 6
(diagonal parity)

1

Calculated Disk 1
(data)

6

Calculated Disk 5
(parity)



Locating the disk with corruption

(Corrupted disk found)

1

Disk 1
(data)

2

Disk 2
(data)

2

Disk 3
(data)

1

Disk 4
(data)

7

Disk 5
(parity)

DP

Disk 6
(diagonal parity)

3

Calculated Disk 2
(data)

7

Calculated Disk 5
(parity)

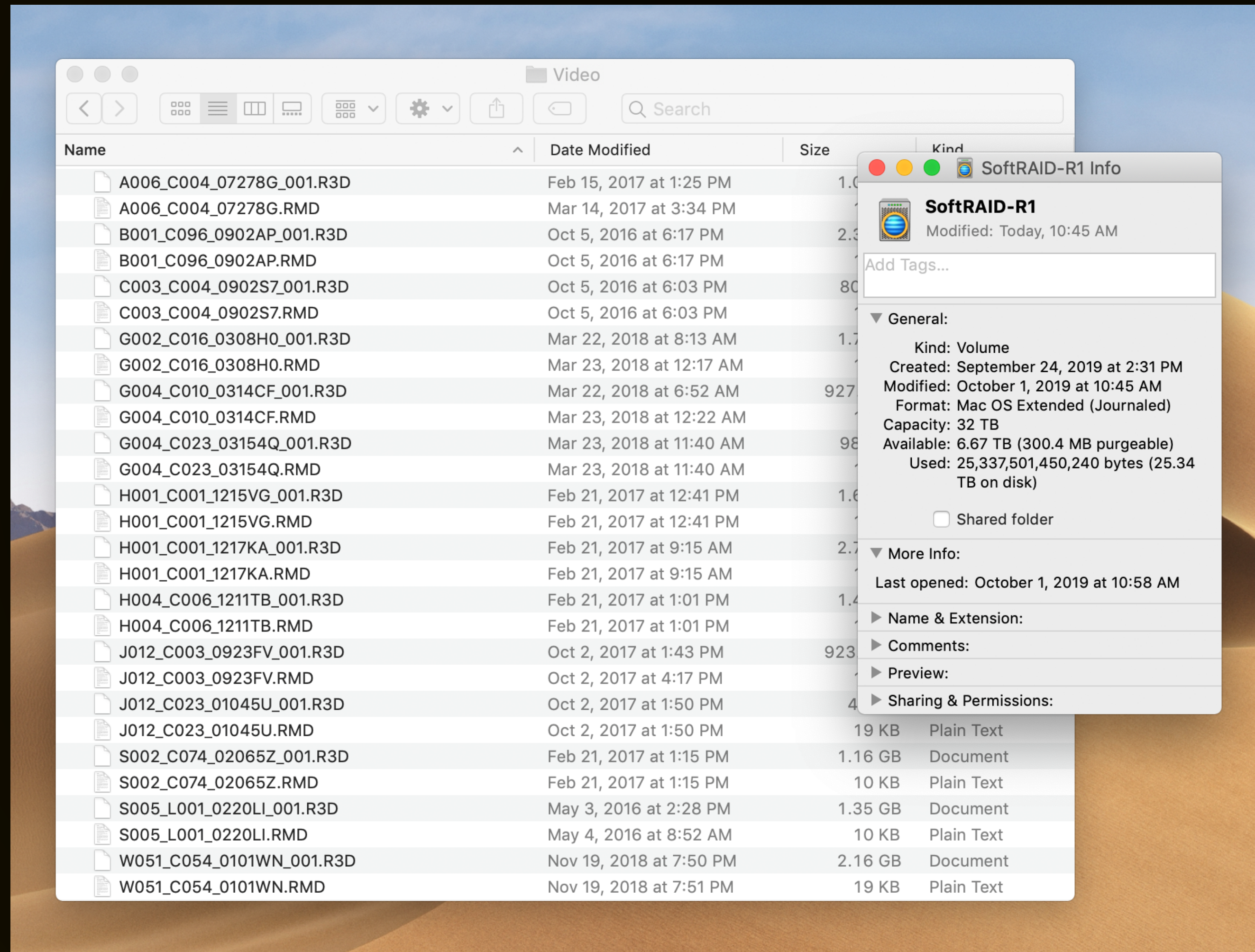


SoftRAID for Windows

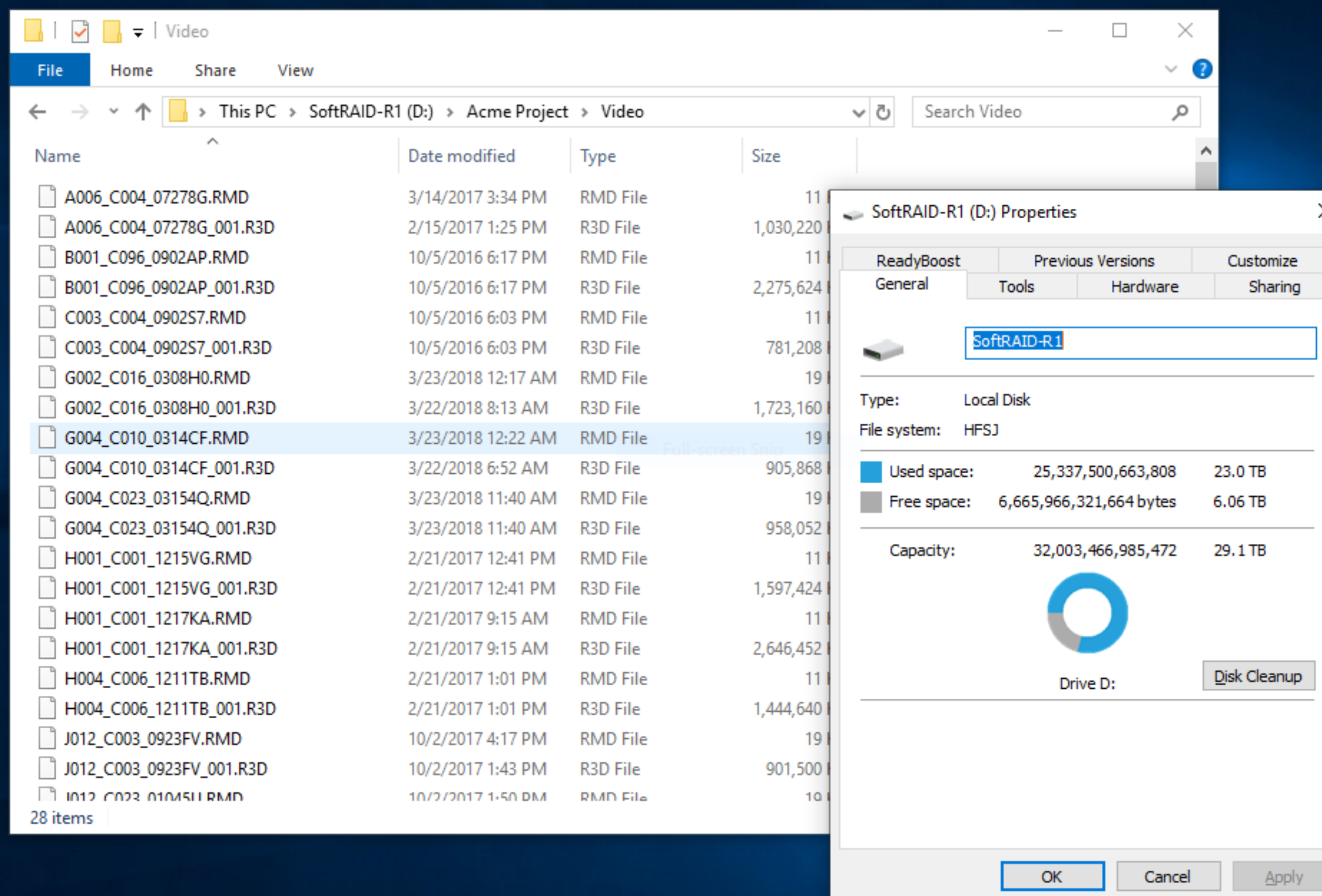
- Supports RAID 0 and RAID 1 volumes
- Can create HFS+ and NTFS volumes
- Volumes interoperate transparently with SoftRAID for Mac
- Feature parity with SoftRAID for Mac
- Currently in beta - Will ship early 2020



A SoftRAID HFS+ volume on a Mac...



...will just mount on Window!



The screenshot shows a Windows File Explorer window displaying a directory of files on the 'SoftRAID-R1 (D:)' drive. The files are organized into a table with columns for Name, Date modified, Type, and Size. The files are categorized as RMD Files and R3D Files. A 'SoftRAID-R1 (D:) Properties' dialog box is open in the foreground, showing the 'General' tab. The dialog box displays the drive name 'SoftRAID-R1', its type as 'Local Disk', and its file system as 'HFS+'. It also shows a progress bar for 'Used space' (23.0 TB) and 'Free space' (6.06 TB), with a total capacity of 29.1 TB. A 'Disk Cleanup' button is visible at the bottom right of the dialog box.

Name	Date modified	Type	Size
A006_C004_07278G.RMD	3/14/2017 3:34 PM	RMD File	11
A006_C004_07278G_001.R3D	2/15/2017 1:25 PM	R3D File	1,030,220
B001_C096_0902AP.RMD	10/5/2016 6:17 PM	RMD File	11
B001_C096_0902AP_001.R3D	10/5/2016 6:17 PM	R3D File	2,275,624
C003_C004_0902S7.RMD	10/5/2016 6:03 PM	RMD File	11
C003_C004_0902S7_001.R3D	10/5/2016 6:03 PM	R3D File	781,208
G002_C016_0308H0.RMD	3/23/2018 12:17 AM	RMD File	19
G002_C016_0308H0_001.R3D	3/22/2018 8:13 AM	R3D File	1,723,160
G004_C010_0314CF.RMD	3/23/2018 12:22 AM	RMD File	19
G004_C010_0314CF_001.R3D	3/22/2018 6:52 AM	R3D File	905,868
G004_C023_03154Q.RMD	3/23/2018 11:40 AM	RMD File	19
G004_C023_03154Q_001.R3D	3/23/2018 11:40 AM	R3D File	958,052
H001_C001_1215VG.RMD	2/21/2017 12:41 PM	RMD File	11
H001_C001_1215VG_001.R3D	2/21/2017 12:41 PM	R3D File	1,597,424
H001_C001_1217KA.RMD	2/21/2017 9:15 AM	RMD File	11
H001_C001_1217KA_001.R3D	2/21/2017 9:15 AM	R3D File	2,646,452
H004_C006_1211TB.RMD	2/21/2017 1:01 PM	RMD File	11
H004_C006_1211TB_001.R3D	2/21/2017 1:01 PM	R3D File	1,444,640
J012_C003_0923FV.RMD	10/2/2017 4:17 PM	RMD File	19
J012_C003_0923FV_001.R3D	10/2/2017 1:43 PM	R3D File	901,500
J012_C003_0923FV_001.R3D	10/2/2017 1:43 PM	R3D File	901,500
J012_C003_0923FV_001.R3D	10/2/2017 1:43 PM	R3D File	901,500

28 items

SoftRAID-R1 (D:) Properties

ReadyBoost Previous Versions Customize
General Tools Hardware Sharing

SoftRAID-R1

Type: Local Disk
File system: HFSJ

Used space: 25,337,500,663,808 23.0 TB
Free space: 6,665,966,321,664 bytes 6.06 TB

Capacity: 32,003,466,985,472 29.1 TB

Drive D: [Disk Cleanup](#)

OK Cancel Apply



OWC ThunderBay 8

- Takes 8 disks
- Can use 2.5 or 3.5 inch disks with no adapter
- SATA interface chip uses PCIe 3
- Approximately 2 GB/sec with a RAID 0 volume



OWC Accelsior 4M2

- PCIe card with 8 lanes
- Uses 4 MVMme blades
- Sizes up to 8 TB
- Currently seeing 6 GB/sec on Windows



☒ = You



Q&A