

Drive sanity for Media Professionals

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Sooner or later, every drive
you own will break your heart

Overview

- Foundation - decoding the language of speed
- Acquisition needs
- Editorial needs
- Archival needs
- When it all goes wrong
- Mac Centric (on tools)

Three aspects for media

- Field/ Acquisition - Speed is key (2 copies)
- Editorial/Post - Speed + Reliability (Sleep at night)
- Archive - Longevity

How many total copies of your media ?

- TOTAL: 1-3 copies depending on access + archive type.
- 2 in Acquisition
 - 1 of those goes to Post (live) + on Working Raid
 - End: 1 raw from Acquisition + backup of all working materials (x2 if you're paranoid)



Foundations

Kilobit	1,000 bits
Kilobyte	1,000 bytes
Kibibit	1,024 bits
Kibibyte	1,024 bytes
Mebibit	1,048,576 bits
Mebibyte	1,048,576 bytes
Megabit	1,000,000 bits
Megabyte	1,000,000 bytes
Gibibit	1,073,741,824 bits
Gibibyte	1,073,741,824 bytes
Gigabyte	1,000,000,000 bytes
Gigabit	1,000,000,000 bits
Tebibit	1,099,511,627,776 bits
Tebibyte	1,099,511,627,776 bytes
Terabyte	1,000,000,000,000 bytes
Terabit	1,000,000,000,000 bits
Pebibit	1,125,899,906,842,624 bits
Pebibyte	1,125,899,906,842,624 bytes
Petabit	1,000,000,000,000,000 bits
Petabyte	1,000,000,000,000,000 bytes
Exabyte	1,000,000,000,000,000,000 bytes
Exabit	1,000,000,000,000,000,000 bits
Exbibit	1,152,921,504,606,846,976 bits
Exbibyte	1,152,921,504,606,846,976 bytes
Zettabyte	1,000,000,000,000,000,000,000 bytes

Speed: Megabits per second

Eyes glaze over at
“Megabits per
second”

Eyes glaze over at

“A... ..”

... ..

... ..

... ..

Speed is measured

in ~~MPH~~

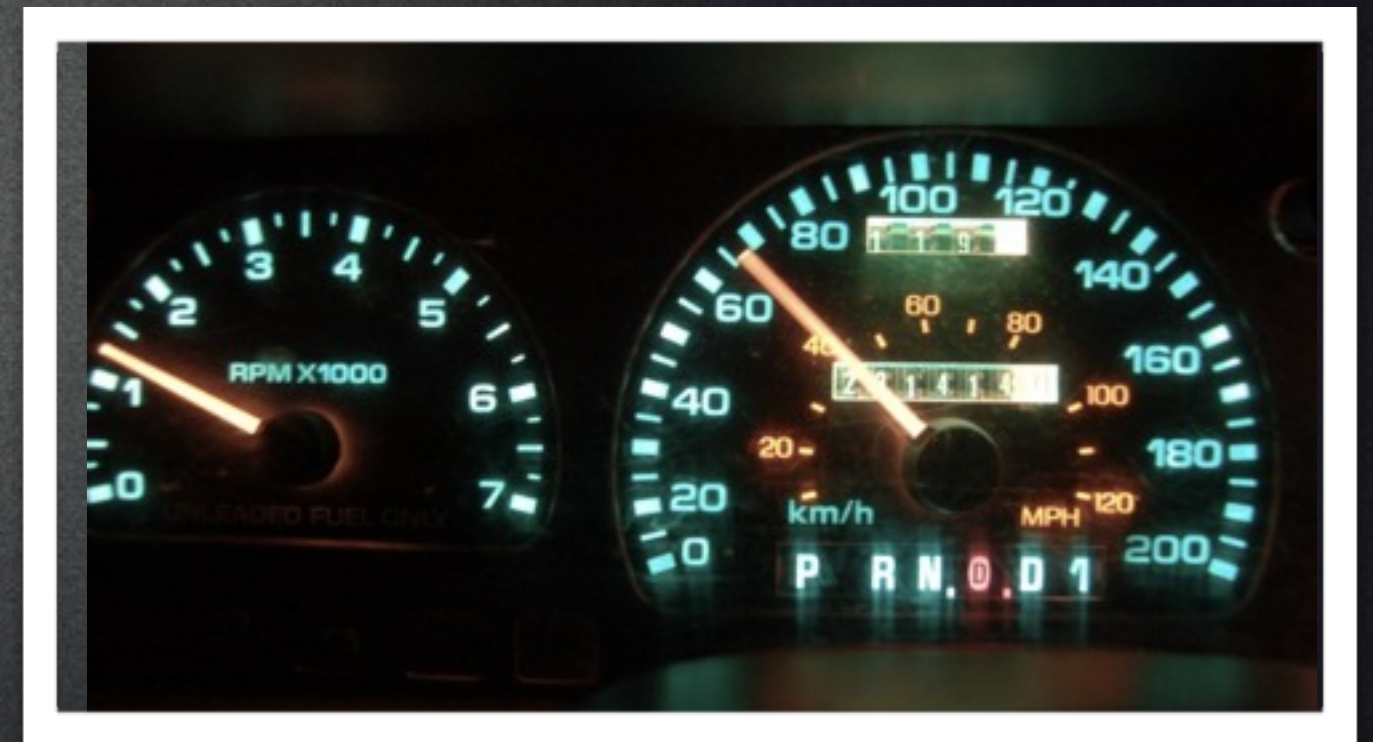
Megabits per second

MegaBytes per second?

- For marketing reasons - everyone describes in Megabits
- 56k modem vs. a 8k modem.

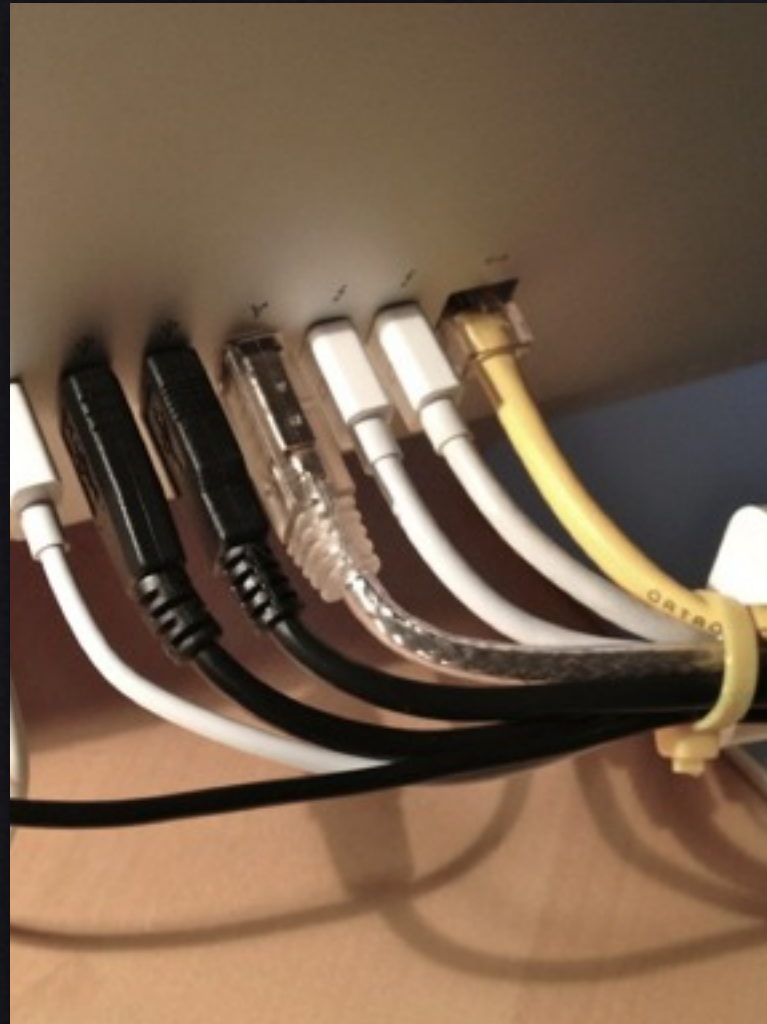
Speed is always Mb/s

- Hardware aka Cables (firewire)
- Network - eg. WiFi (802.11n)
- Internet (FIOS)
- Codecs



Tip

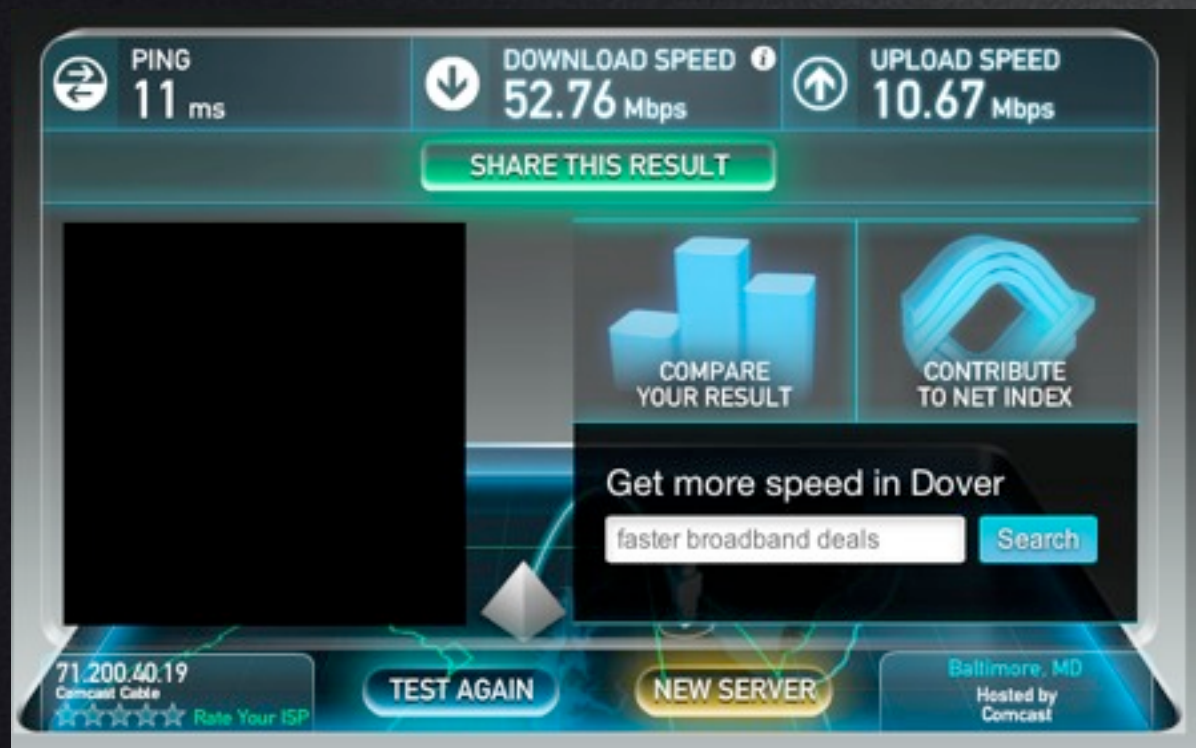
- Larger numbers are better
- except when it comes to file sizes



- FireWire 400/800
- USB 2.0 480
- eSATA 3.0 3000
- USB 3.0 5000
- Thunderbolt 10000+

Cable Speeds

Internet speeds



- Comcast 30 down/ 5 up
- FIOS 10 down/ 10 up
- Hotels: 1.1 down/ .5 up
- SpeedTest.net (no, not right now)

Codecs

- There's a number for every codec

- ProRes 422 = 140

- DNxHD 145

- DPX RAW ~1000

- How large of a file? Divide by 8. Multiply by seconds



*“A man’s gotta know his
limitations”*

Dirty Harry

Bottlenecks

Hardware
connections



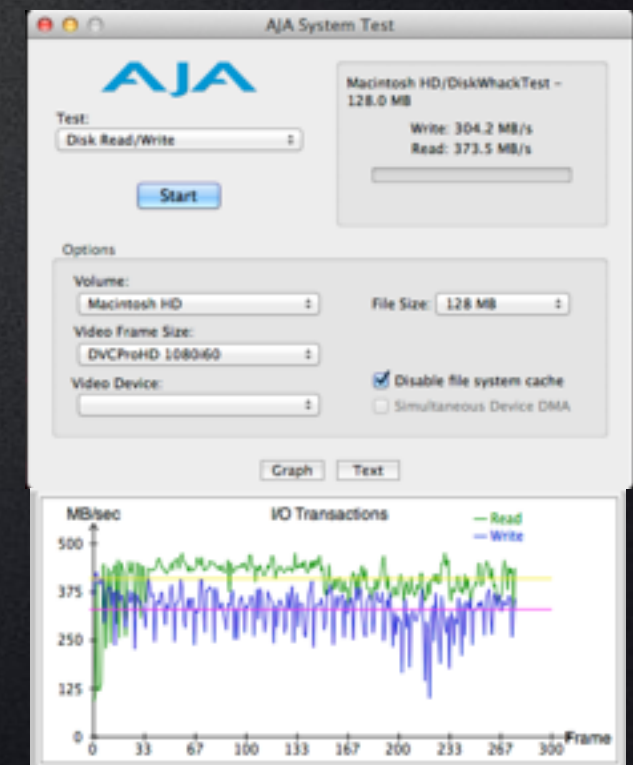
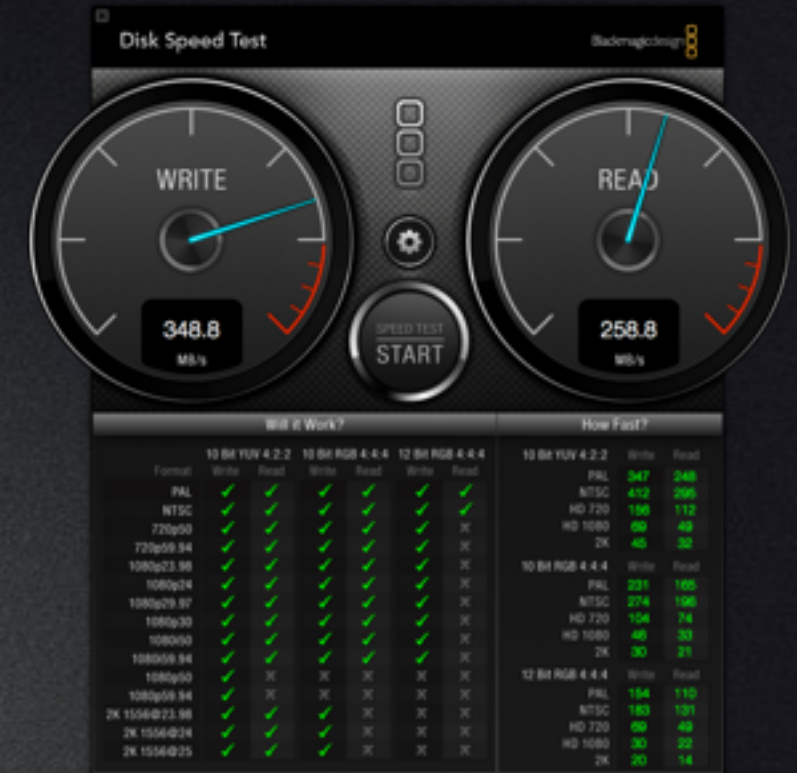
Network

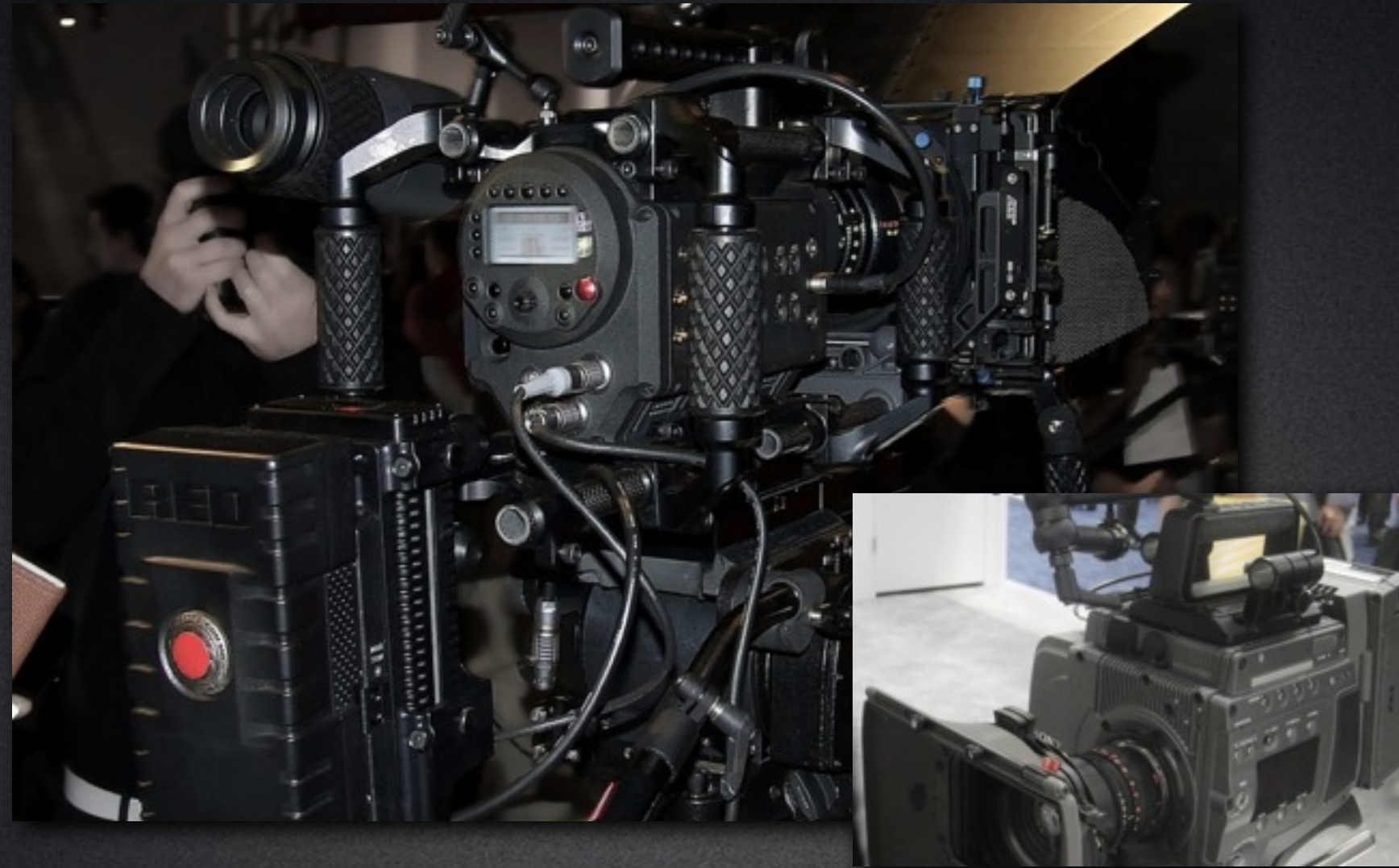


Internet

Tools you need

- Black Magic Disk Speed Test
- AJA System test





Field/ acquisition



Two copies

- Fast capture
- ***Fast backup***
- Fast connections

Speed is key!



Know how you're capturing

- DSLR (QT, Card)
- P2/XDCAM (MXF, Card/Disk)
- Red (R3D, SSD/HD)
- Alexa (ProRes, ArriRaw, SxS Card)
- BM Cinema Camera (ProRes, DNxHD, DNG, SSD)

Better formats?
Bigger files

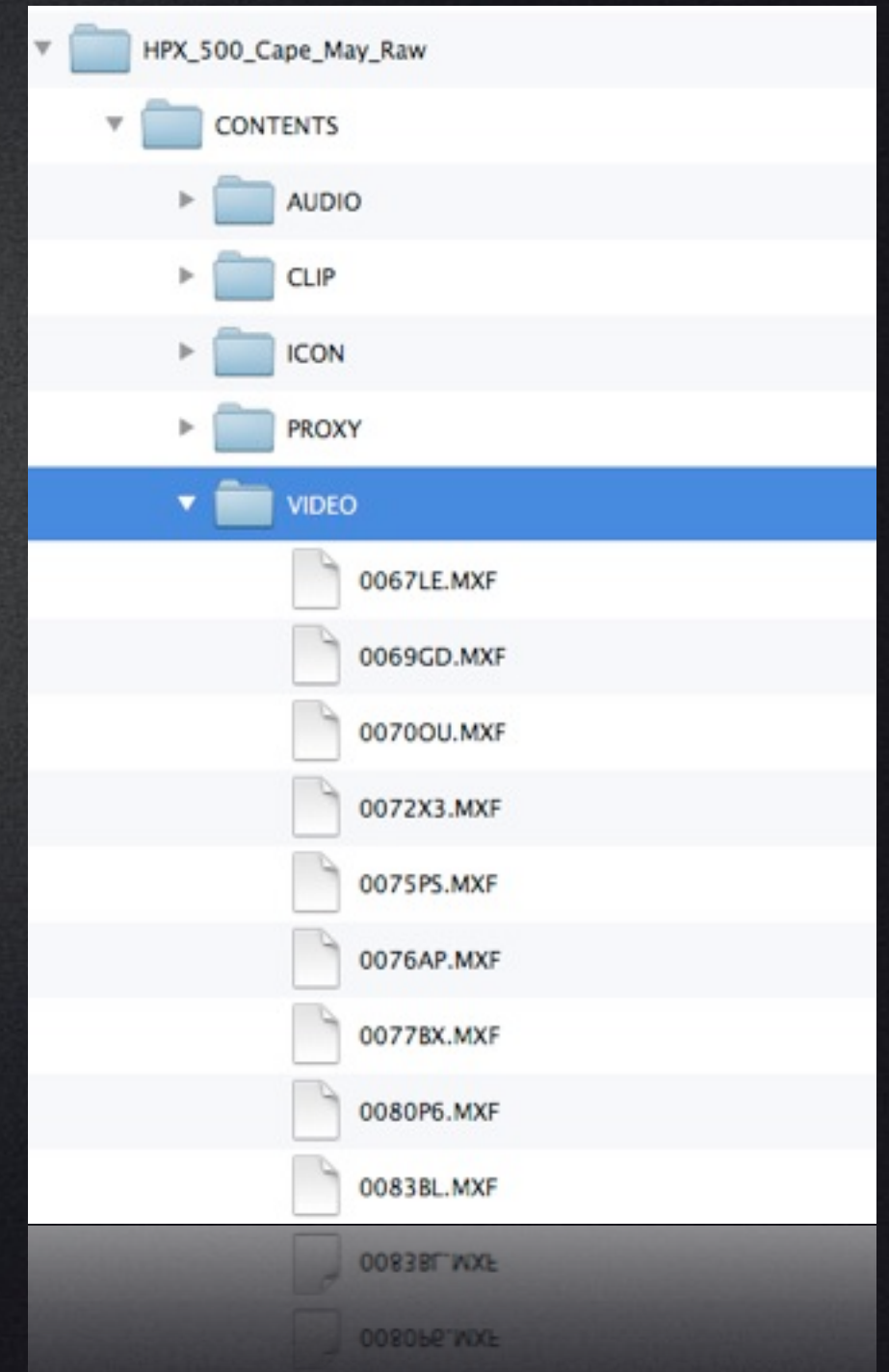
Bigger files?
Longer to duplicate

Outbound capture hardware

- AJA KI Series (ProRes, DNxHD)
- BM HyperDeck Series
- Others

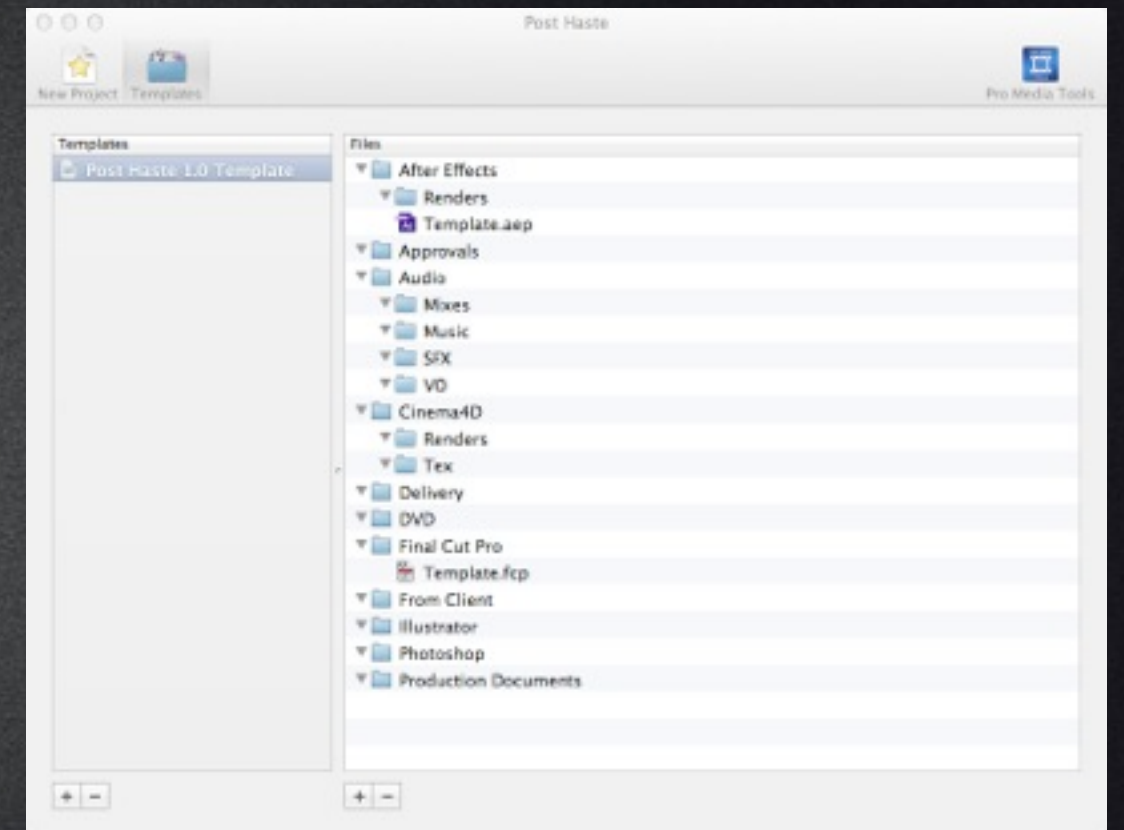
Copy the entire card

- Twice
- Create virtual disks (DMG files) *optional*



Keep a consistent system

- Card naming
 - Camera, Date, Location
- Backup on set
- Digital Rebellion free utility: Post Haste
 - <http://www.digitalrebellion.com/posthaste/>



Check on set!

- Have (preferably) your editorial NLE on hand.
- ShotPut (checksum + error reporting, multiple copies) \$99
- Adobe Prelude (bit by bit, light editorial, multiple copies) \$399

Onset Transcode?

- Prelude
- Squeeze (Watch Folders)
- Episode (Watch Folders)

SSD?

- Solid State Drive
- Expensive ~ 10x cost of a hard drive
- \$0.65/Gig vs. \$0.05/Gig

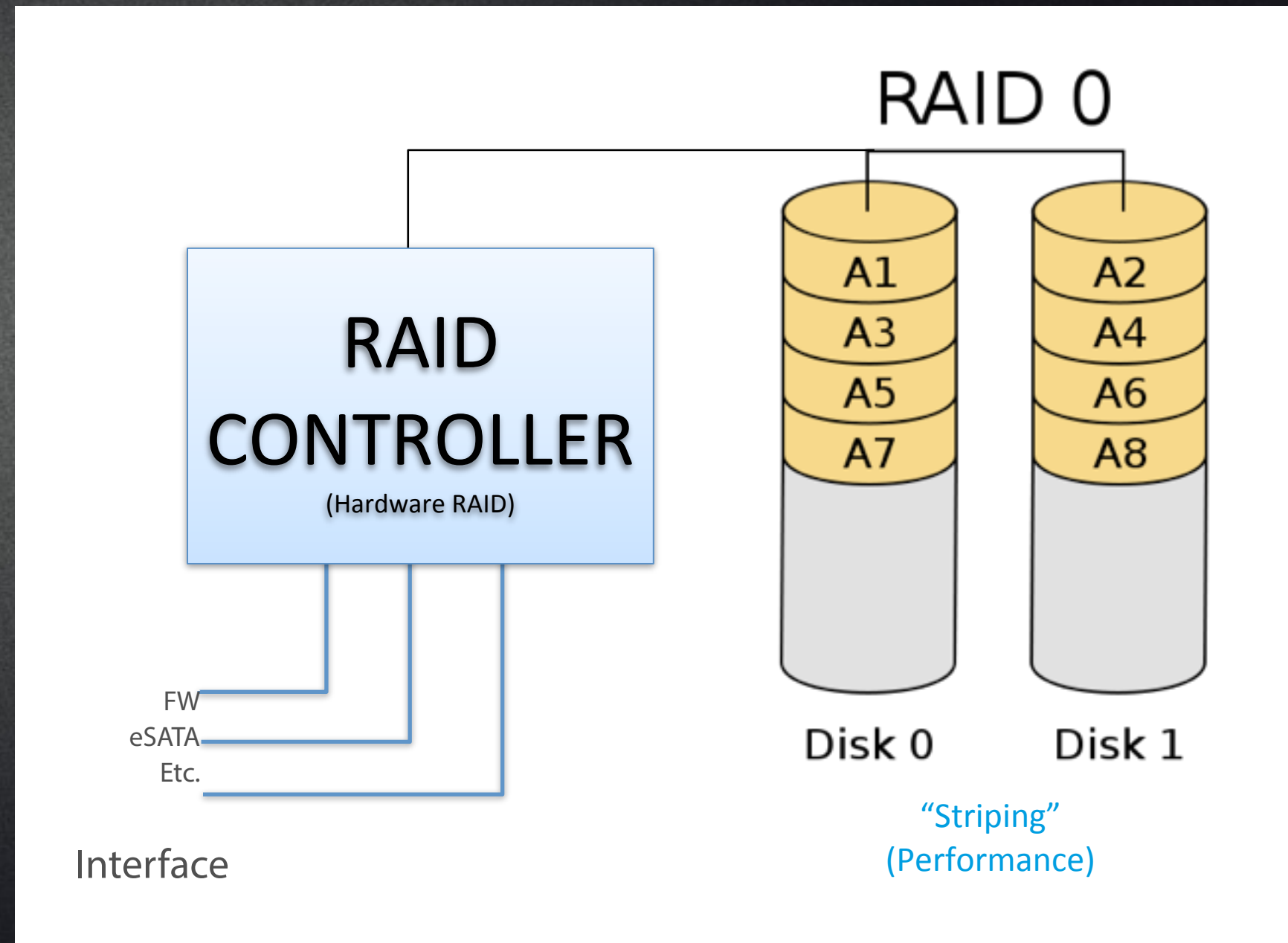
Keeping Costs down

- SSDs are expensive
- Thunderbolt or USB 3.0
- Raid - 0 x 2 = Fast speed/lower cost



Raid 0 - twice as fast

- Splits data across multiple units.
- Fast data connection
- Twice the chance of your data dying



What I want

- Metal enclosure (dissipate heat)
- Fastest connection I can get on my laptop (USB3 or Thunderbolt)
- Raid 0
- Designed for media professionals (vs. everyone)

Two copies = sanity

- Shipping? Different carriers

Editorial



Requirements for Post

- Reliability.
- How long are you going to actively have the media live?
- Speed, speed, speed.

How many streams

- Roughly - divide codecs need against connection
- ex: ProRes on firewire
- Where is your bottleneck?
- Measure by building a sequence AND performance software

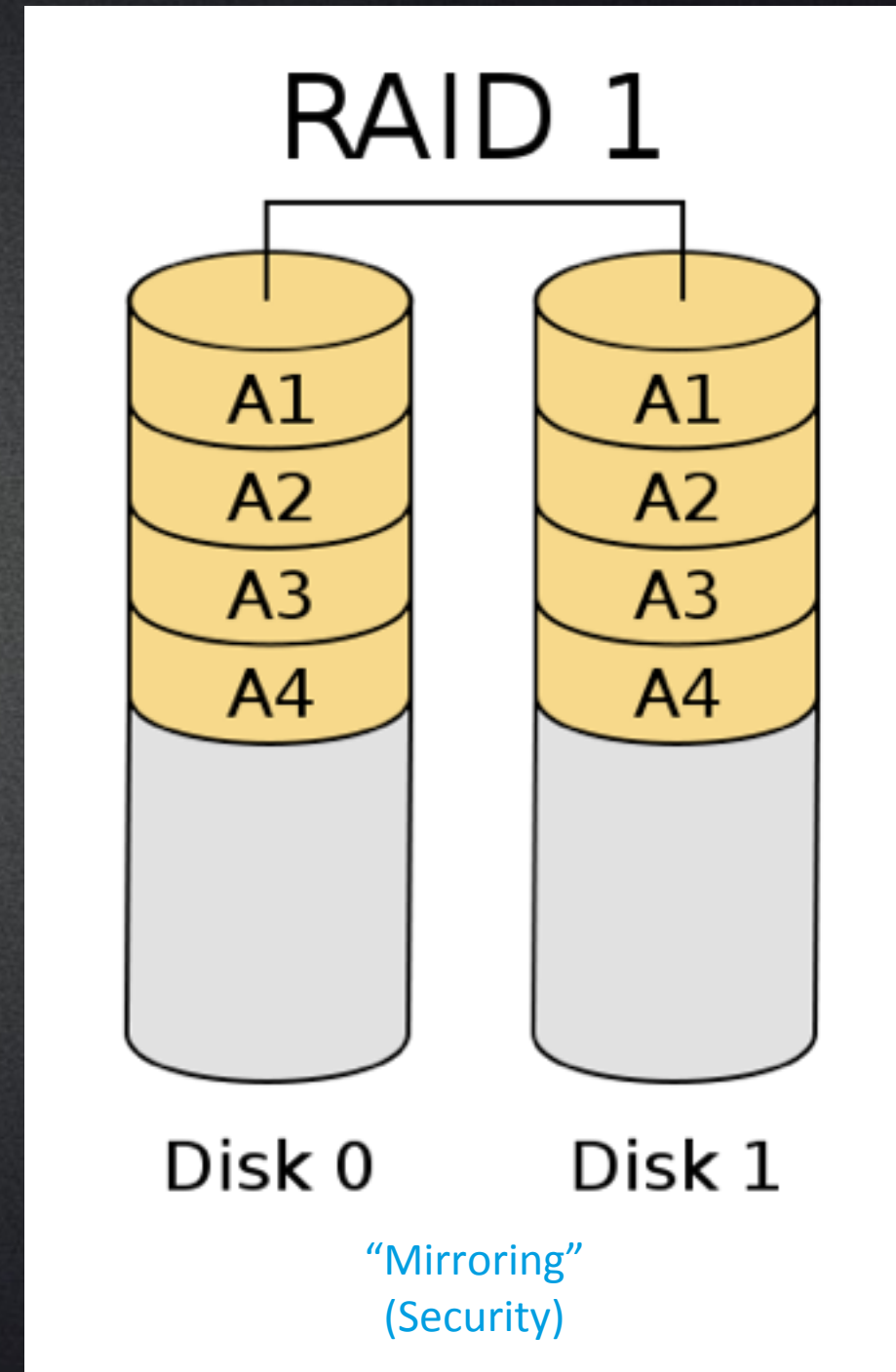


- Overcomes drive speed issues
- RAID 0?

Raids to the Rescue

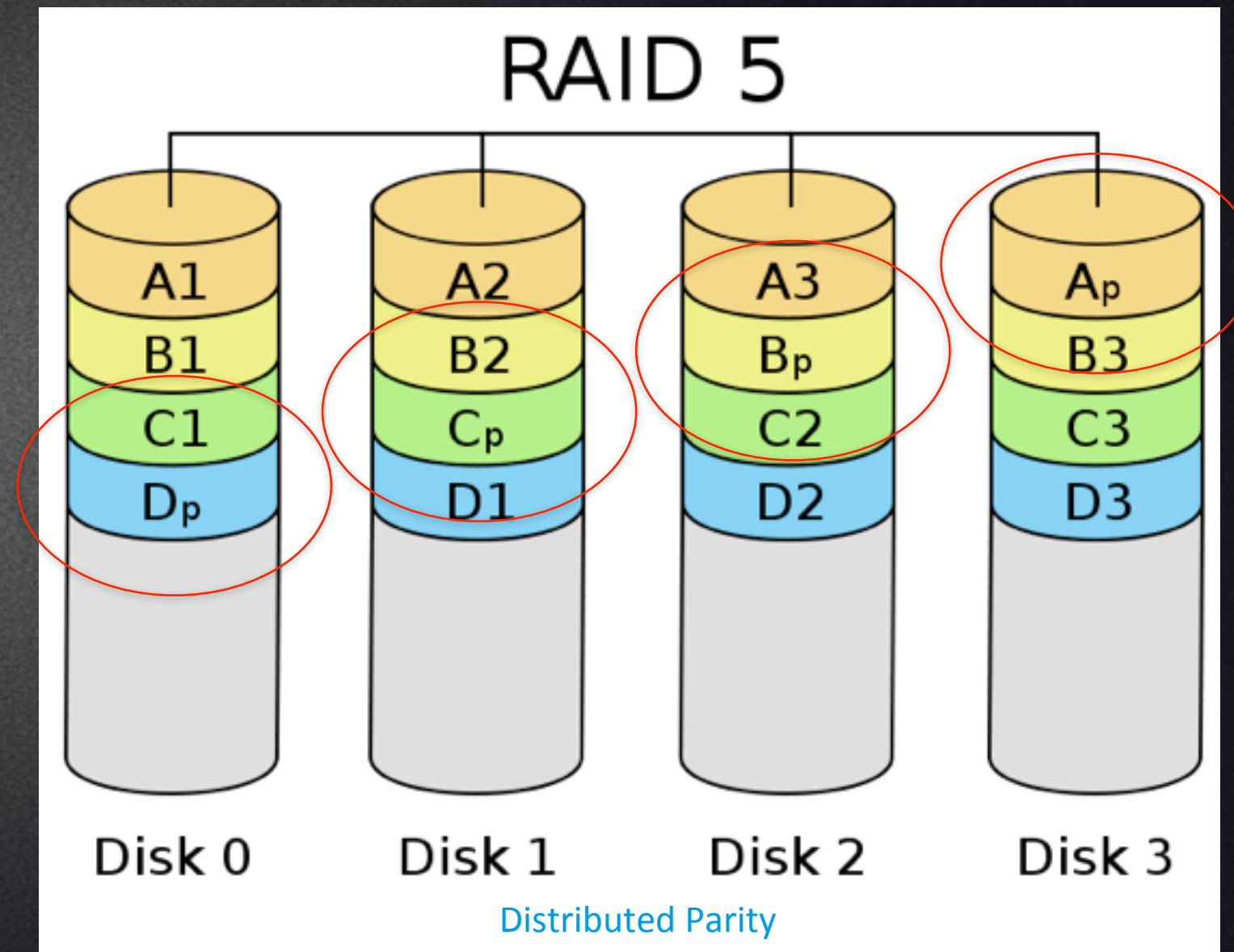
Redundancy

- Raid 1
- TWINS everything
- SLOW
- 1/2s storage.

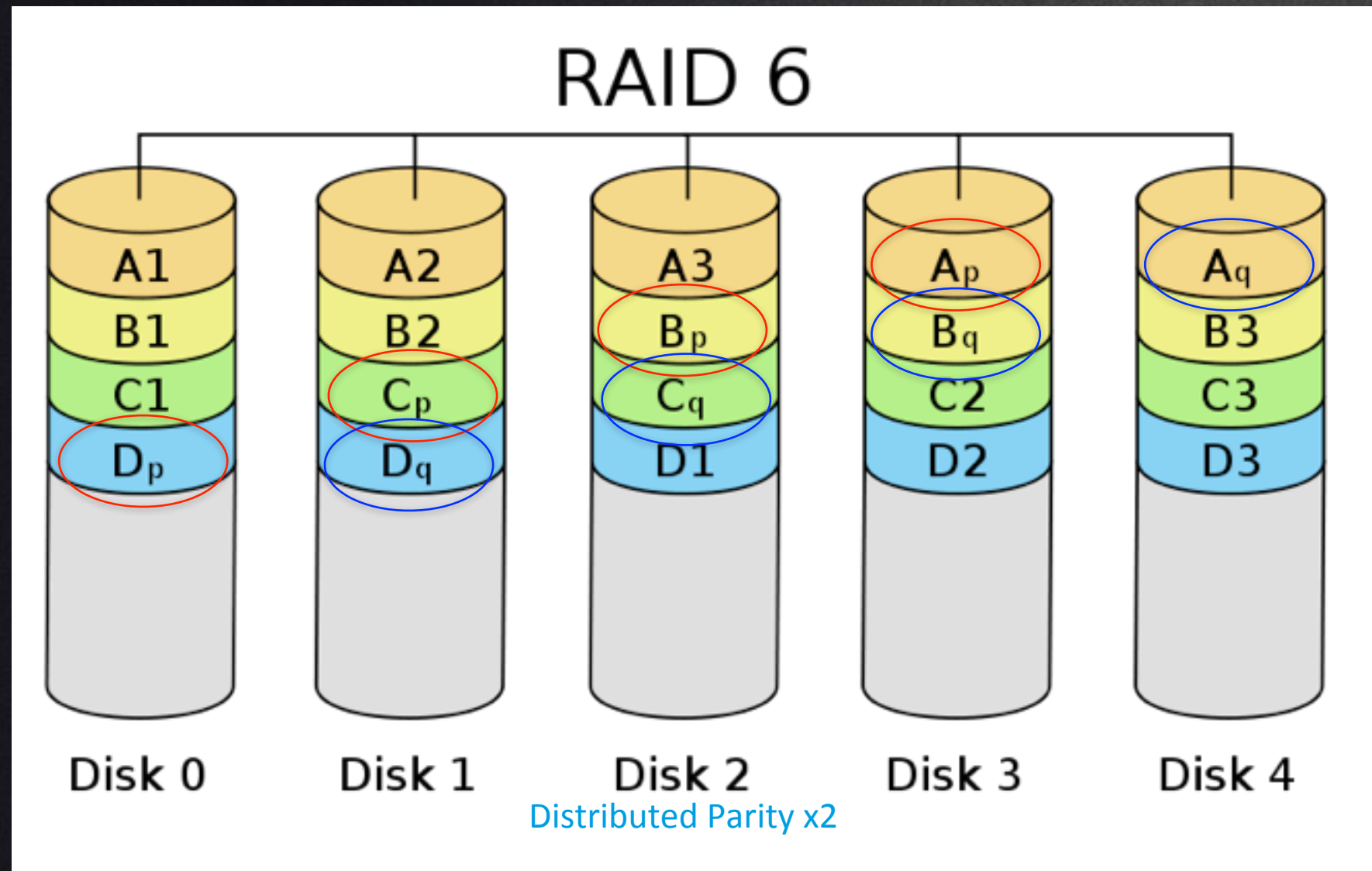


Raid 5

- Minimum 4 drives
- Striping is better (fast)
- Each drive has some parity information of the other drives
- Any one drive dies = okay and performance can continue



Raid 6



- Minimum 4 drives
- Striping is better (fast)
- Each drive has some (more!) parity information of the other drives
- Any two drive dies = okay and performance can continue. Rebuild faster than Raid 5

Variations

- Raid 5+0
- Raid 5+1



Sleep at night

Drive format

- Mac only environment? HFS+
- Mixed environment? exFAT

Checking drive health

- 1-2x a month
- Disk Utility (FSCK/Recovery Partition)
- Disk Warrior (is not a recovery)
- Reformat reassigns blocks

Defragment?

- Debatable option
- Large files
- HFS+ has HFAC (Hot File Adaptive Clustering)
- Easier to reformat

Retirement of drives

- Who makes the 'best' drives
- Google study <http://j.mp/DriveFail>
- What to do with 'retired' drives

Raid 5 = sanity

- Pick a fast connection
 - Thunderbolt
 - USB 3.0
 - eSata
- One company (vs. BYOR)



Archival

What to archive

How much space?

- “Digital Master” - aka 2 Betacams in the Library
- The working project (Media + additives + Project)



Camera Files (Original backup)



Two full copies of the
Media + other assets



+ Final Product

Hardware choices

- Hard drive
- LTO
- DAT, Blu-Ray etc

Hard drives

- The only good thing here is the lower cost.
- Pick the best drives you can afford. Don't buy the cheapest. Ever.

Best Practices

- Minimum two copies, one stored off-site.
- Fire up drives every 3-6 months.
- Every 2-3 years migrate the data (keep your data floating)

Paranoid?

- Add MD5 information -
 - <http://j.mp/md5app>
- Add Parity information
 - <http://j.mp/macpardeluxe>

LTO - Linear Tape Open

- Yes, it's tape
- 20+ years
- Parity + redundancy.
- So-so for restoring 1 file, great for large files



LTO - Linear Tape Open

- LTO - 5 (1.5 TB) @ 140 MB/s \$~2k
- LTO - 6 (2.5 TB) @ 160 MB/s \$~5k
- Compression of 2.5:1 yields >6TB
- 1-2 TB/HR of transfer
- Data Correction
- Serial Attached SCSI (SAS) Interface (yes, Tbolt adapters)



When it all goes wrong

Hardware

- Drive won't power up - good
- Click, click, click - terrible
- Can't read part of a drive - mixed

Disk Utility

- Good, but can't repair unless booted from a different device
- Uses fsck - File system check.
- Disk Warrior

Other drive tools (recover)

- StellarPhoenix
- Disktools Pro
- Drive Genius
- Data Rescue
- Clone drive first please (rsync/CCC/Superduper)

Bonus utilities

- Digital Rebellion has a great package of utilities
- QT Repair

What we (creators) want/ need

Ideal

- **Fast Drive speed (7200)**
- **Fast Drive connections**
- **Metal enclosure + Fan**
- **Redundancy (Raids)**



Who am I?



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Master Trainer (Apple/Adobe/Avid)

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GIFT

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Training materials with macProVideo and Lynda

Editors Guide to Adobe Premiere Pro

Forum Leader on Creative Cow

Feel free to contact me directly! (yes, I can teach your group!)

