Selecting a Disk Drive: How Not to Do Research - Page 2

January 28, 2014
By Henry Newman
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So the specification for the drive, beside the vibration, operating temperature, and other specifications, now Seagate – and likely soon other drive vendors – will be specifying the amount of I/O that can be done to a drive in a year. 55 TB is the equivalent of ~105 hours of operation at 146 MB/sec (the drive average performance). ((55*1000*1000*1000*1000)/(146*1000*1000))/3600=104.6/((24*365) for the percentage per year). So why would anyone buy a drive for an online backup and restore operation that could support drive utilization using average performance of .12% for the year as per the vendor specification?

Now look at the last column. This is the number of drive load/unloads, which is where the sliders that carry the read/write heads in hard disk drives land on the disk media at power down, and remain stationed on the disk until the power up cycle. This has very little to do with reliability of the drive unless the values are exceeded, but is a good example of another limitation that manufacturers document for disk drives. It is not discussed anywhere in the blog.

What Matters in Disk Drive Research?

What matters in disk drive research is obtaining information beyond the surface of averages, and getting the raw numbers to do some basic analysis on data that really matters. You need to know:

1. The age of the drives as it affects the failure rate of the drive.

2. Whether the drives are burned in or not burned in, as it impacts the infant mortality.

3. How much data will be written to and read from each drive time and if over time the drives in question will hit the limits on the hard error rates.

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4. The load and unload cycles and if any of the failures exceed manufacturer specification.

5. Average age does not tell you anything, and statistics such as standard deviation should be provided.

6. Information on SMART data monitoring and if any of the drives had exceeded any of the SMART statistics before they are more likely to fail.

7. Information on vibration, heat or other environmental factors as it impacts groups of drives. Will a set of new drives from a vendor get put into an area of the data center that is hotter or have racks with more vibration?

You must understand the manufacturer's specifications in relationship to the planned usage. If, let's say, you buy a commodity product like a home washing machine, but put it in a laundromat and it

breaks after 3 months of usage, should you have expected it to last 3 years? I think the same question should be asked of anyone using consumer technology and a commercial application.

Next month I'll discuss best practices in selecting a disk drive. Stay tuned.

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Tags: IOPS, disk drive, enterprise data

5 Comments (click to add your comment)

By **Bruce** January 29 2014 18:58 PST
Just because a drive was released in 2008 does not mean that that same model drive, when used somewhere else, was purchased in 2008. Indeed, it could have been purchased any time between 2008 and the present. Just saying ...

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By **Bill Jackson** January 29 2014 18:55 PST
Lots of errors you made in your analysis. You think a design is frozen and never improves from, say 2006 as you refer to the Barracudas = Seagate never changes. In fact almost all aspects of drives, from bearings and heads to control software are undergoing active development and improvement so the most recent 2013 Barracuda will be cheaper to make and more reliable than the 2006 model. I find an operating herd approach that backblaze uses to analyze and optimize their operation is a valid approach. If there was never a flood, some of the poor drives might not be in the fleet at all, the Backblaze approach would weed them out early.

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By **Mr. CPU** January 29 2014 18:55 PST
It doesn't seem like the original backblaze post was intended to be a rigours scientific study, only some interesting statistics about their observations in their environment. For them, the results are the results, and mocking them for not spending a fortune to conduct a more thorough study just seems like a waste of time. I did enjoy reading your article as well, lots of useful little tidbits to flesh out some of the data, but I guess for me, the backblaze was anecdotal, not some kind of gospel, and meant to be taken as such. YMMV.

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By **Phil21** January 29 2014 17:23 PST
I'm not sure what this article is refuting really. The Backblaze blog post mimics my experience with these Seagate 1.5TB drives nearly exactly. They are the worst drives we have spinning, and unfortunately at the time we bought a few hundred of them. It's raw data. Interpret however you like to. In this business, anyone utilizing consumer drives realizes they are making a trade off of cost vs. reliability and support. We absolutely expect higher failure rates, which is offset by how much less expensive the drives are. Many workloads (such as backblaze) allow for this tradeoff, and some do not. I found the Backblaze article very helpful - I know about duty cycle and MTBF, but some drives work better than others even when rated the same. The fact the Seagates are failing at a ~20% rate for Backblaze *and* us, shows at least to me the data is nominally accurate. It's not just old age, this has been a trend since the day they were put into production. All your article states to me really is exactly what everyone already knows. Buy enterprise for more reliable disk. Even with the 20% failure rate on these, it's far cheaper to buy consumer for our use with little downside.

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By **Alan Shutko** January 29 2014 17:15 PST
Did you notice you highlighted release date, not average age in years?

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