

Hard Drive Stats

How long do hard drives actually live for?

By Sebastian Anthony on November 12, 2013 at 6:00 am | [263 Comments](#)



For more than 30 years, the realm of computing has been intrinsically linked to the humble hard drive. It has been a complex and sometimes torturous relationship, but there's no denying the huge role that hard drives have played in the growth and popularization of PCs, and more recently in the rapid expansion of online and cloud storage. Given our exceedingly heavy reliance on hard drives, it's very, very weird that one piece of vital information still eludes us: How long does a hard drive last?

Now, before you all rush to the comments section to tell me how long *your* hard drives have lasted, I'm not talking *anecdotally*. I mean, in hard numbers, just how long does the average hard drive last? One year? Three? Five? Because the standard warranty is now only 12 months, do hard drives die sooner? If I slot a new hard drive in today, how long can I expect it to last?

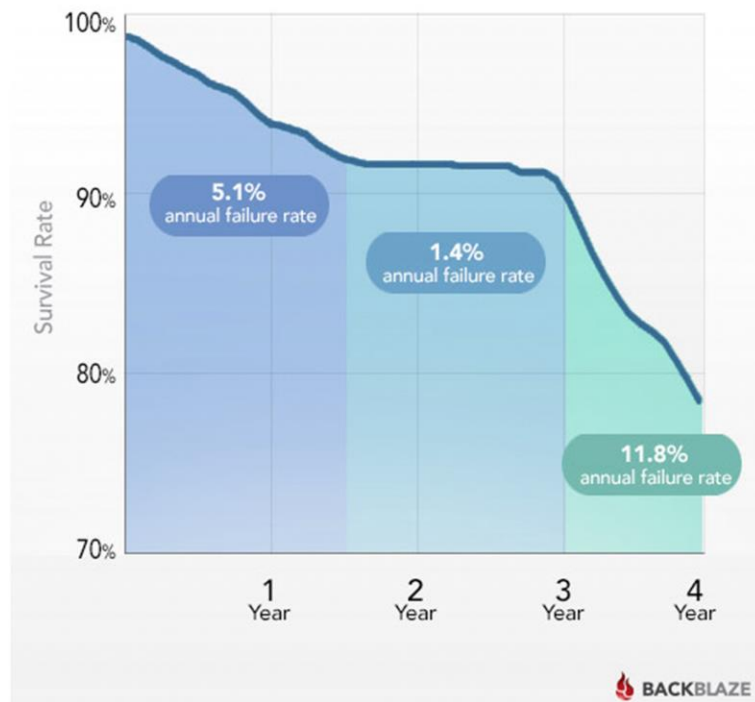
Surprisingly, despite hard drives underpinning almost every aspect of modern computing (until smartphones), no one has ever carried out a study on the longevity of hard drives — or at least, no one has ever published results from such a study. Until now. Backblaze, an unlimited online backup company that keeps 25,000 hard drives spinning at all time, has published [its results on hard drive lifespan](#) — and it makes for very interesting reading indeed.

How long does a hard drive last?

Backblaze has kept up to 25,000 hard drives constantly online for the last four years. Every time a drive fails, they note it down, then slot in a replacement. After four years, Backblaze now has some amazing data and graphs that detail the failure rate of hard drives over the first four years of their life.

Drives Have 3 Distinct Failure Rates

Hard Drive Survival Rates - Chart 1

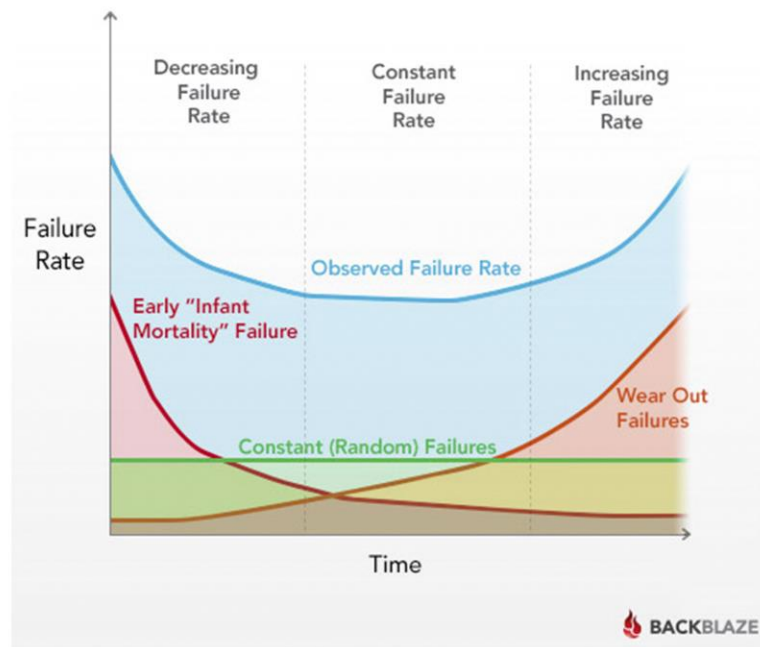


Backblaze hard drive failure rate, over the first four years

It seems that hard drives have three distinct failure "phases." In the first phase, which lasts 1.5 years, hard drives have an annual failure rate of 5.1%. For the next 1.5 years, the annual failure rate drops to 1.4%. After three years, the failure rate explodes to 11.8% per year. In short, this means that around 92% of drives survive the first 18 months, and almost all of those (90%) then go on to reach three years.

Extrapolating from these figures, just under 80% of all hard drives will survive to their fourth anniversary. Backblaze doesn't have figures beyond that, but its distinguished engineer, Brian Beach, speculates that the failure rate will probably stick to around 12% per year. This means that 50% of hard drives will survive until their sixth birthday.

General Predicted Failure Rates



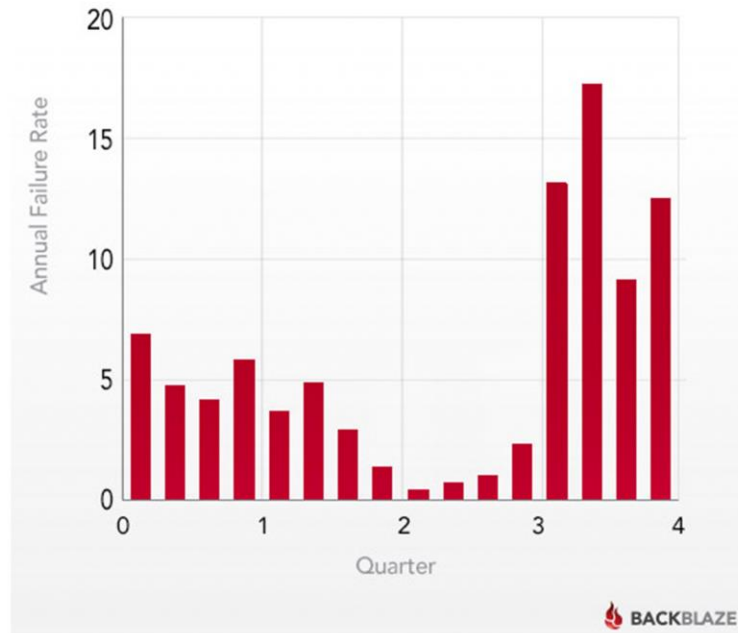
Hard drive failure conforms to the bathtub curve — a curve that reliability engineers use that neatly illustrates the three distinct phases of a product's lifecycle

Why hard drives die

There are three distinct failure phases — and, correspondingly, three distinct ways in which hard drives die. Failures in the first year are primarily caused by *manufacturing defects*. This describes the lemon effect — where, despite most of your drive live for years, some just die after a few months. Between 18 and 36 months, drive deaths are caused by *random failures* — small, random issues that only occur if you're unlucky. Then, as the drive moves into its fourth year, failure rates skyrocket as drives start to *wear out* — the various components can only rotate, gyrate, and actuate so many times before something goes *sprrronngggg*.

It's worth noting that Backblaze uses normal, consumer-level drives — the kind of drives with 12- or 36-month warranties. Considering around 97.5% of these drives are still alive after one year, and about 90% are alive after three years, these warranties are probably spot-on.

Annual Failure Rate Each Quarter



Hard drive failure rate, by quarter, for the first four years

In the case of enterprise-class hard drives with five-year warranties, they are probably manufactured to higher tolerances and subjected to more stringent quality assurance testing. We're only guessing here, but enterprise-class drives probably don't have the same year-one infant mortality rate, but still die off fairly quickly once their moving parts start to wear out (4+ years).

In conclusion... back up your data!

So, there you have it: If you buy a hard drive today, there's a 90% chance that it will survive for three years. If your drive makes it to the three-year point, you would be wise to back up your data, as there's a 12% chance per year that your drive will die. It's worth noting that these figures are for internal hard drives: External hard drives, for a large number of factors, may not last as long (though if you only plug it in every few days to back your data up, it might last *longer*). It's also worth mentioning that Backblaze's drives are spinning constantly — these failure rates are for drives that are turned on 24/7. Your home computer probably isn't powered up 24/7, and thus the drives may last longer.

Because there's a 5.1% chance that your drive will die in its first year, you should either **back up your data regularly** — or, if you're feeling dangerous, not keep any valuable data on that drive until it's worked out any kinks and survived to the 18-month mark. After 36 months, though, you should definitely back up your data, or copy the data to a new hard drive. (Backblaze, at **\$5/month for unlimited backup space**, is a remarkably good deal.)

25,000-drive study shines a light on how long hard drives actually last



By [Brad Chacos](#)

Senior Editor, PCWorld | NOV 12, 2013 8:14 AM PT



Few things in computing are as vital as the lowly hard drive. If your memory goes bad or your processor blows, it's easy enough to switch out; when a hard drive gives up the ghost, your precious files expire along with it.

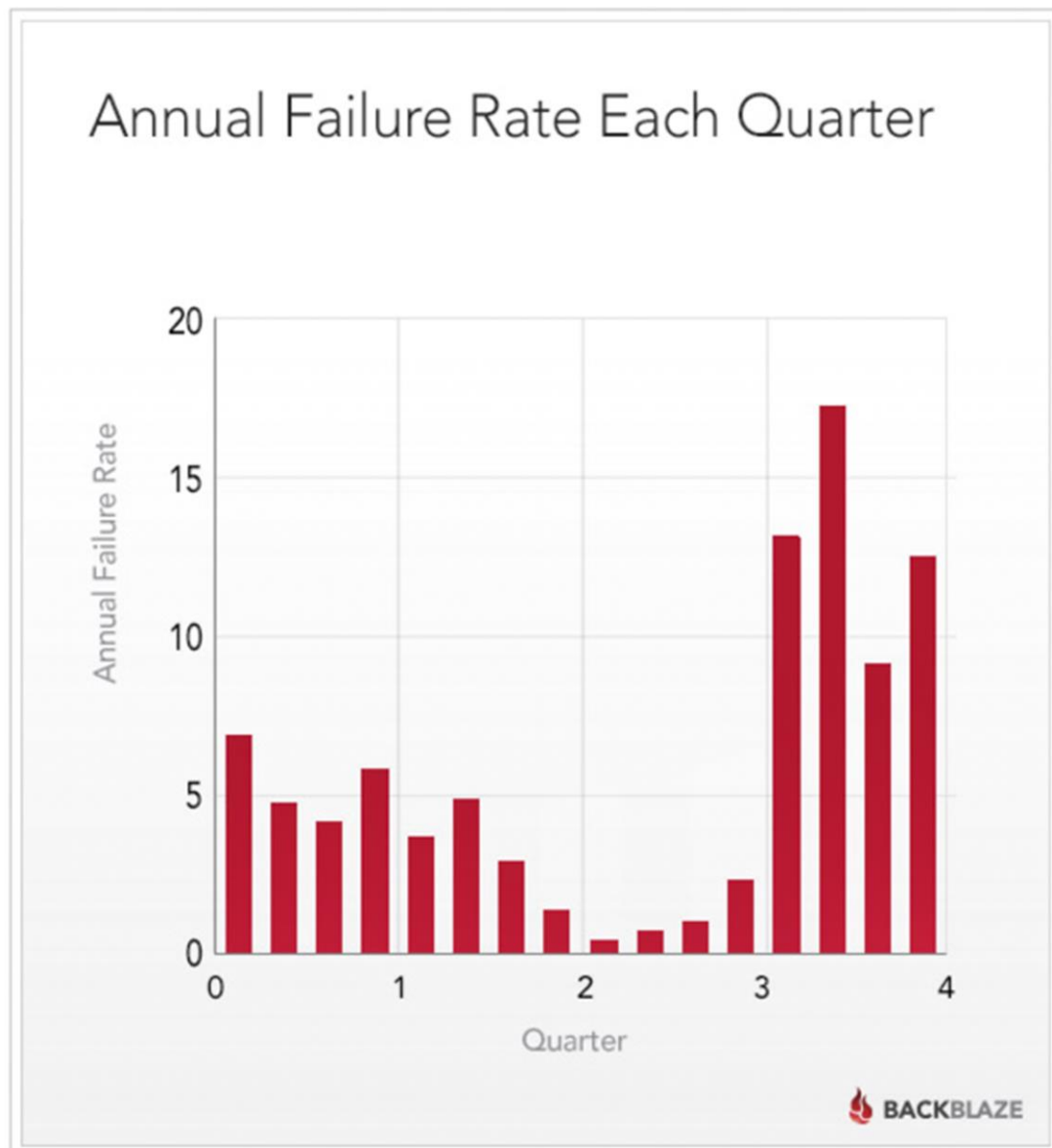
All of which begs the question: Just how long do hard drives last?

We now have a semblance of an answer thanks to BackBlaze, a cloud storage service recently highlighted in [PCWorld's pain-free backup roundup](#). BackBlaze utilizes more than 25,000 consumer-grade hard drives to back up your data, and it just released [a comprehensive report](#) on the lifespan of those drives over a four year period. Hard (drive) data, here we come!

Life comes in waves

Let's get the big reveal out of the way first: Only 26 percent of BackBlaze's drives failed during the four year testing period. That's not too shabby for a component frequently plagued by anecdotal tales of woe.

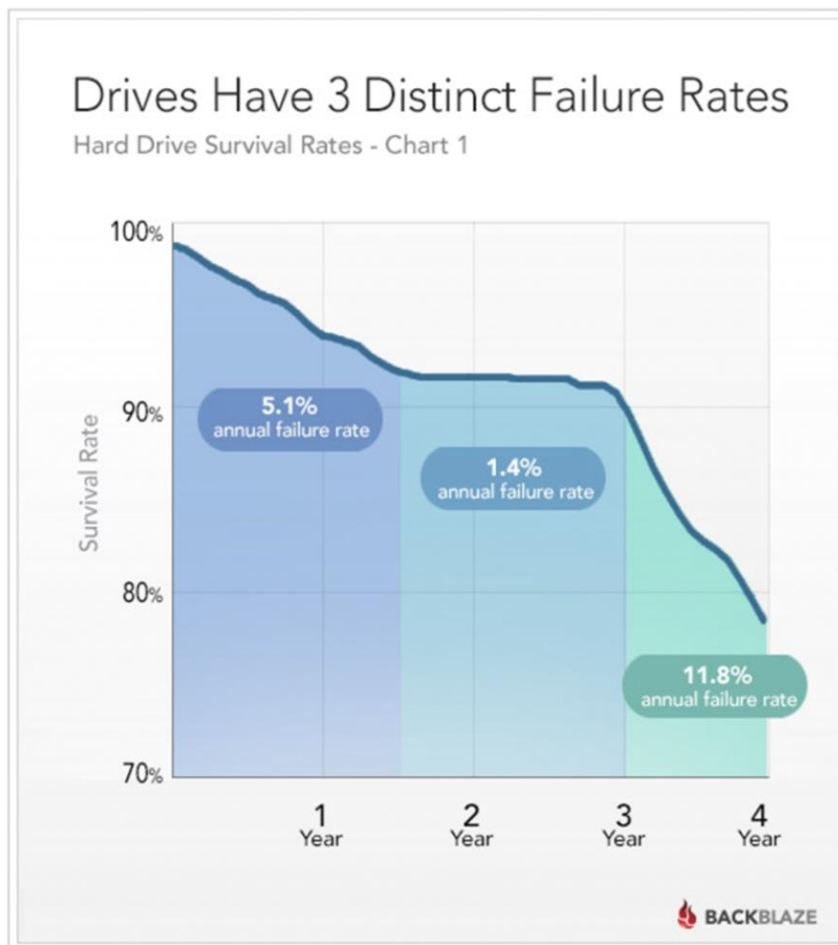
More interesting is exactly *when* and *how* those failures happened.



BackBlaze's hard drive failures by quarter.

The chart above shows the drive failures following the “**Bathtub curve**” held near and dear by reliability engineers. Around 5 percent of BackBlaze’s drives failed within the first year and a half, falling prey to factory manufacturing defects. After that, reliability settles down from year 1.5 to year 3, succumbing mostly to random failures, before worn-out drives start to die *en masse*, causing the failure rate to spike to a double-digit annual percentage.

BackBlaze doesn’t have data beyond four years, but the company expects drive deaths to hold constant at around the 12 percent failure rate seen in year 3 to 4.



BackBlaze’s annual hard drive failure rate.

Double-digit failure rates sound scary, but put it in perspective: Only 1 in 20 drives failed due to manufacturing defects in their early days, more than 90 percent of BackBlaze's drives were still spinning strong after three years, and nearly 80 percent of drives survived to four years *in a server farm*.

That's none too shabby, and the data helps shine a light on why warranties on consumer-grade hard drives tend to be either one or three years in length. It also drives home the point that you really, truly should be [backing up your data on a regular basis](#), especially with brand new or three-plus-year-old hard drives.

Given the comparatively sky-high cost of solid state drives, don't hold your breath for a similarly large-scale study of the lifespan of SSDs to pop up any time soon. Just [follow the best SSD practices](#), back up your data, and keep your fingers crossed.

How Long Your Hard Drive Is Likely to Last



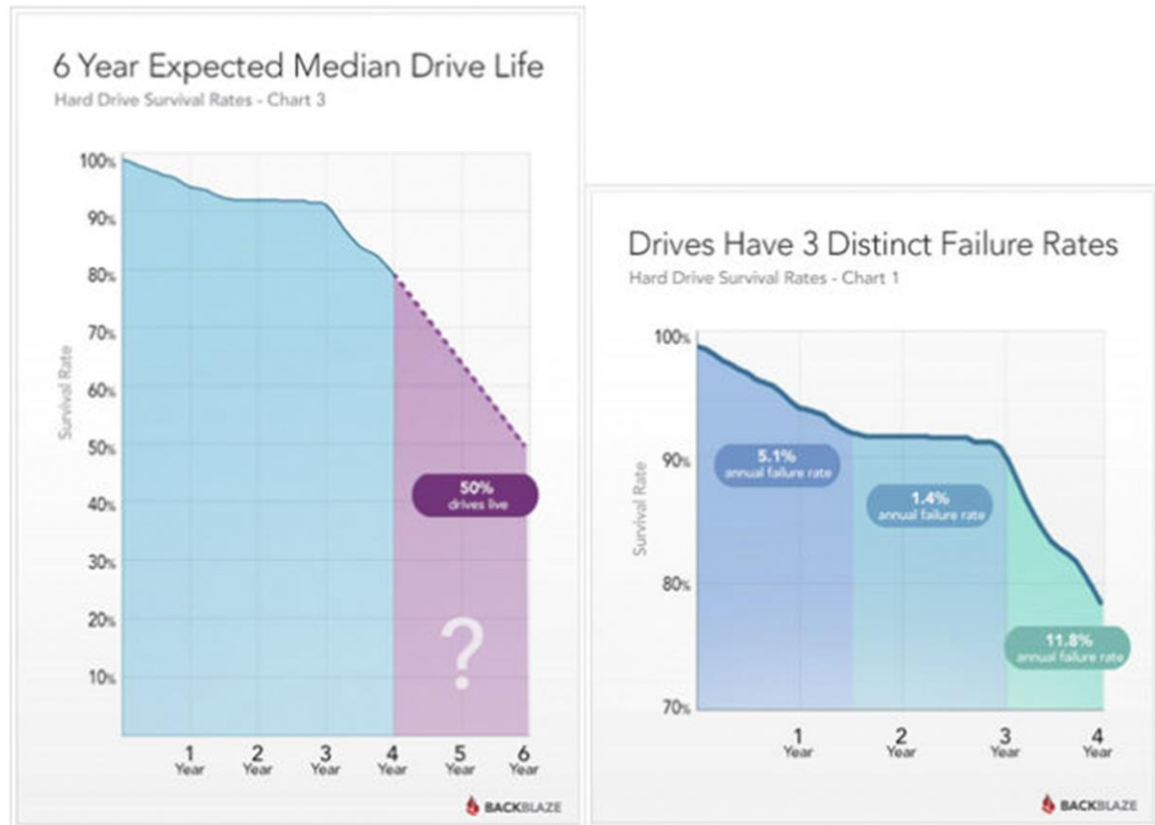
Melanie Pinola

11/12/13 7:30am · Filed to: HARD DRIVES

168.8K

144

8



No physical storage medium lasts forever, and as you probably already know, hard drives in particular can die rather unexpectedly. But how long can you expect your drive to live? 5 years? 50? Backblaze has crunched some numbers to find hard drive failure rates.

The online backup service analyzed 25,000 hard drives it's kept consistently spinning over the last four years, noting when each drive failed. These are "consumer grade" hard drives, the majority of them internal ones but also a portion taken out of their external enclosures and mounted in Backblaze's data racks.

They found that hard drives have three distinct failure rates: in the first year and a half, drives fail at 5.1% per year; in the next year and a half, drives fail *less* —at about 1.4% per year; but after three years, failure rates skyrocket to 11.8% per year.

The good news is, 80% of hard drives last at least four years. The bad news is 20% of them don't. Backblaze doesn't have data beyond the four years measured so far, but extrapolated the data to predict a median lifespan of over 6 years for most hard drives.

Another good reminder to keep **backing up your data**.

How long do disk drives last? | Backblaze via **ExtremeTech**

Backblaze answers the question 'How long do hard drives last?'

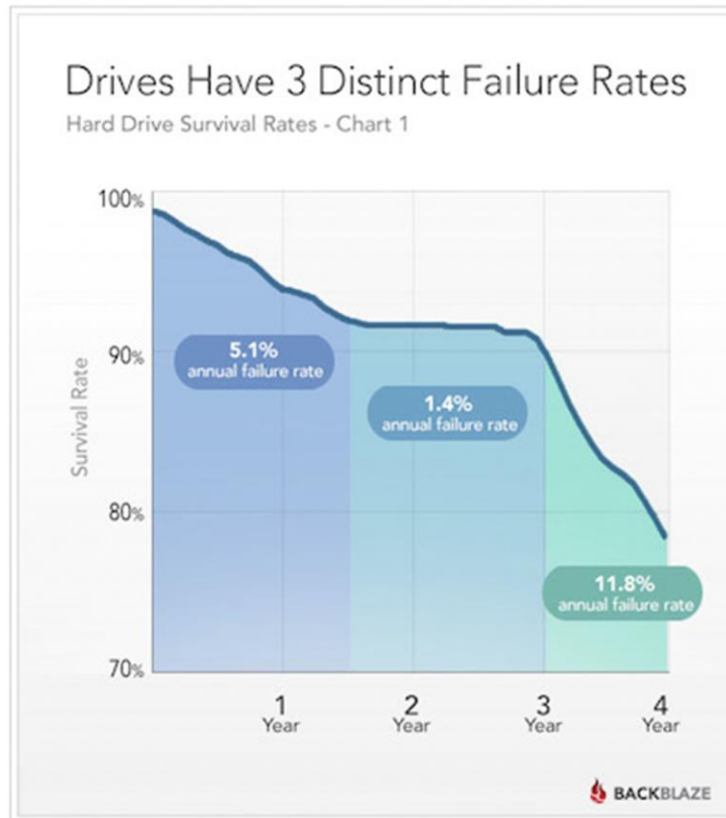


Steven Sande, @stevensande
11.12.13

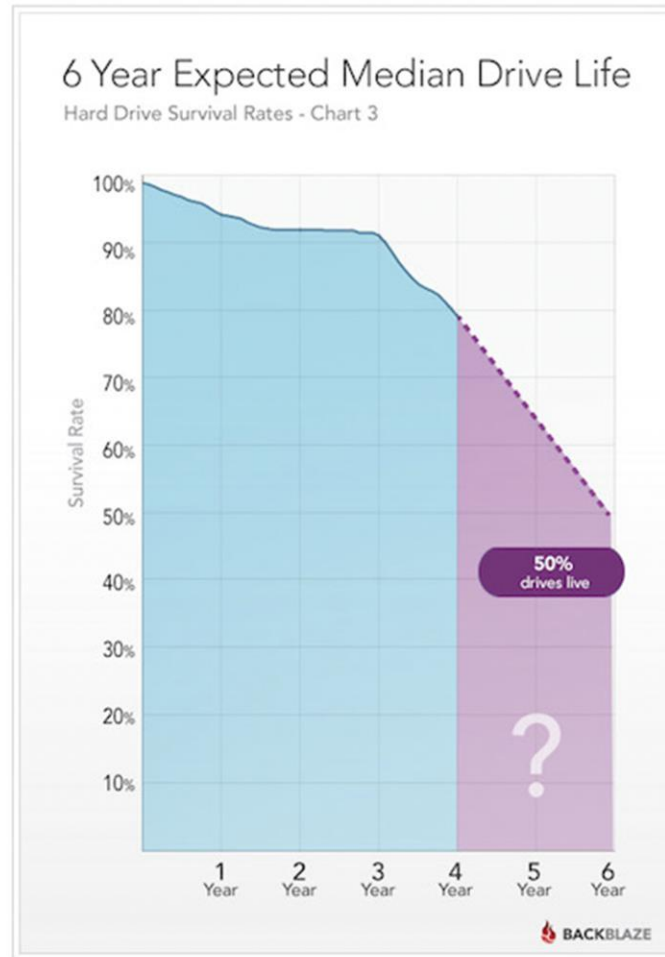


Backblaze knows storage. The online backup company uses more than 25,000 spinning hard drives at any one time, stuffed into the proprietary Storage Pods it developed and made an open-source design. Well, with that many hard drives working away, the company has been able to keep track of failure rates and Backblaze's Brian Beach wrote a wonderful post on the life cycle of hard drives for the company blog.

There are some interesting tidbits in the post. For example, all hard drives exhibit three different failure rates during their lifetimes. Early on, there are failures due to infant mortality -- those drives that might have made it through testing but had some fault that caused them to fail shortly after installation. That failure rate is about 5.1 percent of all drives per year during the first year and a half. After that period, the failure rate flattens out to about 1.4 percent for the next year and a half, and then diving to an 11.8 percent annual failure rate after three years.



On average, 80 percent of all hard drives are still in use after four years. Through extrapolation, Beach posits that the median life span of a hard drive -- the point at which 50 percent of drives will have failed -- is about six years.



The important thing about the Backblaze study is that it doesn't look at specialized data center-grade hard drives. Instead, the company uses consumer-grade drives just like you and I would purchase. Why does Backblaze use these cheap drives? It allows the company to store 75 petabytes of data at extremely low cost through the use of these drives in racks full of RAID Storage Pods.

More than anything, the numbers prove what we've said all along -- if your hard drive hasn't failed yet, it probably will soon. Be sure to back up early and often.

Backblaze: Our bet on consumer hard drives looks good so far

After measuring failure rates for four years, the online backup service is optimistic that buying cheaper consumer-grade hard drives was the right choice.

For years, hard drive makers have manufactured premium enterprise models that are more reliable but more expensive. Online backup service Backblaze, though, chose to use consumer-oriented drives, and now it's releasing statistics about just how reliable they are.

The company now has 75 petabytes of data stored on 25,000 drives, and it's been tracking failure rates since 2009. So far, 76 percent of drives live past their fourth birthday, said Backblaze distinguished engineer **Brian Beach** in a **blog post** Tuesday. Beach just joined Backblaze after 15 years at TiVo, where he was vice president of research and development.

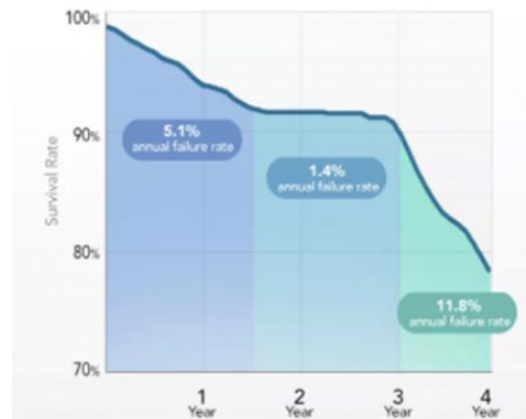
The Backblaze drive failure rate isn't constant. In the first year and a half, it's relatively high -- 5.1 percent -- likely because of manufacturing defects. The second year and a half is the honeymoon period, with a 1.4 percent annual failure rate. Then the hardware starts bombing, with a much higher 11.8 percent failure rate in the fourth year.

Extrapolating the fourth-year failure rate, Backblaze calculates that half its hard drives will last six years. And though it doesn't have enough data to say whether it will reach that point, it's an encouraging statistic for the startup.

"When Backblaze started, there were some concerns that consumer-grade disk drives wouldn't hold up in a data center," Beach said. "If this six-year median lifespan is true, it means that more than half the drives will last six years, and those concerns were unfounded."

The company plans to update the study results quarterly -- including with details on which manufacturers and drive models are most reliable, if the company can make statistically significant conclusions.

"We are looking forward to finding out what will happen when drives become 5, 6, 7, and 8 years old," Beach said.



Backblaze's hard drive failure rate increases after the third year, but after four years, more than three quarters of its hard drives are still working.

Backblaze

How long do disk drives really last?

It is one of the mysteries of storage: how long do disk drives last? An online backup vendor with 75 petabytes spills the beans.



By Robin Harris for Storage Bits | November 12, 2013 -- 08:00 GMT (00:00 PST) | Topic: Storage

Well, the data isn't quite ready. It turns out that [Backblaze](#) – of [open source storagepod fame](#) – are only five years old and don't have enough failed drives to give us a definitive answer, yet.

But the answers they do have are worth considering. 75 PB is a large sample.

The stats

Backblaze has currently a total population of approximately 27,000 drives. Five years ago that number was about 3000. However, they've kept track of all the drives and found some interesting things that at least partly contradict earlier research done with Google by Carnegie Mellon university. (See [Everything you know about disks is wrong](#).)

They measured annual failure rates. If you have 100 drives for a year and five of them fail that is a 5% annual failure rate.

In the first 18 months drives failed at the rate of 5.1 percent per year. For the next 18 months drives failed at the rate of about 1.4 percent per year. But after three years failures went up to 11.8 percent per year.

While that sounds bad the good news is that after five years almost 80 percent of drives are still working. Which explains why they don't actually have an answer to the question how long drives last.

But extrapolating from their experience they believe the median lifespan of a consumer drive will turn out to be six years.

The Storage Bits take

It is refreshing for a large-scale user of hard drives to break the industry code of silence and tell us their experience with a large population of disks. Lots of companies have this information – I'm looking at you, Google and Amazon – and simply refuse to share it.

But, if like me, you only buy a few drives a year, this information may not apply to you. You can get drives from a batch that were marginal or dropped during shipping or poorly handled and you might see several drive failures from single batch.

Or you might have drives that last for 10 years. The important thing to keep in mind is that in five years you can expect at least one in five drives to fail.

The bottom line: backup, backup, backup. Accept no substitutes.

Reliability study tracks 25,000 hard drives

by [Geoff Gasior](#) — 12:08 PM on November 12, 2013

Way back in 2007, Google published a [study on hard drive failure trends](#). The data revealed that failures typically occur very early in life or after several years of use. The study is a little dated, though, and so is [similar research](#) (PDF) conducted by Carnegie Mellon University. Fortunately, we have fresh data from online backup provider Backblaze, which has [published failure statistics](#) for 25,000 hard drives bought in the last five years.



According to this data, infant mortality is still a problem. The failure rate for the first three months of operation is higher than for any other quarter until after the three-year mark. Backblaze reports that 5.1% of its drives failed within the first 18 months, followed by only 1.4% for the following 18 months. After three years of use, the failure rate jumps to 11.8%.

Nearly 80% of the drives are still operational after four years. Backblaze doesn't have data points beyond that, but the current trend suggests a median drive life of six years.

Interestingly, the bulk of Backblaze's drives are consumer-grade models rather than enterprise variants with server-specific features and longer warranties. In fact, 8% of the firm's 75PB storage capacity comes from "shucked" drives that began their lives in external enclosures. Backblaze doesn't break down failure rates by drive type, but it promises to detail the differences between consumer- and enterprise-grade models in a future post. Since the company has "standardized" on consumer drives, it seems to be happy with their longevity versus the server-specific alternatives.

Even if enterprise-grade drives fail less frequently, the difference may not be large enough to justify the price premium. Pricing also appears to motivate Backblaze's harvesting of external drives. The firm started shucking portable drives in response to the high prices and limited availability of internal drives that immediately followed 2011's Thailand flooding. A [recent blog post](#) suggests the practice continues to this day, perhaps because portable drives are often cheaper to buy than equivalent internal products.

Although Backblaze has pledged to update its reliability statistics every quarter, it doesn't look like we'll get a manufacturer breakdown. I'd be very curious to see whether any makes or models are failing more often than others.

Server, server in the rack, when's my disk drive going to crack?

Backblaze's 25,000-drive study scribes the future of your storage



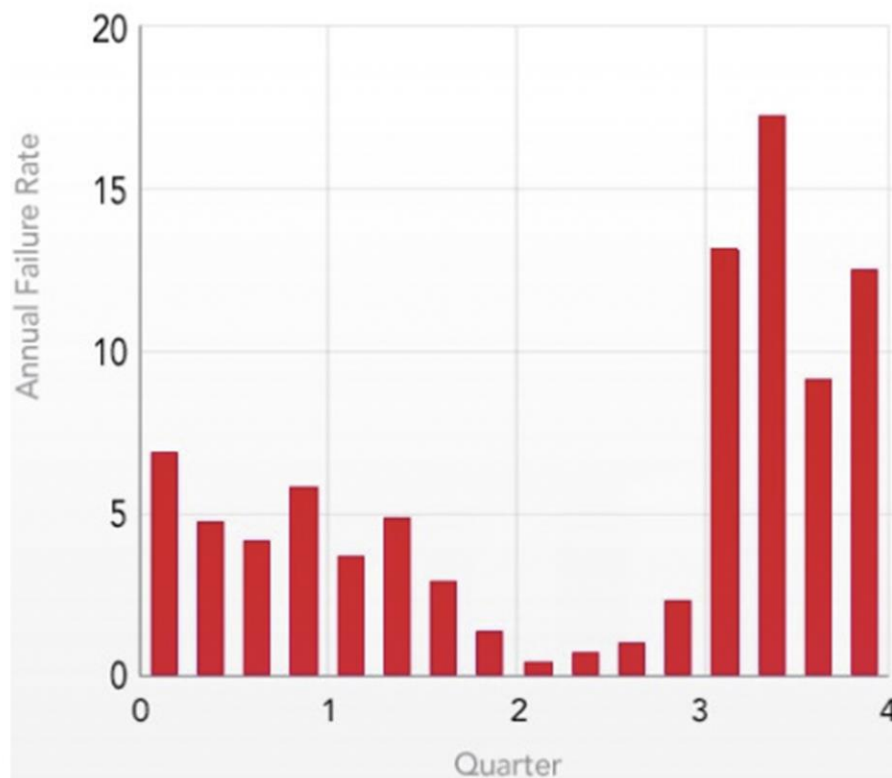
12 Nov 2013 at 11:03, [Simon Sharwood](#)



Cloud backup outfit Backblaze has cobbled together all the data it's gathered from the 25,000 or so disk drives it keeps spinning and drawn some conclusions about just how long you can expect disks to survive in an array.

The study's not the best of guides to data centre performance, because Backblaze happily [makes do](#) with consumer-grade drives. As even those drives routinely offer mean time between failure (MTBF) in the hundreds of thousands of hours – decades of operation – or the storage industry's preferred longevity metric of annualised failure rates (AFR) of under one per cent per year, the study tests those claims as well as any other. It's also rather more recent than the 2007 studies from [Google \(PDF\)](#) or [Carnegie Mellon University](#).

Backblaze's study finds that both AFR and MTBF are bunk. The [document](#) finds that disks follow the predicted "bathtub" curve of failure: lots of early failures due to manufacturing errors, a slow decline in failure rates to a shallow bottom and then a steep increase in failure rates as drives age.



Backblaze's disk longevity study shows something pretty close to the 'bathtub' curve one would expect

The study then looked at when drives fail and found a drive that survives the 5.1 per cent AFR of its first 18 months under load will then only fail 1.4 per cent of the time in the next year and half. After that, things get nasty: in year three a surviving disk has an 11.8 per cent AFR. That still leaves over 80 per cent of drives alive and whirring after four years, a decent outcome.

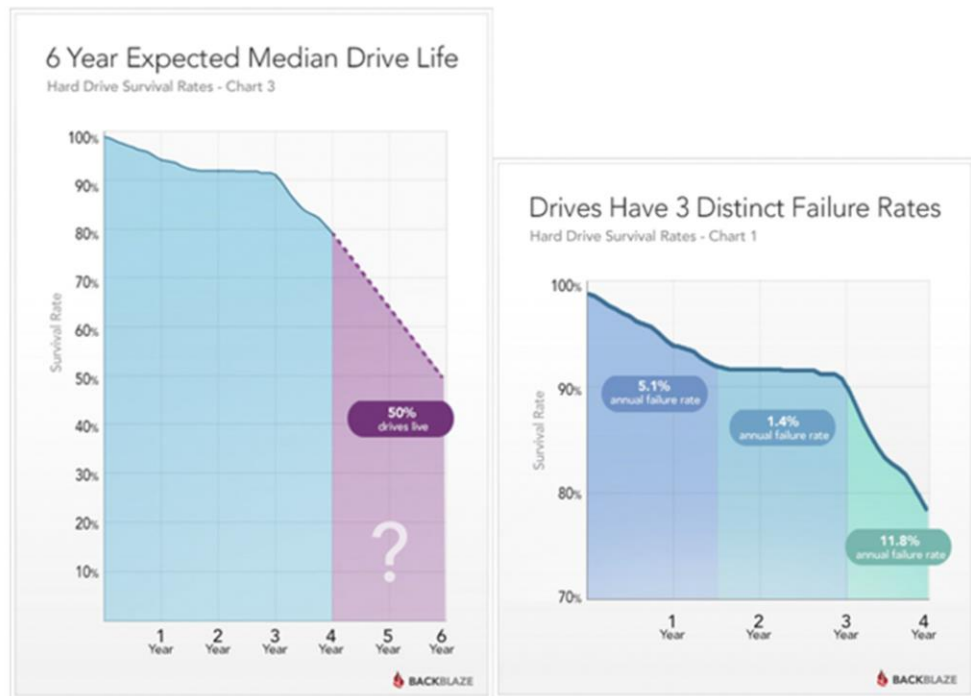
The study also predicts accelerated failure rates in years four and five, guesstimating things will get very, very bad in years four and five.

Backblaze promises to compare consumer-grade and enterprise-grade drives in a future study, which will be interesting if it reveals the premium paid for the latter makes little difference to longevity. Whatever the outcome of that study, this one shows that disk-makers' claims for longevity need to be taken with a decent pinch of salt. ®

How Long Your Hard Drive Is Likely To Last

Melanie Pinola

Nov 13, 2013, 11:00am



No physical storage medium lasts forever, and hard drives in particular can die rather unexpectedly. But how long can you expect your drive to live? Five years? Fifty? Backblaze has crunched some numbers to find hard drive failure rates.

The online backup service analysed 25,000 "consumer grade" hard drives that have been consistently spinning over the last four years, noting when each drive failed. The majority of them were internal hard drives, but a portion were also taken out of their external enclosures and mounted in Backblaze's data racks.

They found that hard drives have three distinct failure rates: in the first year and a half, drives fail at 5.1 percent per year; in the next year and a half, drives fail less — at about 1.4 per cent per year; but after three years, failure rates skyrocket to 11.8 per cent per year.

The good news is that 80 per cent of hard drives last at least four years. The bad news is 20 per cent of them don't. Backblaze doesn't have data beyond the four years measured so far, but extrapolated data predicts a median lifespan of over six years for most hard drives.

It's another good reminder to keep **backing up your data**.

How long do hard drives actually last?

by [Nicole Kobie](#) | Thursday 14 November 2013 | [3 Comments](#)



Backup firm Backblaze predicts the median lifespan for a consumer hard disk will be six years.

How long will a consumer hard drive last? Longer than you may think, according to one cloud backup provider.

Backblaze stores 75 petabytes of data across 25,000 disks; and rather than paying for specialist enterprise-class drives, it stores that mountain of data on consumer-grade hard disks – many of which are actually external drives that have been stripped of their casing – to make up for shortages following the 2011 flood in Thailand.

Realising that there's little good data available on hard disk failure rates, the company has been analysing its own collection.

It's found that the vast majority of its drives are still running after four years, with 26% failing during that time. If a drive is going to fail, it will probably do so either early on – likely because of a manufacturing defect – or after three years, a [blog post from Backblaze](#) revealed.

"For the first 18 months, the failure rate hovers around 5%; then it drops for a while, and then goes up substantially at about the three-year mark," said engineer Brian Beach. "We're not seeing that much 'infant mortality', but it does look like three years is the point where drives start wearing out."

For the first 18 months, the drive failure rate is 5.1% a year; then it falls for the next 18 months to 1.4%, before jumping to 11.8% at the three-year mark. However, Beach notes that nearly 80% of all the drives Backblaze has ever purchased are still operating.

Extrapolating from this data, Beach predicts that the median lifespan of a drive will be around six years – and this is for consumer-grade hardware used in a cloud setting.

"When Backblaze started, there were some concerns that consumer-grade disks wouldn't hold up in a data centre," Beach said. "If this six-year median lifespan is true, it means that more than half the drives will last six years, and those concerns were unfounded."

The company promised to update the stats regularly to see if the prediction holds true.

This article originally appeared at [pcpro.co.uk](#)

Study: Median Lifespan for a Hard Drive is Six Years

BY WESLEY FENLON ON NOV. 13, 2013 AT NOON

Petabytes of storage and mountains of data help Backblaze answer the difficult question of hard drive longevity.

It's always a little unnerving to read user reviews while shopping for a new hard drive. No matter how well-reviewed a drive is, on average, there are still those scary exceptions--reports of drives that died a day or week or month after they arrived, still practically brand new. Backblaze, an online backup site, calls those infant mortality drive failures. Those kinds of hard drive deaths represent just one statistic in a huge pile of data Backblaze has collected on hard drive longevity, which the company has used to try to answer a very difficult question: **How long do hard drives last?**

Because Backblaze has only been around for five years, it doesn't have a conclusive answer quite yet. But it has enough data to make an educated guess, based on the near-28,000 hard drives (providing 75 petabytes of cloud storage) the company has installed since 2009. All but six petabytes of that data is stored on standard internal hard drives, while the rest is stored on hard drives ripped from external shells--Backblaze had to turn to those drives during the shortage created by Thailand's flooding crisis.



So here's the good news: Many hard drives in operation at Backblaze have been around as long as the company, giving them lifetimes of more than five years. At home, you shouldn't have to worry too much about replacing drives every couple years. But the data is a bit more nuanced and interesting than that.

"Reliability engineers use something called the Bathtub Curve to describe expected failure rates," Backblaze's blog explains. "The idea is that defects come from three factors: (1) factory defects, resulting in 'infant mortality', (2) random failures, and (3) parts that wear out, resulting in failures after much use."

For the first 18 months a drive is in operation, its failure rate hovers around five percent. That means five percent of drives end to fail during their first year and a half of operation. After a year and a half, however--once factory defects have cleared out--the failure rate drops to an annual 1.4 percent. Then, after the three year mark, the failure rate begins to climb up to 11.8 percent. That's when drives begin to give out.

Backblaze's explanation of annual failure rates is also a key piece of the puzzles. It explains that 100 percent isn't the worst possible failure rate, but that's not the case: "Imagine you have a disk drive supplier who provides drives that are 100% reliable for six months, but then all fail at that point. What's the annual failure rate? If you have to keep 100 drives running at all times, you'll have to replace the drive in every slot twice a year. That means that you'll have to replace 200 drives each year, which makes your annual failure rate 200%. So, in theory at least, there is no worst possible failure rate. If every drive failed after one hour of use, the annual failure rate would be 876,000%. Fortunately, the drives that Backblaze gets are more reliable than that."

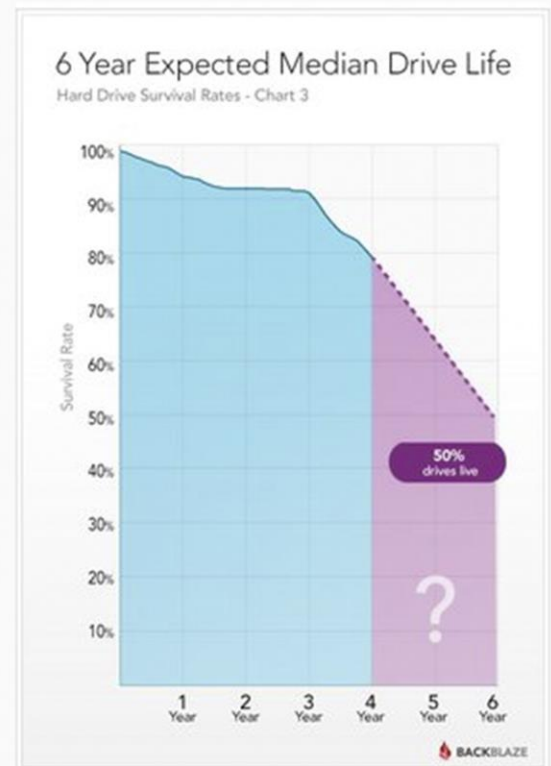


IMAGE CREDIT: BACKBLAZE

Despite having its drives running 24/7, more than 80 percent of Backblaze's purchased hard drives are still operating. That's pretty good. Based on their data, they project that the median lifespan of a hard drive will be over six years. So even though failures become significantly more common after three years, the odds are in your favor until you hit that six year mark. After that, it's probably time to start thinking about buying a new hard drive.

How long do consumer level hard drives last?

Posted 12 November 2013 17:30 CET by Kerry Brown

Many of us have had hard drives fail. And stories of dead drives are commonplace around the net. But for the most part these have been anecdotal accounts, with very little hard data for comparison. Backblaze, an online data storage company, has released a study examining their 25,000 hard drives over a period of four years.

Backblaze runs their drives twenty-four hours a day, and the majority of their 75 petabytes of data capacity is made up of consumer grade internal hard drives, but 6 petabytes of that use external drives that were removed from their cases due to the shortage of drives caused by flooding in Thailand.

Their results show that hard drives are fairly reliable during their first three years. There are basically three stages of failure. During the first 1.5 years, drives fail at a rate of 5.1% annually. During the next 1.5 years, the drives fail at 1.4% annually and after 3 years the failure rate jumps dramatically to 11.5%. Extrapolating from that data, Backblaze expects a 50% total failure rate for their consumer level drives at the 6 year mark.

Backblaze promises to update their findings every quarter and will be examining durability of enterprise drives in comparison to consumer grade drives as well.

How long do hard drives actually last?

Backup firm Backblaze predicts the median lifespan for a consumer hard disk will be six years

Nicole Kobie 13 Nov 2013



How long will a consumer hard drive last? Longer than you may think, according to one cloud backup provider.

Backblaze stores 75 petabytes of data across 25,000 disks; and rather than paying for specialist enterprise-class drives, it stores that mountain of data on consumer-grade hard disks – many of which are actually external drives that have been stripped of their casing – to make up for [shortages following the 2011 flood in Thailand](#).

Realising that there's little good data available on hard disk failure rates, the company has been analysing its own collection.

It's found that the vast majority of its drives are still running after four years, with 26% failing during that time. If a drive is going to fail, it will probably do so either early on - likely because of a manufacturing defect - or after three years, a [blog post from Backblaze](#) revealed.

"For the first 18 months, the failure rate hovers around 5%; then it drops for a while, and then goes up substantially at about the three-year mark," said engineer Brian Beach. "We're not seeing that much 'infant mortality', but it does look like three years is the point where drives start wearing out."

For the first 18 months, the drive failure rate is 5.1% a year; then it falls for the next 18 months to 1.4%, before jumping to 11.8% at the three-year mark. However, Beach notes that nearly 80% of all the drives Backblaze has ever purchased are still operating.





Extrapolating from this data, Beach predicts that the median lifespan of a drive will be around six years - and this is for consumer-grade hardware used in a cloud setting.

"When Backblaze started, there were some concerns that consumer-grade disks wouldn't hold up in a data centre," Beach said. "If this six-year median lifespan is true, it means that more than half the drives will last six years, and those concerns were unfounded."

The company promised to update the stats regularly to see if the prediction holds true.

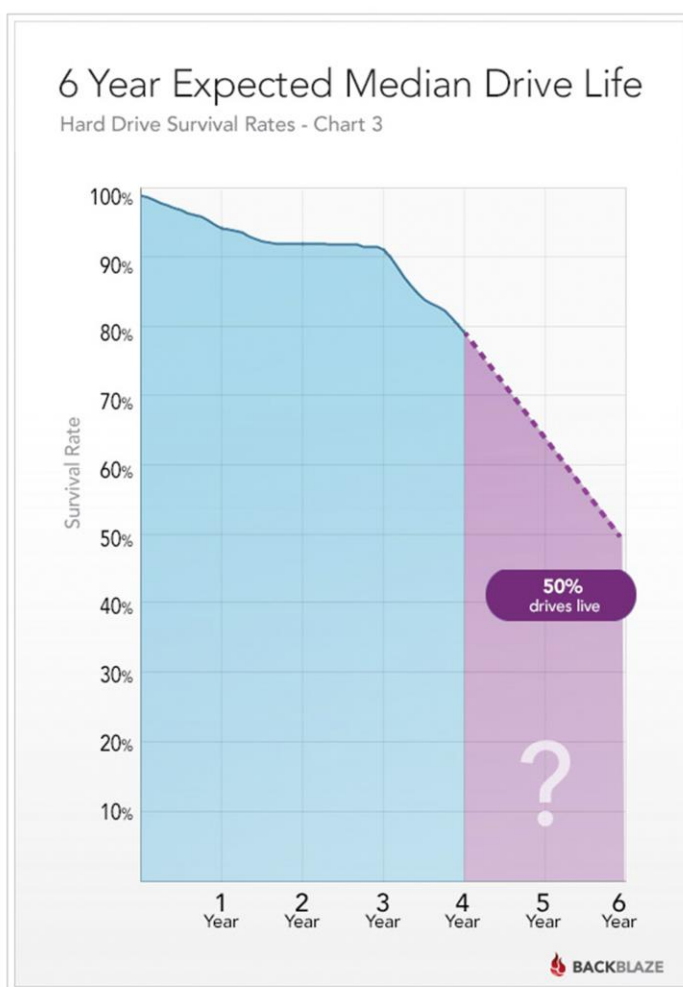
Backblaze stores 75 petabytes on 25,000 drives, and most are still spinning

Derrick Harris Nov 12, 2013 - 3:00 AM CDT

Cloud backup provider is fast becoming one of my favorite companies in IT, if only because it shares so much information about its operations. On Tuesday, the company — famous for [its open source storage-pod designs](#) and infamous for [getting blacklisted from stores including Best Buy and Costco](#) during the 2010 hard drive shortage — released a new set of data regarding the lifespan of the hard drives on which its service runs.

Backblaze Distinguished Engineer Brian Beach provides a lot of detail [in a blog post about the study](#), but here are the highlights:

- The company is storing 75 petabytes of customer data on more than 25,000 consumer-grade hard drives.
- It has been in business for 5 years and 74 percent of the hard drives it has ever deployed are still running.
- Annual failure rate for drives is 5.1 percent for the first 18 months, 1.4 percent for the next 18 months, and 11.8 percent during years three and four.
- By Backblaze's estimates, more than half of its drives could still be running after 6 years — a finding most studies on hard drive lifespans to date would not have predicted.

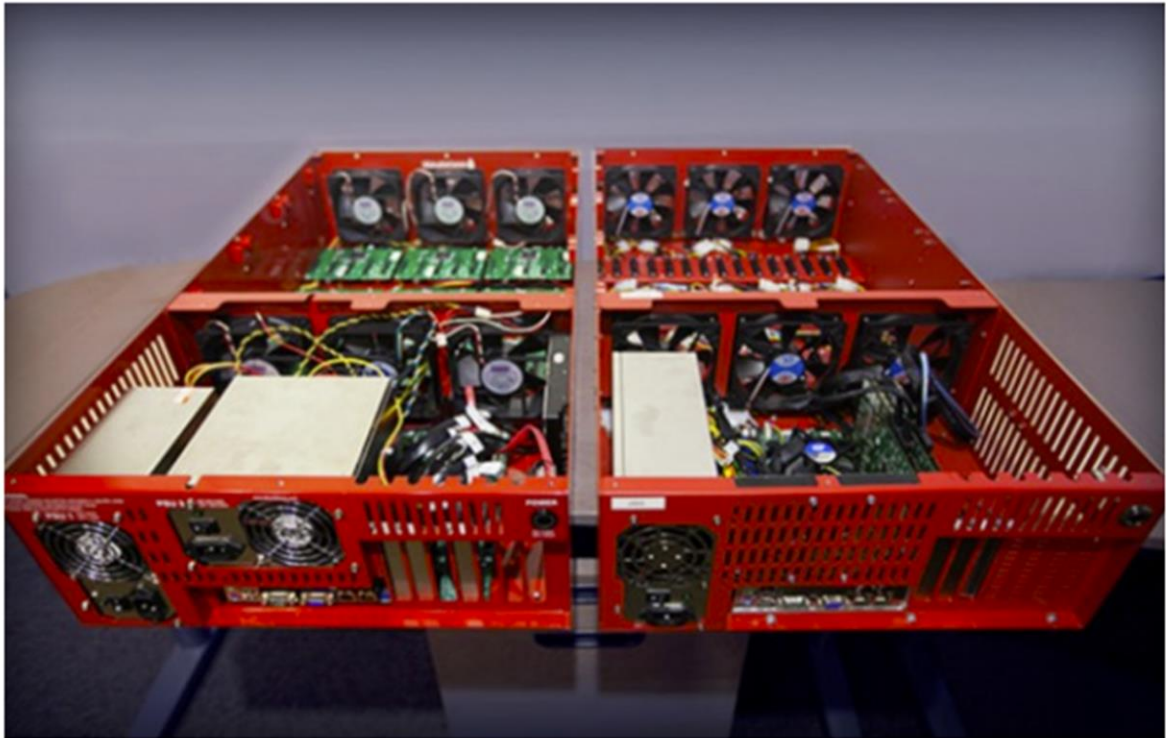


The direct implications of the study beyond the borders of Backblaze's business are unclear — its cloud backup service is certainly different than running a large web operation like Google, or even an application-serving storage service like Amazon S3 — but the numbers are interesting nonetheless. Taken as a whole, the efforts of companies like Backblaze and [organizations like the Open Compute Project](#) suggest a future where intrepid CIOs can legitimately question prior assumptions about how much hardware should cost, what it should look like and how long it should last.

And if you want to hear a little more about Backblaze's history — its ups, downs, courtships from the CIA and blown marketing budgets — listen to our [recent Structure Show podcast](#) with Co-founder and CEO Gleb Budman.

How to build your own 180TB RAID6 storage array for \$9,305

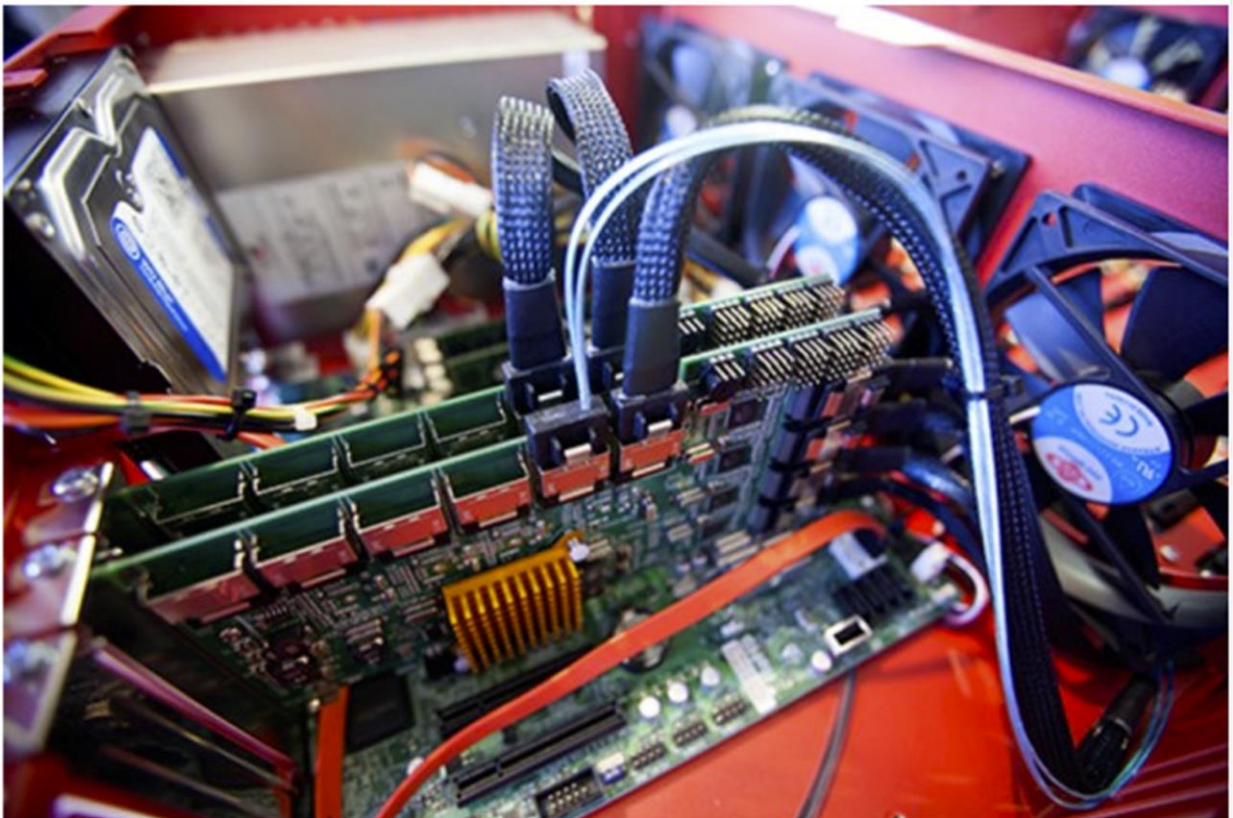
By Sebastian Anthony on March 19, 2014 at 8:00 am



We've all been there: Your computer's 2-terabyte drive has filled itself up again, and it's time to delete some movies and uninstall some games. But wait! Instead of deleting data like some kind of chump, I have a better idea: Build your own 180-terabyte RAID6 storage array, and never run out of space ever again. With 180 terabytes of storage under the hood, never again will the Steam Summer Sale give you storage anxiety; never again will you have to decide which files get backed up. The best part? Building your own 180TB storage array will cost you just \$9,305.

The 180TB storage array, like many of our other hard drive-related stories, comes from our friends at Backblaze. Backblaze is a cloud-based backup company that provides unlimited storage for a fixed monthly price — a service it can only provide because it builds its own Storage Pods, instead of using commercial devices that are well over twice the price. Backblaze originally open sourced [the specifications of Storage Pod 2.0 in 2011](#) — and now, as the company continues to grow and seek out cheaper and higher density storage solutions, it has just published the details of Storage Pod 4.0.

First, the specifications. Storage Pod 4 consists of a custom-designed 4U server case containing 45 4TB hard drives, a single 850W power supply, and a motherboard/CPU/RAM that runs the controller software. The centerpiece of the installation, though, is a pair of Rocket 750 40-port SATA PCIe host adapter expansion boards, priced at around \$700 each. These specs are a big step up from Storage Pod 2.0 and 3.0, which required two PSUs, and nine five-drive NAS backplanes that then connected to three SATA expansion cards. By wiring the hard drives directly into the host adapter, Backblaze says Storage Pod 4 has between *four and five times* the throughput of its predecessor.



Rocket 750 40-port SATA expansion cards, inside the Backblaze Storage Pod 4.0

If you want to build your own Storage Pod, Backblaze does provide a complete parts list and blueprint, but it would be a pretty epic endeavor. Instead, Backblaze suggests that you buy an empty Storinator chassis from 45 Drives, which is based on the Backblaze Storage Pod, and fill it up with your own drives. This method will cost you around \$12,500, rather than Backblaze's cheaper in-house cost of \$9,305. In case you're wondering, Backblaze is currently filling its Storage Pods with Hitachi (HGST) and Seagate 4TB hard drives, but it wants to try out Western Digital's Red drives in the near future. (Read: [Who makes the most reliable hard drives?](#))

The Thailand hard drive crisis, three years on

What's odd about Storage Pod 4.0, however, is that its cost-per-gigabyte is almost identical to Storage Pod 2.0, released back in July 2011. Storage Pod 2.0 provided 135TB at a cost of \$7,394, or 5.5 cents per gig; Storage Pod 4.0 is 180TB for \$9,305, or 5.1 cents per gig.

Cost per GB for Hard Drives

Prices Backblaze paid for drives from 2009-2013



If **the Thailand flooding of 2011 hadn't occurred**, we'd probably be around 3 cents per gig. After the floods, hard drive prices shot up, and it took almost 30 months for hard drive prices to start trending below their July 2011 level. This is why, after almost three years, 4TB drives are still the most cost effective (before the Thailand floods, the cost-per-gig was almost halving every two years, in line with Moore's law).

The good news, though, is that 5- and 6-terabyte drives are now on the market — they're just incredibly expensive. The **WD/HGST helium-filled 6TB drive** is one of the most exciting hard drives to hit the market in the last decade — but priced at around \$750, or 12 cents per gig, it just doesn't make economical sense for large storage arrays.

For a complete parts list, chassis blueprint, and info on how to build your own Storage Pod 4.0, **hit up the Backblaze website**. It's worth noting that Backblaze's controller/RAID6 software is proprietary — so if you do go down the DIY route, you'd probably end up using something like **FreeNAS**, or rolling your own software. (Let's face it, 180TB storage arrays aren't really for home users; this is enterprise- and supercomputing-level stuff).



Buy a 180TB array for 6¢/GB

After five years, the folks at Backblaze are back with a completely redesigned Storage Pod. The V4 is faster, better AND cheaper. And open source, so you can build your own. Here's what you need to know.



By Robin Harris for Storage Bits | March 19, 2014 -- 12:00 GMT (05:00 PDT) | Topic: Storage

Backblaze is an [all-you-can-eat backup service for \\$5/mo](#). As such, they couldn't afford expensive brand name RAID arrays, SANs, or NAS boxes, so they rolled their own.

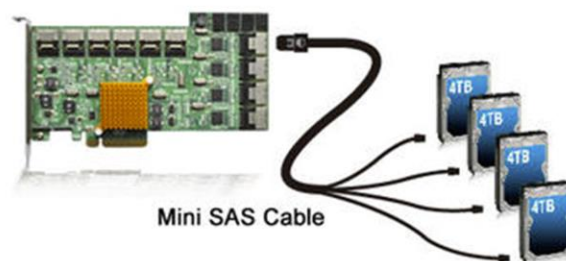
They now have over 100,000TB of their original Storage Pods in versions 1, 2, and 3. All had 45 drives using nine 5-drive SATA port multipliers - not the most reliable design - which meant five drives barfed when a PM went down.

4x performance

The new design has two [HighPoint Rocket 750](#) cards, each delivering 40 6Gb/s SATA 3 interfaces through 10 mini-SAS ports. Much faster and less contention because each drive gets its own dedicated SATA and power port.

The Rocket 750s mount on an 8x PCIe 2.0 bus, giving a 4x performance boost over the earlier design. This enables much faster RAID syncs bringing up a new Pod and should - though Backblaze didn't speak to this - also enable faster rebuilds of replacement drives.

The direct connections remove the port multipliers, simplify the wiring and isolate connector issues - a common problem - to a single drive. Each mini-SAS cable fans out to 4 SATA connectors. Like this:



Graphic courtesy HighPoint

The old Pods had 2 power supplies for capacity, not redundancy, and that was expensive. The new Pod has a single high-efficiency power supply that powers everything and should be more reliable as well as cheaper. If you were using just a few Pods, you'd mirror data across a pair for availability.

There are other changes. New side rails improve cab mounting and access. Boot drives are on the rear for easier wiring and access.

5¢ a gig

But Backblaze's price for a 180TB Pod is now a record low \$9305, including drives - just over 5¢ a gigabyte of raw capacity. You'll pay 6¢/GB if you buy from their supplier - [45 Drives](#) - but they also offer optional redundant power and boot drives.

Backblaze has published the complete parts list so you can buy the chassis from [45 Drives](#) and bolt the parts together yourself and save some more money. Its an open source design so you can even bend your own metal if you like.

The Storage Bits take

The Storage Pods are designed for Backblaze's particular need: low-cost storage for online backup. They would choke and die on a call-center transactional workload.

But as we gather more data - backups, log files, web content, video - we typically access it less. And while SSDs are great for transactional workloads, disk drives are still competitive for large sequential reads and writes and are way cheaper.

As drive prices drop - 5 and 6TB drives are starting to come on the market in volume - Storage Pod 4 costs will drop as well. If you need lots of capacity there's no lower cost solution.

Comments welcome, as always. Say, with 6TB drives that would be 270TB per Pod and a petabyte for about \$50k next year. I remember when 500MB was \$50k!

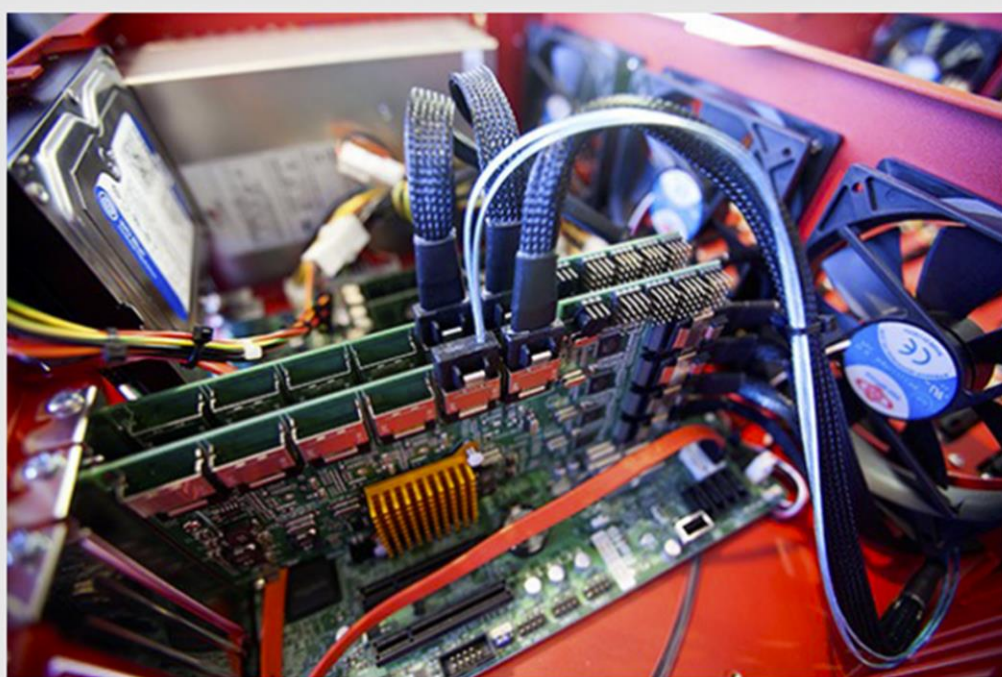
Read the entire Backblaze v4 blog post [here](#).

BACKBLAZE STORAGE POD V4 ANNOUNCED – STH DISSECTS THE BUILD

by PATRICK KENNEDY
MARCH 19, 2014

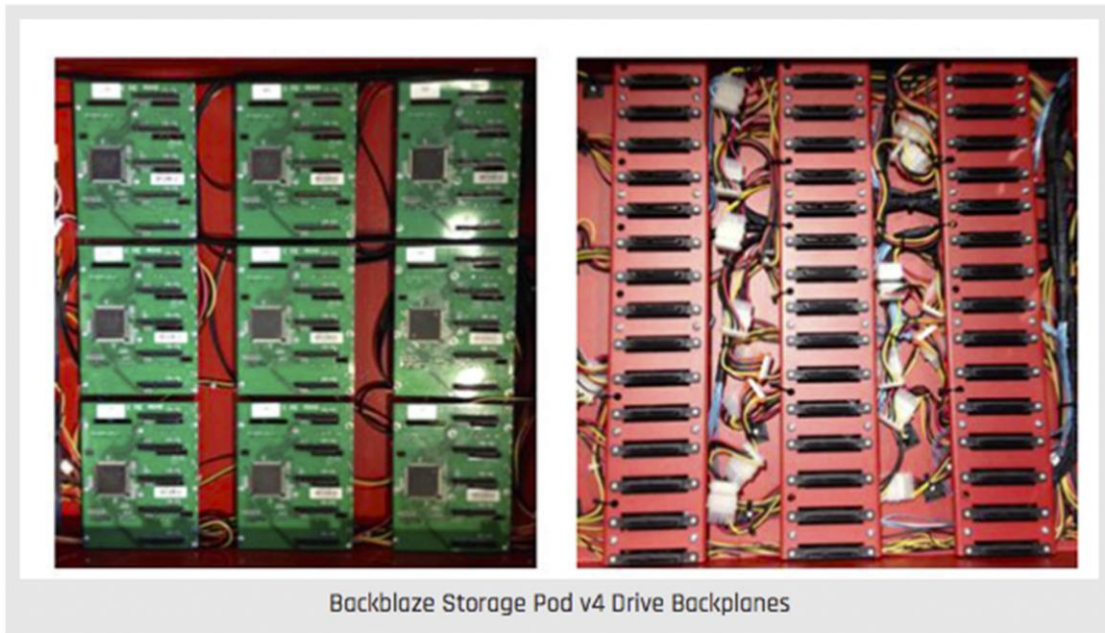
Backblaze has released details around their newest v4 storage pod. This new version (finally) changes out the previous port multiplier design. Instead Backblaze uses new controllers to make the storage pods have fewer points of failure. We decided to dissect the new build and discuss changes made in this fourth major iteration.

Backblaze has changed from a few SATA cards with port multipliers to two big HighPoint Rocket 750 SATA cards. These cards have 10x SFF-8087 ports so each card can theoretically handle 40 drives each. The HighPoint cards are powered by Marvell 88SE9485 chips and are fairly hard to find. Since Backblaze sent me a preview of their article, Amazon is the only retailer with the cards in stock for just [under \\$700 each](#). Marvell SATA chips do have an interesting reputation in the [forums](#) in terms of reliability across OSes, but Backblaze has used them in the past with success in their environment.



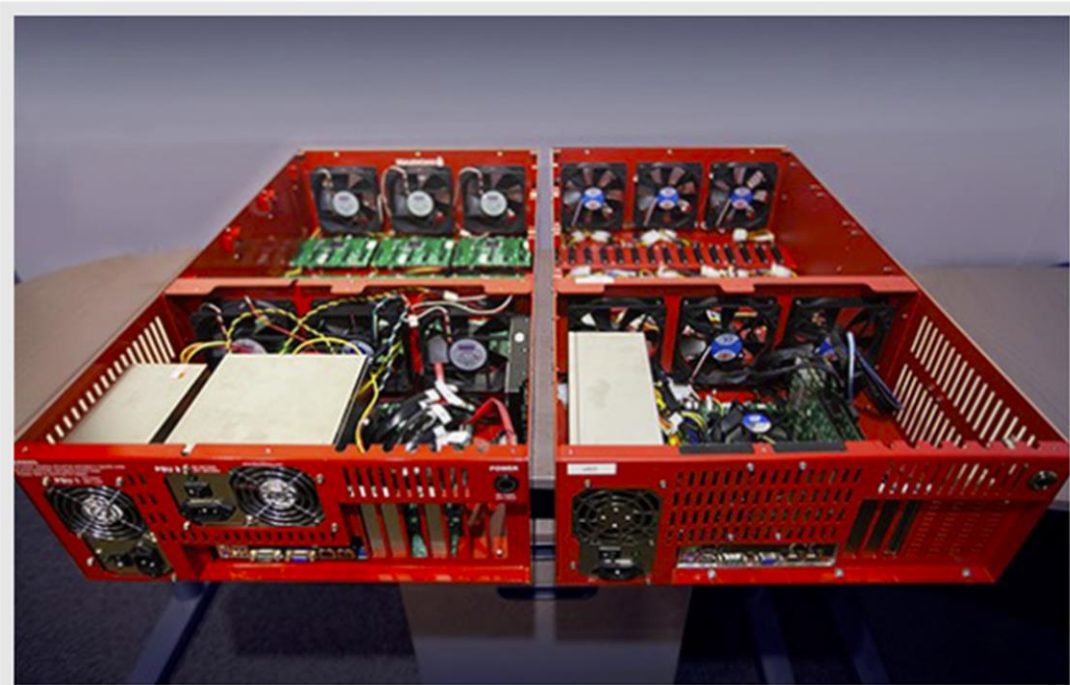
Backblaze Storage Pod v4 Highpoint 750 SATA Controllers

The HighPoint controllers are now directly connected to drives. The connectors now provide data and power to individual drives via what appears to be 45x SFF-8482 connectors. This change means that Backblaze can get much more performance than it could in its previous design and the company notes RAID rebuild times have dropped by days. That has a major impact on MTDL as can be seen with the [STH RAID Reliability Calculator](#) (MTDL model.)



One other major change is that is format could fairly easily be adapted to work with SAS drives.

Another major change is that Backblaze has moved to a single power supply design. One can see the changes below but the storage pod now includes even fewer parts because of this. The previous dual power supply design was just to feed the power requirements of drives and system. Backblaze does not utilize redundant power supply designs.



Backblaze Storage Pod v4 Power Supply

Overall this is a great change. The HighPoint controllers are a novel solution but the general scarcity of the controller likely means that we will see a different solution in a newer generation. Of course, HighPoint may decide to start producing cards in quantity again in which case that may be an issue.

One implication of the new design is that it is now nearline SAS friendly. One could certainly see this as getting much closer to a Sun Thumper competitor simply by changing the disk controllers and possibly using a SAS expander.

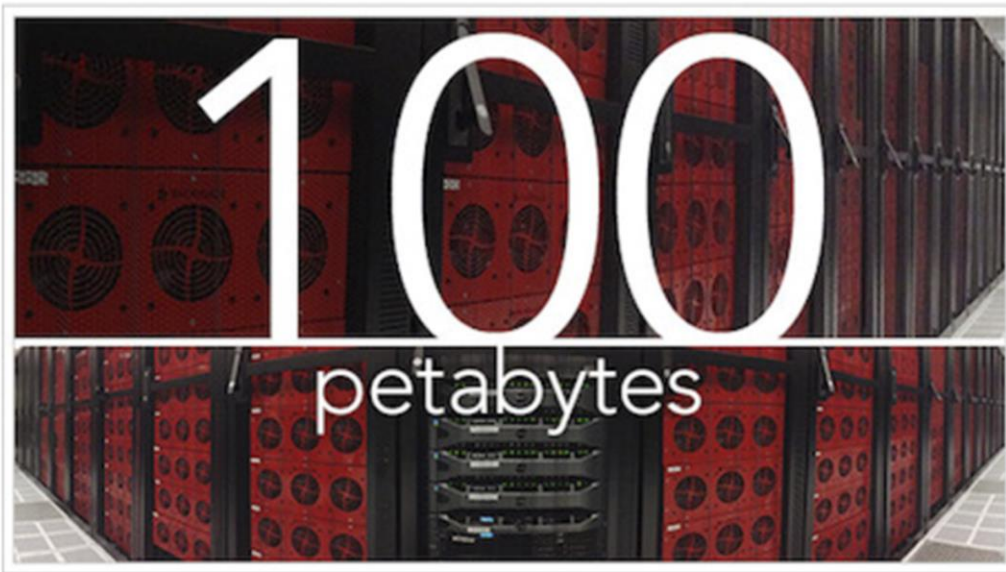
The final major thought on the new build is that Highpoint is still using an inexpensive Intel Core i3-2100. Newer generation Core i3 processors have AES-NI support so if Backblaze decides it was to do AES 256 encryption using hardware acceleration, a new chip would be in order. *[ed.] A final BOM showed that they are using a newer Core i3 so this point is moot. Thanks Ken for catching the fact I was working from a pre-production BOM.*

You can read more about the Backblaze Storage Pod V4 [here](#).

Backblaze now storing 100 petabytes of data, announces Storage Pod 4.0



Steven Sande, @stevensande
03.19.14



When it comes to storing large amounts of data inexpensively, Backblaze is a leader. The online backup company just announced that they're now storing 100 petabytes -- that's *one hundred million gigabytes* -- of data from both Mac and Windows users around the globe. To put the number in perspective, Backblaze CEO Gleb Budman published some fun figures on the company's blog.

That 100 petabytes is about a quarter of what Facebook stores for its over 1 billion customers, or equivalent to storing 33 billion songs -- that's all of the songs on iTunes, 1,270 times over. You could store 11,415 *years* of HD video for viewing 24/7. The 31,954 hard drives in the Backblaze data center stacked on end would reach 9,941 feet (over 3,000 meters) in height, almost as tall as California's Mt. Shasta measured from its base.

At 3 MB per, Backblaze would store:
33 billion songs



To be able to offer unlimited storage at an affordable rate, Backblaze created the Storage Pod, an open source project using off-the-shelf components to cram as much storage into a rack-mounted module as possible. The company today announced the fourth generation of the Storage Pod, bringing the cost of mass storage down to a piddling \$0.051 per gigabyte.

Backblaze buys its components in bulk, so they can build a Storage Pod 4.0 for about US\$9,305. If you try to make your own 180 TB Storage Pod 4.0, it's going to cost you about \$10,587 plus the cost of your labor.

Backblaze VP of Engineering Tim Nufire recorded a video outlining the details of this speedy new Storage Pod, which we present in its entirety for your nerdy viewing pleasure. We're still waiting to hear from a TUAW reader who has built one of these in his or her basement...



Backblaze's newest storage pod holds 180TB at 5 cents per GB

Derrick Harris Mar 19, 2014 - 7:36 AM CDT

Cloud backup startup Backblaze open sourced its first storage system in 2009, and has been making them bigger and (most of the time) cheaper ever since. On Wednesday, the company released its latest version that doesn't boost capacity over the last iteration — it's still 180 terabytes — but does drive the cost of the whole system down to just \$9,305, or just over 5.1 cents per gigabyte.

Backblaze [laid out the details in a blog post](#), mostly focusing on changes to the pods' power supplies and faster processors. More interesting, however, might be its inclusion of information about how much it costs to build the system yourself versus buying from 45 Drives, a company that builds and sells the Backblaze pods commercially. Already last year, the number of companies and institutions building their own drives was growing pretty fast.

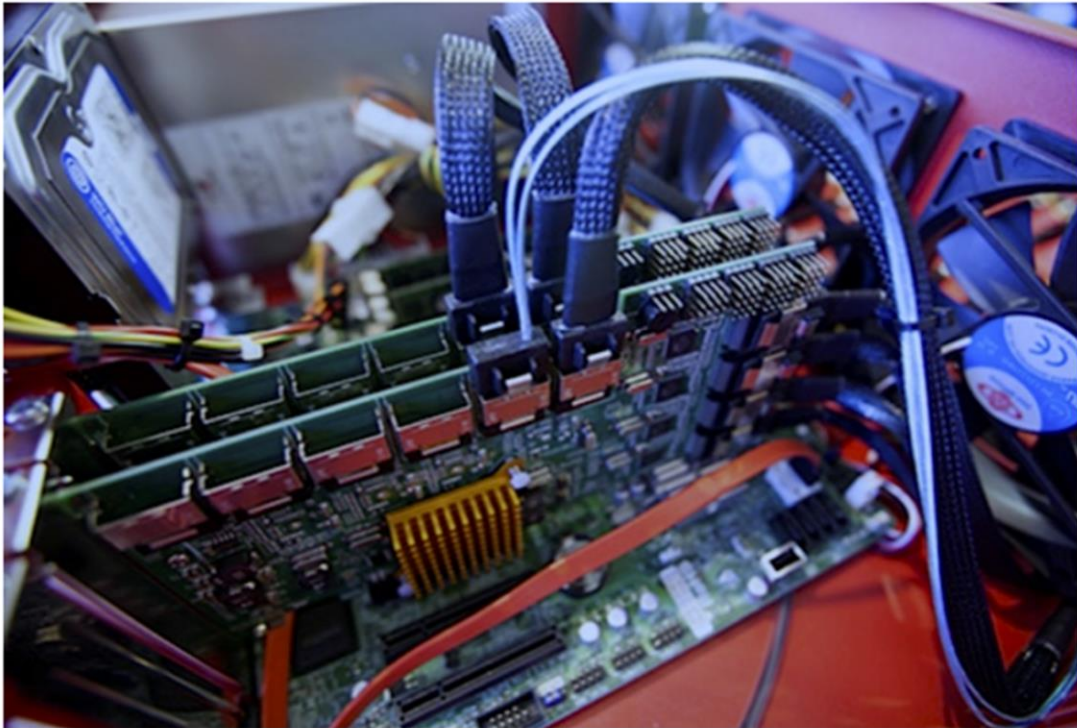
	Storage Pod 1	Storage Pod 2	Storage Pod 3	Storage Pod 3	Storage Pod 4
Date	Sep-09	Jul-11	Feb-13	Feb-13	Mar-14
Backblaze Cost	7,867	7,394	7,568	10,717	9,305
Drive Size in TB	1.5	3	3	4	4
Total Storage in TB	67	135	135	180	180
Cost per GB	0.117	0.55	0.056	0.059	0.0517

If you want to hear more about the history of Backblaze, its business model and its rationale for open sourcing storage arrays, listen to [this interview with Founder and CEO Gleb Budman](#) from the Structure Show podcast in October.

BackBlaze publishes new Storage Pod plan, reduces build cost

updated 08:11 am EDT, Wed March 19, 2014

by MacNN Staff



New array boasts higher speeds, lower per-GB cost

Data backup specialist [BackBlaze](#) has updated its DIY multi-drive Storage Pod design again. According to the company, the newest [4.0 revision](#) "performs four times faster, is simpler and more reliable, and is even less expensive to build." As with its predecessors, the Storage Pod 4.0 is an open-source build, with plans and part lists available from the company itself for free.

The original design eschews port multiplier backplanes in favor of individual direct-wire SATA and power connectors. Three four-port SATA cards were replaced in favor of two 40-port HighPoint Rocket 750 cards with SAS connectors, with cables fanning out to four drives per SAS port, each with SATA 3 speeds.

The new version of the hardware gives a "four to five times performance improvement" over the previous iteration of the product. Additionally, switching to the new methodology provided an added bonus -- with the direct wire connection, if a connector fails, only one drive drops off the RAID, not all of them.

The company claims that each build costs it \$9,305 for 180TB of storage, as the company gets a bulk price discount on parts and drives. A user choosing to build their own would spend approximately \$10,587. The current build is the lowest price per terabyte online to date for the company, even given the effect the Thailand flooding continues to have on hard drive pricing. For comparison, arrays such as the BackBlaze solution populated with drives for enterprise routinely run well over \$100,000.



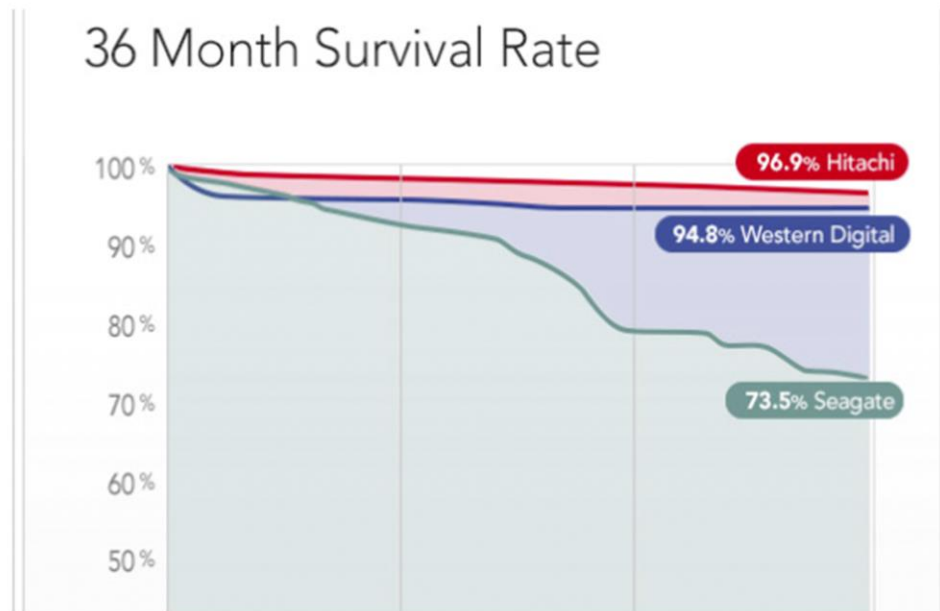
	Storage Pod 1	Storage Pod 2	Storage Pod 3	Storage Pod 3	St l
	Sep-09	Jul-11	Feb-13	Feb-13	N
Cost	7,867	7,394	7,568	10,717	9
in TB	1.5	3	3	4	
age in TB	67	135	135	180	
gB	0.117	0.55	0.056	0.059	C

The Most (and Least) Reliable Hard Drive Brands



Melanie Pinola

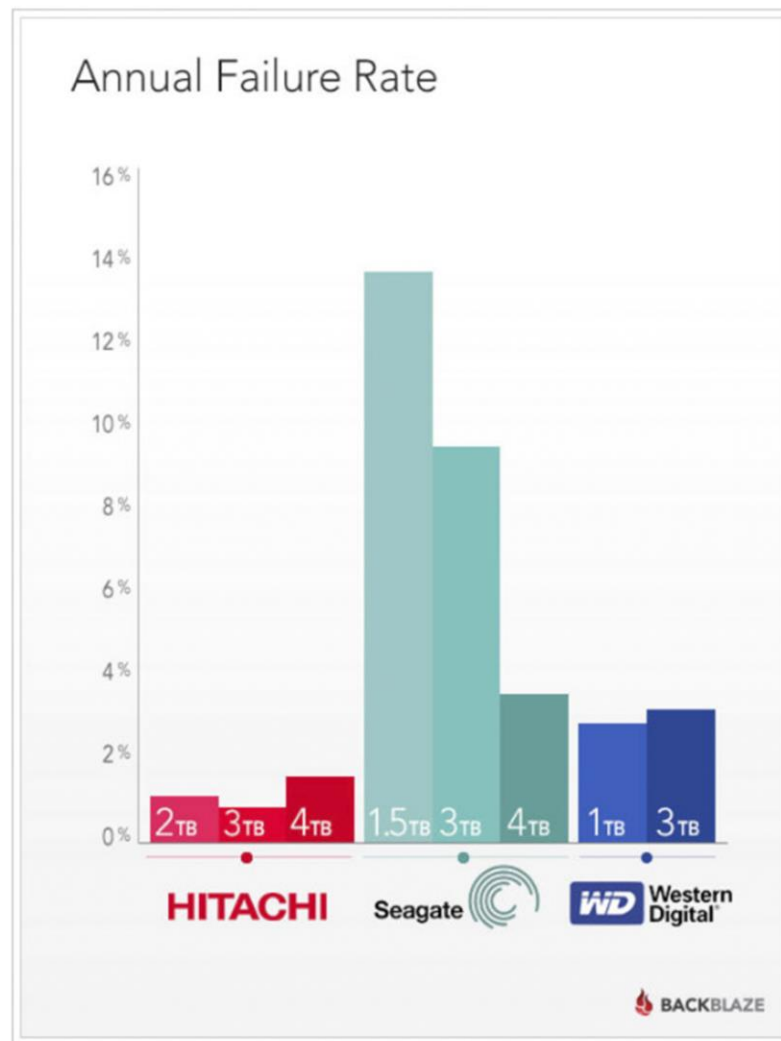
1/21/14 9:00am · Filed to: HARD DRIVES



Backblaze uses 25,000 hard drives for its online backup service. This has provided some interesting information, such as **how long hard drives are likely to last** and the **difference in reliability between enterprise and consumer drives**. Today, Backblaze has spilled the beans on which drive manufacturers are the most reliable.

The comparison is between Seagate, Hitachi, and Western Digital. (The company has a few Toshiba and Samsung drives, but not enough for analysis.) Backblaze says they buy the least expensive drives that perform well, based on stress tests and a few weeks in production.

As with the previous analyses, Backblaze measured the reliability of the drives by looking at the annual failure rate, the average number of failures while running a drive for one year. Here is a pretty telling chart:



The company has also broken it down by drive model on their blog. The Hitachi GST Deskstar (7K2000, 5K3000, and 7K3000) had the lowest annual failure rates, from 0.9% to 1.1%. Meanwhile, the Seagate Barracuda Green had a whopping 120% annual failure rate (an average age of 0.8 years). While those were warranty replacement drives—likely refurbished ones already used—the other Seagate drives had failure rates between 3.8% and 25.4%.

Overall, most of the drives survived for at least three years, but looking at this data, you might want to consider going with a Hitachi or WD drive instead of Seagate, unless you read other reviews of a specific drive's reliability.

What Hard Drive Should I Buy? | Backblaze

Who makes the most reliable hard drives?

By Joel Hruska on February 1, 2017 at 8:11 am | [61 Comments](#)



Backblaze is back again, this time with updated hard drive statistics and failure rates for all of 2016. Backblaze's quarterly reports on HDD failure rates and statistics are the best data set we have for measuring drive reliability and performance, so let's take a look at the full year and see who the winners and losers are.

Backblaze only includes hard drive models in its report if it has at least 45 drives of that type, and it currently has 72,100 hard drives in operation. The slideshow below explains and steps through each of Backblaze's charts, with additional commentary and information. Each slide can be clicked to open a full-size version in a new window.

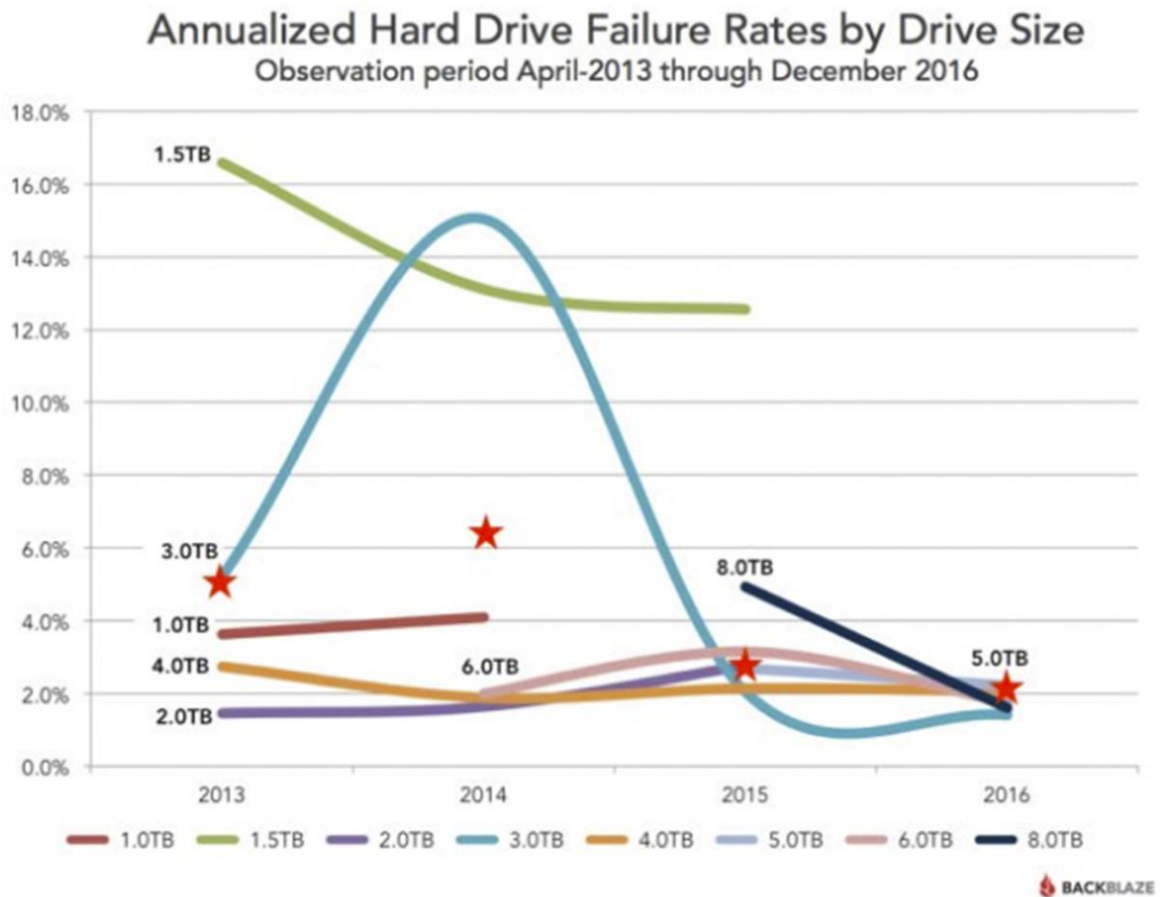
HGST	HDS723030ALA640	3 TB	978	61.21	90,415	9	3.63%
HGST	HDS5C3030ALA630	3 TB	4,476	55.87	412,752	13	1.15%
HGST	HDS5C4040ALE630	4 TB	2,625	45.35	241,665	4	0.60%
Toshiba	DT01ACA300	3 TB	46	44.12	4,232	-	0.00%
Seagate	ST4000DX000	4 TB	184	38.54	17,354	7	14.72%
WDC	WD30EFRX	3 TB	1,105	30.39	100,259	9	3.28%
HGST	HMS5C4040ALE640	4 TB	7,014	29.48	648,393	9	0.51%
WDC	WD60EFRX	6 TB	446	24.14	41,304	5	4.42%
HGST	HUH728080ALE600	8 TB	45	22.99	4,140	-	0.00%
Toshiba	MD04ABA500V	5 TB	45	22.15	4,140	-	0.00%
Seagate	ST4000DM000	4 TB	34,738	21.73	3,196,552	234	2.67%
Seagate	ST6000DX000	6 TB	1,889	21.48	173,720	8	1.68%
Toshiba	MD04ABA400V	4 TB	146	20.61	13,432	-	0.00%
WDC	WD40EFRX	4 TB	75	17.16	4,232	-	0.00%
HGST	HMS5C4040BLE640	4 TB	9,407	15.51	809,119	14	0.63%
Seagate	ST8000DM002	8 TB	8,660	4.72	663,697	30	1.65%

The statistics here are great for every drive but the Seagate ST4000DX000. Seagate's 4TB drives are the only hard drives to report a double-digit failure rate. 184 drives isn't very many in comparison to some models, but it's enough to see statistical trends. 38 months isn't young, but there are much older drive families turning in much better failure rates.



Backblaze has explained before that it can tolerate a **relatively high failure rate** before it starts avoiding drives altogether, but the company has been known to take that step (it stopped using a specific type of Seagate drive at one point due to **unacceptably high failure rates**). Current Seagate drives have been much better and the company's 8TB drives are showing an excellent annualized failure rate.

Next, we've got something interesting — drive failure rates plotted against drive capacity.



The "stars" mark the average annualized failure rate for all of the hard drives for each year.

The giant peak in 3TB drive failures was driven by the Seagate ST3000DM001, with its 26.72% failure rate. Backblaze actually took the unusual step of yanking the drives after they proved unreliable. With those drives retired, the 3GB failure rate falls back to normal.

One interesting bit of information in this graph is that drive failure rates don't really shift much over time. The shifts we do see are as likely to be caused by Backblaze's perpetual rotation between various manufacturers as old drives are retired and new models become available. Higher capacity drives aren't failing at statistically different rates than older, smaller drives, implying that buyers don't need to worry that bigger drives are more prone to failure.

The usual grain of salt

As always, Backblaze's data sets should be taken as a representative sample of how drives perform in this specific workload. Backblaze's buying practices prioritize low cost drives over any other type, and they don't buy the enterprise drives that WD, Seagate, and other manufacturers position specifically for these kinds of deployments. Whether or not this has any impact on consumer drive failure rates isn't known — HDD manufacturers advertise their enterprise hardware as having gone through additional validation and being designed specifically for high-vibration environments, but there are few studies on whether or not these claims result in meaningfully better performance or reliability.



Backblaze's operating environment has little in common with a consumer desktop or laptop, and may not cleanly match the failure rates we would see in these products. The company readily acknowledges these limitations, but continues to provide its data on the grounds that having *some* information about real-world failure rates and **how long hard drives live for** is better than having none at all. We agree. Readers often ask which hard drive brands are the most reliable, but this information is extremely difficult to come by. Most studies of real-world failure rates don't name brands or manufacturers, which limits their real-world applicability.

<http://www.pcworld.com/article/2089464/-three-year-27-000-drive-study-reveals-the-most-reliable-hard-drive-makers.html>

Three-year, 27,000 drive study reveals the most reliable hard drive makers



By [Ian Paul](#)

Contributor, PCWorld | JAN 21, 2014 9:24 AM PT



If you're looking to [upgrade your PC's hard drive](#) in the next few months, you might want to take a look at an interesting blog post from online backup provider [Backblaze](#). After shining a general light on [how long hard drives actually last](#) late last year, the company took to its blog on Tuesday to provide a detailed look at how consumer-grade hard drives from Hitachi, Seagate, and Western Digital performed in Backblaze's storage pods.

By the end of 2013, Backblaze had more than 27,000 consumer-grade hard drives spinning away in its storage facilities, backing up photos, mp3s, and important documents for its users. Those may not be Google-sized numbers, but tens of thousands of drives are certainly enough to glean a few trends.

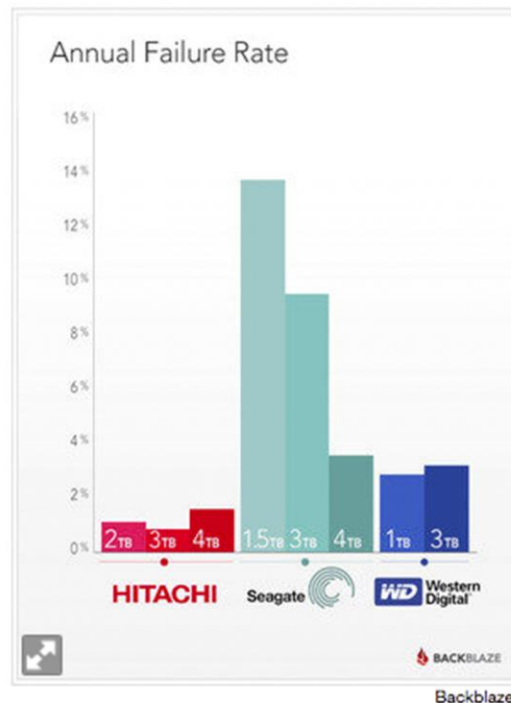
The company took a look at the failure rates for a wide range of specific models in its storage pods, as well as uptime and overall lifetime by brand. The end result? Hitachi and Western Digital were workhorses, while Seagate drives were more likely to fade after a few years.

That doesn't mean Backblaze is swearing off Seagate drives. In fact, the company has high hopes for Seagate's new 4TB Desktop HDD.15 (ST4000DM000). Other Seagate drives are also big favorites with the Backblazers.

Here's a quick look at the highlights from the company's HDD breakdown.

Failure rates

For this report, Backblaze took a look at 15 different HDD models from the three aforementioned major brands. Earning impressive marks for reliability was the Hitachi 3TB Deskstar 7K3000 (HDS723030ALA640) with a 0.9 percent failure rate and an average lifetime of about 2.1 years. That model was followed by another Hitachi, the Deskstar 5K3000 (HDS5C3030ALA630) with an average lifetime of 1.7 years and a similar failure rate. (Remember, these drives are putting in some serious overtime that your PC would likely never see.)



(Click to enlarge.)

The worst of the bunch, meanwhile was the 1.5 TB Seagate Barracuda Green (ST1500DL003), with an average lifespan of 0.8 years. Ouch!

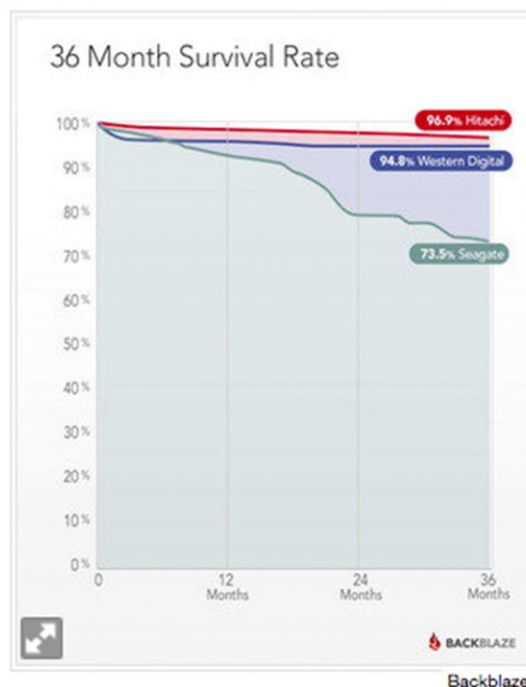
Backblaze said this particular model is pretty bad, but it cautions not to read too much into it. The company received these specific drives as warranty replacements, so they were probably refurbished with wear and tear on them by the time they met Backblaze's HDD taskmasters.

Overall, Seagate drives had the highest failure rates by brand in Backblaze's environment reaching close to a 14 percent annual failure rate for 1.5TB drives, around 10 percent for 3 TB drives, and 4 percent for 4TB drives. WD 1TB and 3TB drives stayed under 4 percent, while all Hitachi drives (2, 3, and 4 TB) failed less than 2 percent of the time on an annual basis.

Over a 36 month span, Hitachi drives had a 96.9 percent survival rate, followed by WD at 94.8 percent and Seagate way below that at 73.5 percent.

So what's a home shopper to do?

Backblaze's data may look like making your next drive a Hitachi is a no-brainer, but it's important to remember that Backblaze runs drives harder than the average PC user ever could. So while Seagate products may go down all the time at the company, a PC user may never notice a problem during the lifetime of their PC.



The 3 year survival rate for Backblaze's HDDs, by manufacturer. (Click to enlarge.)

For example, Backblaze said it will stop buying Seagate LP 2TB drives and Western Digital Green 3TB drives, because they just don't work in the company's environment. Part of the problem, Backblaze says, is these drives are designed to spin down when not in use to save power. That's a great feature for a home PC user, but in an industrial environment Backblaze says the drive would spin down only to spin back up a few minutes later. The end result being more wear and tear on the drive than it was designed for.

Then there's cost. The only thing holding Backblaze back from going with all Hitachi drives was the price, which was one reason why the company sticks with Seagate drives.

Your risk of a complete hard drive failure over the long-term might be higher with Seagate than Hitachi, Backblaze's numbers suggest at first glance but there's no guarantee that will happen. In fact, Backblaze's earlier study showed that hard drives are actually pretty reliable overall over a four-year stretch, even in a server farm. And hey, a number of individual Seagate models actually had a longer average age than Hitachi products!

Maybe the lesson from Backblaze's data is that choosing the right hard drive is all about tradeoffs. (Isn't it always?) Nevertheless, it's an interesting look at the reliability of many internal hard drives you might be considering for your next PC. Be sure to check out [the full Backblaze post](#) if you want to dive even deeper into the nitty-gritty numbers.

Disk drive reliability: What we've learned from a billion hours

Disk drives may be down, but they're not out - we'll be using them for decades to come. The good folks at online backup service Backblaze have accumulated over 1,000,000,000 hours of drive reliability stats in the last three years. Here's what they've learned.



By Robin Harris for [Storage Bits](#) | May 17, 2016 -- 12:11 GMT (05:11 PDT) | Topic: [Storage](#)

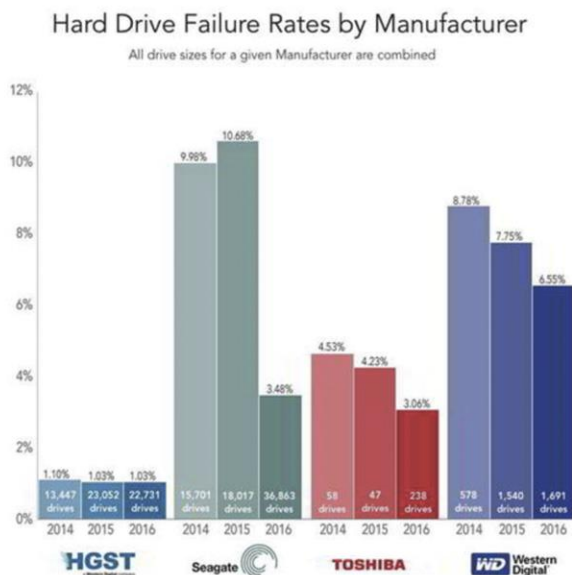
I've been a paying Backblaze customer for the last couple of years and [a fan](#) for even longer. The company has a relentless focus on easy-to-use software and unlimited backup storage. I use over 2TB of Backblaze storage for encrypted backup data.

This morning they've [released](#) their latest three years of disk drive data from over 60,000 drives. While much notebook primary storage is now SSD-based, hard drives remain a great way to backup data inexpensively.

Backblaze uses consumer hard drives almost exclusively, since more costly enterprise drives aren't more reliable. That's good for those of us, like me, who use multiple consumer hard drives for local backup.

THE GOOD NEWS

Backblaze has seen steadily increasing drive reliability over the last three years. Here's their overall reliability by vendor:



<http://www.zdnet.com/article/what-weve-learned-from-one-billion-hours-of-disk-drive-use/>

Given those stats Backblaze accumulates over half their drive hours on HGST (a division of WD) drives, with Seagate accounting for another 45 percent of drive hours. Toshiba and WD account for the remainder.

THE BAD NEWS

While overall reliability is getting better, the newer 6TB WD drive has an above average failure rate - which may be due to new production line startup issues - although Seagate's 6TB drive isn't seeing those problems. The other drives with high failure rates are older models, such as the 4TB Barracuda, which is out of production.

Hard Drive Failure Rates for Q1 2016

Observation period 01-Jan-2016 thru 31-Mar-2016

MFG	Model	Drive Size	Drive Count	Drive Days	Failures	Annual Failure Rate
HGST	HDS722020ALA330	2TB	4,264	399,203	19	1.74%
HGST	HDS5C3030ALA630	3TB	4,552	410,112	6	0.53%
HGST	HDS723030ALA640	3TB	998	89,923	2	0.81%
HGST	HMS5C4040ALE640	4TB	7,075	637,116	10	0.57%
HGST	HMS5C4040BLE640	4TB	3,091	278,190	0	0.00%
HGST	HDS5C4040ALE630	4TB	2,706	243,312	7	1.05%
HGST	HUH728080ALE600	8TB	45	4,050	0	0.00%
Seagate	ST31500541AS	1.5TB	45	5,961	0	0.00%
Seagate	ST4000DM000	4TB	34,729	2,849,179	198	2.54%
Seagate	ST4000DX000	4TB	207	18,945	5	9.63%
Seagate	ST6000DX000	6TB	1,882	169,380	0	0.00%
Toshiba	DT01ACA300	3TB	47	4,230	1	8.63%
Toshiba	MD04ABA400V	4TB	146	13,108	0	0.00%
Toshiba	MD04ABA500V	5TB	45	4,050	0	0.00%
WDC	WD20EFRX	2TB	133	11,617	4	12.57%
WDC	WD30EFRX	3TB	1,054	94,384	8	3.09%
WDC	WD40EFRX	4TB	46	4,140	0	0.00%
WDC	WD60EFRX	6TB	458	41,220	6	5.31%
Totals			61,523	5,278,120	266	1.84%



<http://www.zdnet.com/article/what-weve-learned-from-one-billion-hours-of-disk-drive-use/>

THE STORAGE BITS TAKE

The Backblaze data is most valuable to volume buyers of 3.5" drives. If you're only buying a few drives you might encounter the small number of drives that fail due to a quality or mishandling problem. Buying quality drives is no substitute for a robust backup process!

Despite that risk, I look for the more reliable models when I add to my drive collection, which is currently over 25TB of capacity. Overall though, these reliability stats show what an incredible job the hard drive industry has done in building reliable high capacity drives.

Modern hard drives are engineering and manufacturing marvels that play a crucial role in IT and cloud infrastructure. For \$20 to \$30 per terabyte they are a bargain. Buy lots to maintain multiple copies of your crucial data.

Courteous comments welcome, of course. You can grab all of the [Backblaze data here](#).

One billion hours on, and HGST still rules the roost for hard disk reliability

Even five-year-old disks are still going strong.

PETER BRIGHT - 5/17/2016, 7:24 PM



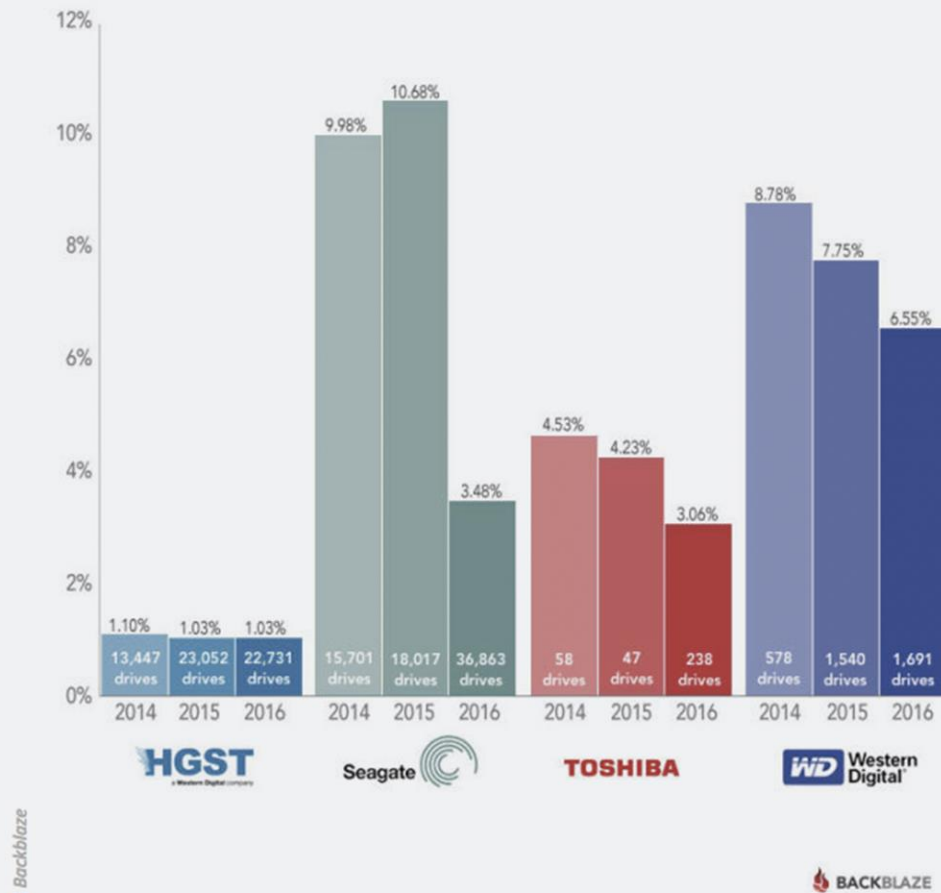
Cloud backup provider Backblaze has **published** the latest data it has accumulated about the reliability of the hard drives it uses. In the first quarter of the year, the company passed more than a billion hours of aggregate drive usage since it started tracking reliability in April 2013.

HGST's drives have **long stood out** as the most reliable, and that trend continues. Their failure rate is remarkably low; even after three years in service, the 3TB and 4TB units have annualized failure rates of just 0.81 percent and 1.03 percent, respectively. 2TB units, which last quarter were already on average more than 5 years old, have seen a small increase in failure rate—1.57 percent, compared to 1.15 percent a year ago—but still show extraordinary reliability considering their age.

After some bad experiences with certain models and annualized failure rates in some cases approaching 30 percent, Seagate's performance is also solid. Backblaze's most common disk type is a 4TB Seagate unit, with nearly 35,000 of the drives in use, and those are demonstrating at a failure rate of 2.90 percent.

Hard Drive Failure Rates by Manufacturer

All drive sizes for a given Manufacturer are combined



Enlarge

The company continues to substantially stick with Seagate 4TB units, in spite of somewhat worse failure rates, due to a combination of better pricing and availability. Backblaze says that it typically orders disks 5,000 to 10,000 at a time, and while it has found suppliers of Seagate and (Western Digital-owned) HGST that can handle these orders, it has struggled to do so consistently for Western Digital and Toshiba disks. This availability concern also pushes the company toward 4TB units over 6 or 8TB ones; although the pricing of those is starting to make them cost-effective, their bulk availability is still limited.

While the company uses a mixture of different disks, within each of its Vaults (systems of 20 individual Storage Pods, with older storage pods holding 45 drives and the latest ones increasing that to 60) it standardizes on a particular type, so Backblaze needs to be able to buy 1,200 disks at once to be able to deploy disks at any kind of a reasonable scale.

NEWS

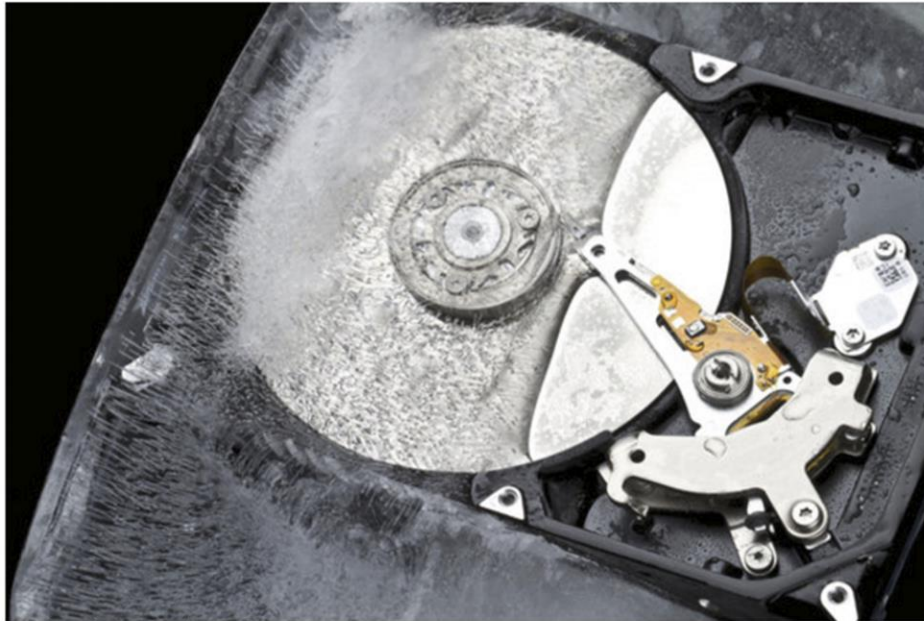
Who makes the most reliable hard drive? Latest BackBlaze survey claims to know

Seagate's reliability improved dramatically, but Hitachi still rules the roost.



By [Gordon Mah Ung](#)

Executive Editor, PCWorld | MAY 17, 2016 11:45 AM PT



Credit: ChrisPole / iStock

Nearly every hard drive manufacturer improved in reliability but one manufacturer still leads the pack, according to the latest [hard drive survey](#) from BackBlaze.

The hard drives in question power BackBlaze's cloud backup data center and total some 61,590 spinning drives with more than a billion hours of operation among them.

Why this matters: Hard drives aren't sexy anymore but a failure means expensive recovery fees or simply the loss of one's precious memories. BackBlaze's annual survey of a large sample of drives has come to represent a way for consumers to discern what brand and what model to buy.

Survey says: Hitachi

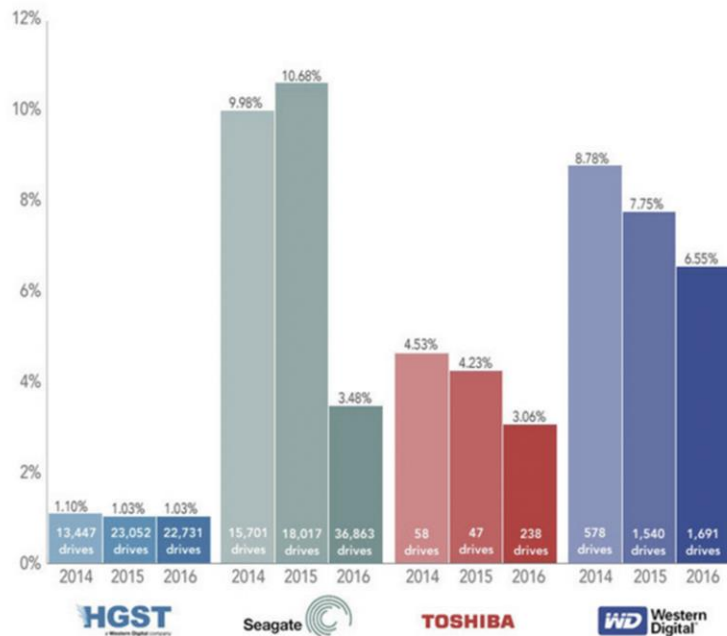
The latest BackBlaze survey shows Seagate drives greatly improving on failure rates. In BackBlaze's 2015 survey that includes one year of data ending on March 31, Seagate drives experienced the most problems, with a 10.68 percent failure rate.

This time around, though, Seagate dropped its failure rate to 3.48 percent on a total 36,863 drives. That's good, but the overall winner is still Hitachi, which has tracked at just about 1 percent for the last three surveys.

Hard drives from Toshiba and Western Digital are also represented, but one weakness of the data is the much smaller sample size. BackBlaze has just 238 Toshiba hard drives in service, with Western Digital drives pushing the sample to 1,691. It's better than a typical consumer's sample size of one, but clearly the 22,731 Hitachi hard drives and the 36,863 Seagate drives lend more credibility to the survey.

Hard Drive Failure Rates by Manufacturer

All drive sizes for a given Manufacturer are combined



BackBlaze's hard drive report shows lowest number of drive failures in a quarter ever for the cloud storage company

BackBlaze's numbers aren't quite straightforward, though. The annual failure rate figure is [calculated](#) based on a certain drive failing with the service life factored in to it.

Why are mainly Hitachi and Seagate drives in BackBlaze's data center? The company said it just can't source other brands at the prices it wants.

Potential problems

BackBlaze's methods haven't been without controversy either. In the past, the company has been criticized for changing its storage pod designs, which can impact the reliability of a certain cluster of drives.

And rather than order 1,000 drives directly from a manufacturer, the company in the past has said it sourced hard drives by buying consumer external backup drives and "shucking" the hard drives to repurpose in its data center. The drives also run on a 24/7 duty cycle, which hard drive makers have said is outside the design of a consumer hard drive. BackBlaze waded into that criticism by comparing failure rates of 24/7-rated enterprise drives with consumer hard drives and it found the difference to be very little. In fact, BackBlaze's [numbers](#) showed consumer drives to be more reliable.

No matter what statistics and failure analysis nerds think of its methodology, there's still a lot of nuggets of gold. For example, the Seagate 3TB model ST3000DM001 has a one-year failure rate of 13.92 percent with a sample of 4,074. The Seagate ST4000DM000 has one-year failure rate of 3.83 percent on a sample of 8,800.

Of course, you can look at the Hitachi 4TB model HDS5C404ALE630 with a 0.81 percent failure rate on 4,552 after three years of use and think, well, maybe I need to buy that one instead.

Hard Drive Failure Stats through 3/31/2016

Cumulative from 4/2013 through period indicated

MFG	Model	Drive Size	3/31/2014 (1 year)		3/31/2015 (2 years)		03/31/2016 (3 years)	
			Drive Count	Annualized Failure Rate	Drive Count	Annualized Failure Rate	Drive Count	Annualized Failure Rate
HGST	HDS5C3030ALA630	3TB	4,591	0.85%	4,596	0.74%	4,552	0.81%
HGST	HDS5C4040ALE630	4TB	2,582	1.33%	2,653	1.16%	2,706	1.03%
HGST	HDS722020ALA330	2TB	4,713	1.08%	4,664	1.15%	4,264	1.57%
HGST	HDS723030ALA640	3TB	1,020	1.54%	1,013	1.83%	998	1.71%
HGST	HMS5C4040ALE640	4TB	47	2.67%	7,026	1.18%	7,075	0.79%
HGST	HMS5C4040BLE640	4TB	494	20.29%	3,100	0.48%	3,091	0.38%
HGST	HUH728080ALE600	8TB	—	—	—	—	45	3.84%
Seagate	ST3000DM001	3TB	4,074	13.92%	485	28.26%	—	—
Seagate	ST31500341AS	1.5TB	404	22.27%	259	24.12%	—	—
Seagate	ST31500541AS	1.5TB	1,746	9.87%	1,485	10.18%	45	10.12%
Seagate	ST32000542AS	2TB	211	8.03%	81	9.93%	—	—
Seagate	ST33000651AS	3TB	287	6.53%	234	5.27%	—	—
Seagate	ST4000DM000	4TB	8,800	3.83%	14,803	2.83%	34,729	2.90%
Seagate	ST4000DX000	4TB	179	0.75%	175	1.61%	207	2.95%
Seagate	ST6000DX000	6TB	—	—	495	1.70%	1,882	1.42%
Toshiba	DT01ACA300	3TB	58	4.63%	47	4.23%	47	4.22%
Toshiba	MD04ABA400V	4TB	—	—	—	—	146	2.21%
Toshiba	MD04ABA500V	5TB	—	—	—	—	45	2.05%
WDC	WD20EFRX	2TB	—	—	—	—	133	10.56%
WDC	WD30EFRX	3TB	578	8.78%	1,045	7.90%	1,054	6.74%
WDC	WD40EFRX	4TB	—	—	45	9.01%	46	2.14%
WDC	WD60EFRX	6TB	—	—	450	6.64%	458	5.71%



BackBlaze's data on drive failures gets down to the models that failed.

Backblaze releases billion-hour hard drive reliability report

By Joel Hruska on May 17, 2016 at 8:00 am | 39 Comments



Backblaze has released its reliability report for Q1 2016 covering cumulative failure rates both by specific model numbers and by manufacturer. The company noted that as of this quarter, its 61,590 drives have cumulatively spun for over one billion hours (that's 42 million days or 114,155 years, for those of you playing along at home).

Backblaze's reports on drive lifespan and failure rates are a rare peek into hard drive longevity and lifespan. One of the most common questions from readers is which hard drives are the most reliable. It's also one of the most difficult to answer. Companies do not release failure data and the handful of studies on the topic typically cloak vendor names and model numbers. As always, I recommend taking this data with a grain of salt: Backblaze uses consumer drives in a demanding enterprise environment and while the company has refined its storage pod design to minimize drive vibration, the average Backblaze hard drive does far more work in a day than a consumer HDD sitting in an external chassis.

For those of you wondering if drive vibration actually matters, here's a video of someone stopping a drive array by yelling at it.



Here's Backblaze's hard drive failure stats through Q1 2016:

Hard Drive Failure Rates for Q1 2016

Observation period 01-Jan-2016 thru 31-Mar-2016

MFG	Model	Drive Size	Drive Count	Drive Days	Failures	Annual Failure Rate
HGST	HDS722020ALA330	2TB	4,264	399,203	19	1.74%
HGST	HDS5C3030ALA630	3TB	4,552	410,112	6	0.53%
HGST	HDS723030ALA640	3TB	998	89,923	2	0.81%
HGST	HMS5C4040ALE640	4TB	7,075	637,116	10	0.57%
HGST	HMS5C4040BLE640	4TB	3,091	278,190	0	0.00%
HGST	HDS5C4040ALE630	4TB	2,706	243,312	7	1.05%
HGST	HUH728080ALE600	8TB	45	4,050	0	0.00%
Seagate	ST31500541AS	1.5TB	45	5,961	0	0.00%
Seagate	ST4000DM000	4TB	34,729	2,849,179	198	2.54%
Seagate	ST4000DX000	4TB	207	18,945	5	9.63%
Seagate	ST6000DX000	6TB	1,882	169,380	0	0.00%
Toshiba	DT01ACA300	3TB	47	4,230	1	8.63%
Toshiba	MD04ABA400V	4TB	146	13,108	0	0.00%
Toshiba	MD04ABA500V	5TB	45	4,050	0	0.00%
WDC	WD20EFRX	2TB	133	11,617	4	12.57%
WDC	WD30EFRX	3TB	1,054	94,384	8	3.09%
WDC	WD40EFRX	4TB	46	4,140	0	0.00%
WDC	WD60EFRX	6TB	458	41,220	6	5.31%
Totals			61,523	5,278,120	266	1.84%

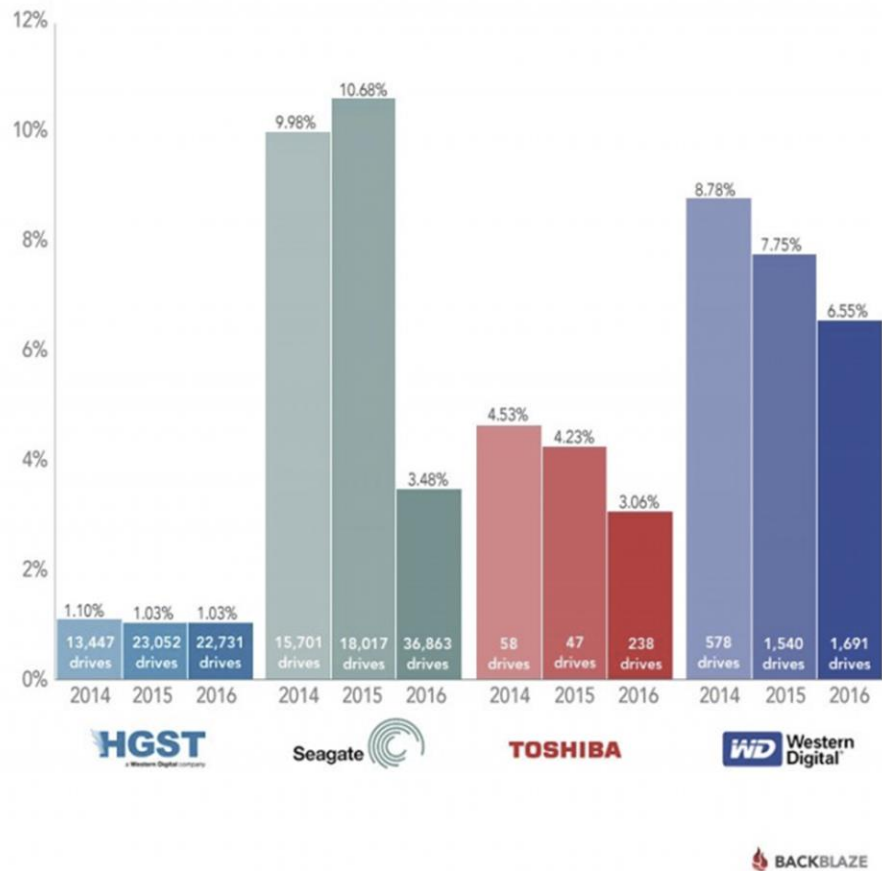


The discrepancy between the 61,590 drives Backblaze deploys and the 61,523 drives listed in this chart is that the company doesn't show data unless it has at least 45 drives. That seems an acceptable threshold given the relatively small gap. Backblaze also notes that the 8.63% failure rate on the Toshiba 3TB is misleadingly high — the company has just 45 of those drives, and one of them happened to fail.

Here's the same data broken down by manufacturer. This chart combines all drive data, regardless of size, for the past three years.

Hard Drive Failure Rates by Manufacturer

All drive sizes for a given Manufacturer are combined



HGST is the clear leader here, with an annual failure rate of just 1% for three years running. Seagate comes out the worst, though we suspect much of that rating was warped by the company's crash-happy 3TB drive. Backblaze prominently **pulled the 3TB drives from service** just over a year ago, and Seagate's drive failure rate fell precipitously as a result. Western Digital now holds that dubious honor, though the company's ratings have also improved in the past year.

Asked why it sources the vast majority of its drives from HGST or Seagate, Backblaze reported that it has little choice:

These days we need to purchase drives in reasonably large quantities, 5,000 to 10,000 at a time. We do this to keep the unit cost down and so we can reliably forecast our drive cost into the future. For Toshiba we have not been able to find their drives in sufficient quantities at a reasonable price. For WDC, we sometimes get offered a good price for the quantities we need, but before the deal gets done something goes sideways and the deal doesn't happen. This has happened to us multiple times, as recently as last month. We would be happy to buy more drives from Toshiba and WDC, if we could, until then we'll continue to buy our drives from Seagate and HGST.

The company notes that 4TB drives continue to be the sweet spot for building out its storage pods, but that it might move to 6, 8, or 10TB drives as the price on the hardware comes down. Overall it's an interesting look at a topic we rarely get to explore.

MAY 17TH, 2016 by Adam Armstrong

Backblaze Releases Its New HDD Reliability Results

Today Backblaze released its latest hard drive reliability for the first quarter of 2016. This time around Backblaze evaluated over 60,000 drives (61,523 to be exact). All of the hard drives in Backblaze's data center equaled to over one billion hours, nearly 42 million days or 114,155 years worth of spinning hard drives.



Since 2007 Backblaze has been offering an online backup service. For the backup service Backblaze uses storage pods that hold at least 45 HDDs (the newer pods hold 60 HDDs). They put 20 storage pods together to make a storage vault that can hold up to 1,200 HDDs. That's a lot of hard drives. Backblaze uses hard drives from primarily four main vendors: Seagate, WD, HGST, and Toshiba. The reason for choosing these companies comes from being able to buy the quantity needed for the price that enables Backblaze to offer customers the best deal. Backblaze also states that the reason most of the drives they use are Seagate and HGST is due to the availability of purchasing the quantity needed at the right price.

Hard Drive Failure Rates for Q1 2016

Observation period 01-Jan-2016 thru 31-Mar-2016

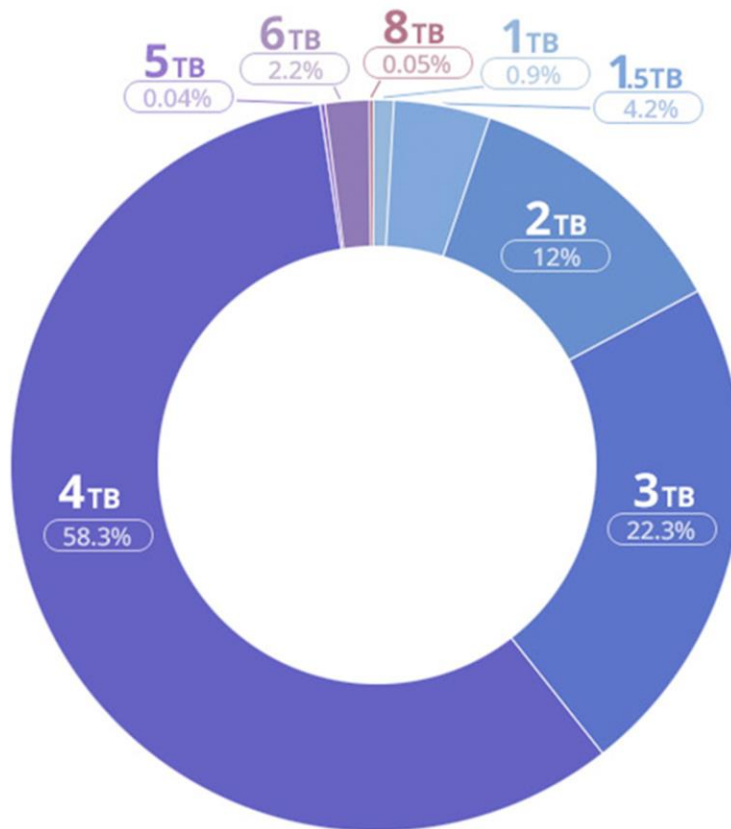
MFG	Model	Drive Size	Drive Count	Drive Days	Failures	Annual Failure Rate
HGST	HDS722020ALA330	2TB	4,264	399,203	19	1.74%
HGST	HDS5C3030ALA630	3TB	4,552	410,112	6	0.53%
HGST	HDS723030ALA640	3TB	998	89,923	2	0.81%
HGST	HMS5C4040ALE640	4TB	7,075	637,116	10	0.57%
HGST	HMS5C4040BLE640	4TB	3,091	278,190	0	0.00%
HGST	HDS5C4040ALE630	4TB	2,706	243,312	7	1.05%
HGST	HUH728080ALE600	8TB	45	4,050	0	0.00%
Seagate	ST31500541AS	1.5TB	45	5,961	0	0.00%
Seagate	ST4000DM000	4TB	34,729	2,849,179	198	2.54%
Seagate	ST4000DX000	4TB	207	18,945	5	9.63%
Seagate	ST6000DX000	6TB	1,882	169,380	0	0.00%
Toshiba	DT01ACA300	3TB	47	4,230	1	8.63%
Toshiba	MD04ABA400V	4TB	146	13,108	0	0.00%
Toshiba	MD04ABA500V	5TB	45	4,050	0	0.00%
WDC	WD20EFRX	2TB	133	11,617	4	12.57%
WDC	WD30EFRX	3TB	1,054	94,384	8	3.09%
WDC	WD40EFRX	4TB	46	4,140	0	0.00%
WDC	WD60EFRX	6TB	458	41,220	6	5.31%
		Totals	61,523	5,278,120	266	1.84%



Looking at non-cumulative results of Q1 we can see that some drives had a zero percent failure rate while the Seagate ST4000DX000 had a failure rate as high as 9.63% and the WD Red 2TB had an even higher failure rate of 12.57%. While these numbers seem high there are a few things to keep in mind. First, failure in this study is defined as 1) The drive will not spin up or connect to the OS. 2) The drive will not sync, or stay synced, in a RAID Array. 3) The Smart Stats used show values above our thresholds. Second, these failures happened while running within Backblaze's data center, which may not represent the best use case for the given drives. The percentages listed above actually only came from a handful of drives failing in either case. And the overall rate of failure is only 1.84%.

Hours in Service by Drive Size

Based on hard drive population 4/10/2013 - 3/31/2016



Another interesting take away from this report is the fact that the most used drives are the ultra dense drives. While 8TB drives have become almost common and we use 6TB drives for a majority of our testing here at StorageReview, Backblaze uses mainly 4TB drives (58.3%). Again this boils back down to quantity, price, and bulk availability. Buying drives at 1,200 at a time means there needs to be 1,200 drives available for the right price. While the higher capacity drives are dropping in price it still makes more economical sense for Backblaze to purchase 4TB drives in bulk.

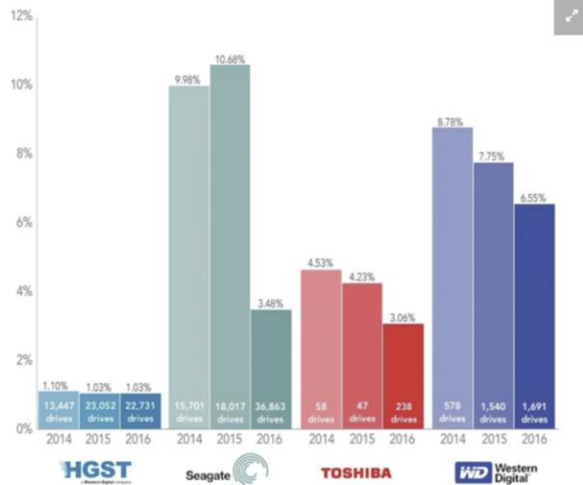
The entire study is available at Backblaze's site for more insights on which drives performed well as well as the amount of time the drives ran in their data centers.

[Backblaze Hard Drive Reliability results](#)

Which Brands Of Hard Drive Are Most Likely To Fail?

A new analysis points fingers

By Dave Gershgorn May 17, 2016



Western Digital [hard drives](#) have the highest failure rate of those Backblaze used in their servers.

The shelf life for the average drive is about four years, according to research by data storage company Backblaze.

The company's [latest analysis](#) of more than 60,000 hard drives details which brands of drive fail with greater frequency. This isn't a sweeping investigation of every hard drive manufacturer on the market, but the independent data of one company that buys hard drives in bulk, and buys from the biggest players in the market.

At first glance, hard drive technology seems to be improving. Year over year, the failure rate decreases. The largest improvement was by Seagate between 2015 and 2016, where the rate of failures dropped from 10.68 percent to 3.48 percent, more than half. (It's also worth noting that the sample size in 2016 also doubled from 18,017 drives to 36,863 drives.)

In terms of the hard drives that are most likely to fail, Backblaze's data outs Western Digital, which had a 2016 failure rate of 6.55 percent. Over 1,691 drives, about 110 failed.

The drives least likely to fail were made by HGST, a hard drive company owned by Western Digital that isn't targeted at a consumer market. HGST's drives also fail at a decreasing rate year over year, with a rate just over one percent. Backblaze says they'd like to order more of these, but the company isn't able to take orders that large.

Gleb Budman, Backblaze's CEO, describes the way hard drives fail as a [bathtub curve](#). Hard drives usually fail at the beginning of their lifetimes or at around 4 years old. If they survive past a year, there's a good chance that they'll make it the expected lifespan.

Backblaze considers it a hard drive failure when the drive will no longer spin or connect to the computer's operating system, will not sync with other disks, or displays signs [highly correlated with imminent failure](#).

Backblaze tested 61,000 drives for one billion hours and found the most reliable

BY LEE MATHEWS

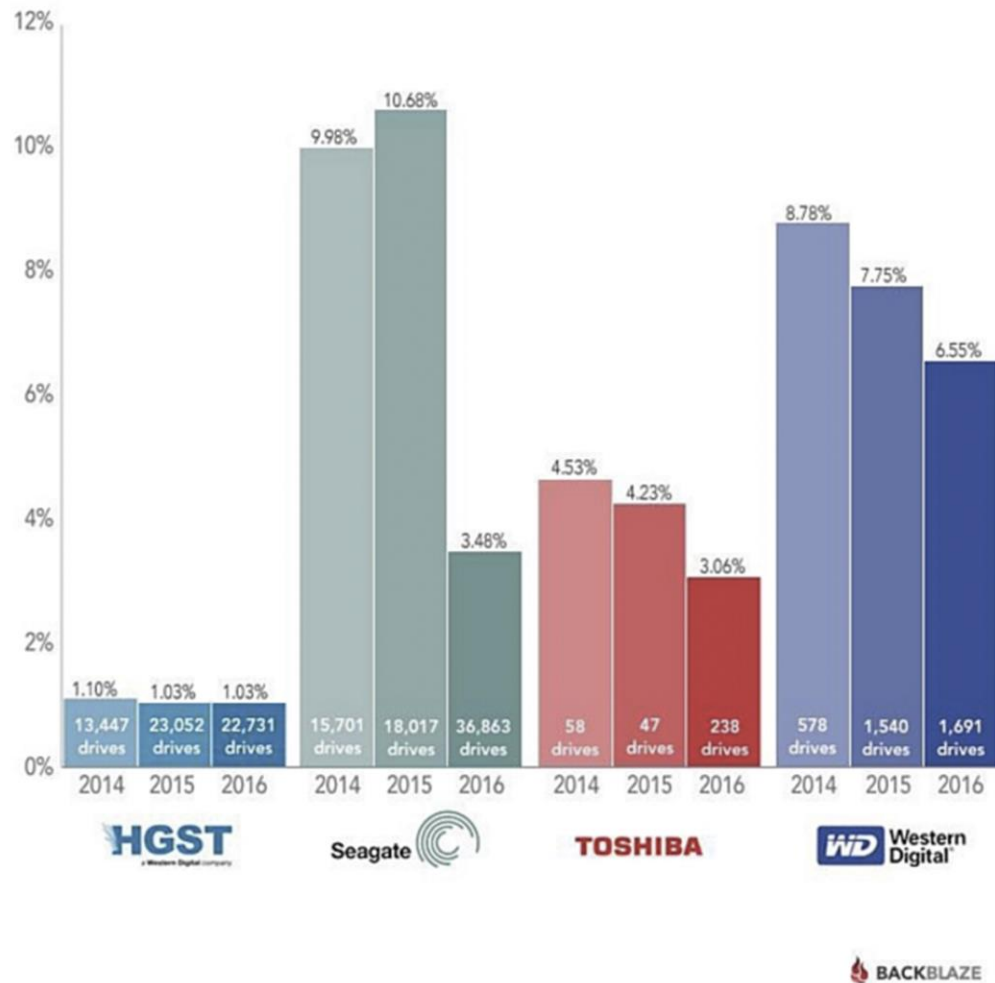
05.17.2016 :: 11:14AM EDT



When you're in the cloud storage business and you build devices that pack nearly half a petabyte into a 4U rack chassis, you buy a lot of hard drives. You run them hard, too, and if you're **Backblaze**, after you've run them hard for a long, long time, you assemble all the data you have about those drives, analyze it, and then share it with the storage-mad masses. This year, Backblaze is reporting on more than 61,000 drives that have logged more than a billion total hours reading and writing data in their datacenters.

That's more than double the number of drives they based the same report on back in 2014. So, whose drives proved to be the most reliable this time around? Once again, Hitachi came out on top. Out of the nearly 23,000 Hitachi drives that they ran, only 44 failures were reported. Compared to the most common drive in Backblaze's boxes, the 4TB Seagate ST4000DM000, that's insanely good. Nearly 200 of them failed.

Another Seagate drive that was used more sparingly posted an even more alarming failure rate. Five of the 207 ST4000DX000 drives experienced trouble. Backblaze says that works out to an annual failure rate of nearly 10%. That's high, but it's not the worst drive in their report. That distinction goes to a Western Digital drive, the 2TB WD20EFRX. Backblaze only spun up 133 of them, and four failed — that's a 12.57% annual failure rate.



Go back to 2013, and things don't change too much. The most reliable hard drives over the past three years still have a Hitachi label on them, and no single model hit 2% failure.

You might be wondering why there are so many of one kind of drive and so few of some others. When Backblaze goes shopping, they consider the same things the rest of us do. Two key factors in their decision are price and availability. They need 1,200 drives to fill a single Vault, and they'll sometimes buy 5,000 to 10,000 drives at a time. Hitachi and Seagate have been good for availability, while Western Digital and Toshiba supplies have been a bit more "constrained."

WHICH HARD DRIVES ARE THE MOST RELIABLE? BACKBLAZE'S TESTING FINDS SURPRISES

By Jon Martindale — May 17, 2016 10:47 AM



For the past three years, online backup provider BackBlaze has been testing the reliability of the hard drives (HDD) it uses to store its customers' data. With almost 62,000 drives running in its service, sometimes they're going to fail. And when they do, BackBlaze notes it down, letting the world know which ones have caused it the most problems.

Since the beginning of this documentation, BackBlaze found HGST proved to be the most reliable, regardless of size or brand of drive, while Western Digital and Seagate duked it out for the dubious honor of having the most failed drives. This year, though, things are quite different.

For the first quarter of 2016, the backup provider found that of the 35,000-plus Seagate drives it operates, slightly more than 200 failed, or around 3.5 percent. That's a huge dropoff from 2015's near 11 percent failure rate. Clearly, moving to Seagate's newer 4TB drives has made a big difference in reliability.



Unfortunately for Western Digital, though, the same cannot be said for its latest crop of HDDs. Of the 1,691 in operation at BackBlaze, 6.55 percent failed

That said, none of these results should suggest the drives in use are poor quality or prone to failure. Indeed, they have been subjected to (in some cases)

millions of days worth of operation, with intense usage far beyond what you could expect in an average consumer's system.

The heat, vibrations, and other stress factors that must be considered with any such testing should mean that these results be of only minor consideration when making your own purchases, but they do give us a large sample size to work with.

As [ExtremeTech](#) points out, when it comes to buying drives itself, BackBlaze's first consideration is cost. Even though HGST is the most reliable drive by its own testing metrics, it still employs more Seagate drives — which is surprising considering they were some of the most unreliable until recently. However, that was mostly due to one particular three terabyte drive, [which we are well aware of](#).

HGST top for hard drive reliability after 1 billion hours of testing

By Darren Allan May 18, 2016 Storage

Backblaze has detailed the most reliable – and least favored – hard disks



Some hard disks are more reliable than others, and a new report has cast further light on which drives are less likely to fail.

Backblaze produces [regular reports](#) on hard disk reliability and the latest one for **Q1 2016** was conducted using over 61,000 HDDs in data centers, with no less than a billion hours of operation in total between them.

The good news is that in the big picture, across all hard drives surveyed, failures decreased, and in fact the recorded annual failure rate of 1.84% is the lowest quarterly number that Backblaze has ever seen. In other words, hard disks are getting more reliable generally speaking.

As to which is the most reliable brand, once again the lowest failure rate was achieved by HGST with 1.03% across 22,731 HDDs (i.e. one in a hundred drives failed in the year running up to Q1 2016).

The next best overall average was Toshiba on 3.06%, although this was based on a very small amount of drives, just 238 of them. Seagate had a failure rate of 3.48%, but that was over a far greater sample of 36,863 drives.

Western Digital brought up the rear with a failure rate of 6.55%. Again, that was over a smaller sample size of 1,691 hard disks. Backblaze says it would buy more Toshiba and Western Digital HDDs, but it simply can't source them in sufficient quantities to make cost-effective purchases.

Seagate back in the game

So without any shadow of a doubt, HGST is the most reliable [hard drive](#) vendor at least according to these statistics. While HGST's failure rate remained the same as seen the previous year, though, Seagate saw the biggest improvement with a huge drop from a worrying 10.68% failure rate to the current figure of 3.48%.

The majority of the drives Backblaze uses across all vendors are 4TB affairs – these represent 58% of the company's HDDs in fact – and their annualized failure rate is 2.12%.

Two individual hard drives stood out because they're being run in considerable quantities and they experienced a 0% failure rate in Q1; in other words not a single disk failed. These were an HGST 4TB model (HMS5C4040BLE640) and a Seagate 6TB disk (ST6000DX000).

SAFE STORAGE —

Hard disk reliability examined once more: HGST rules, Seagate is alarming

Even old HGST disks stand up well under punishing conditions.

PETER BRIGHT - 1/21/2015, 5:00 AM



Alpha six

A year ago we got some insight into hard disk reliability when cloud backup provider Backblaze **published its findings** for the tens of thousands of disks that it operated. Backblaze uses regular consumer-grade disks in its storage because of the cheaper cost and good-enough reliability, but it also discovered that some kinds of disks fared extremely poorly when used 24/7.

A year later the company has **collected even more data** and drawn out even more differences between the different disks it uses.

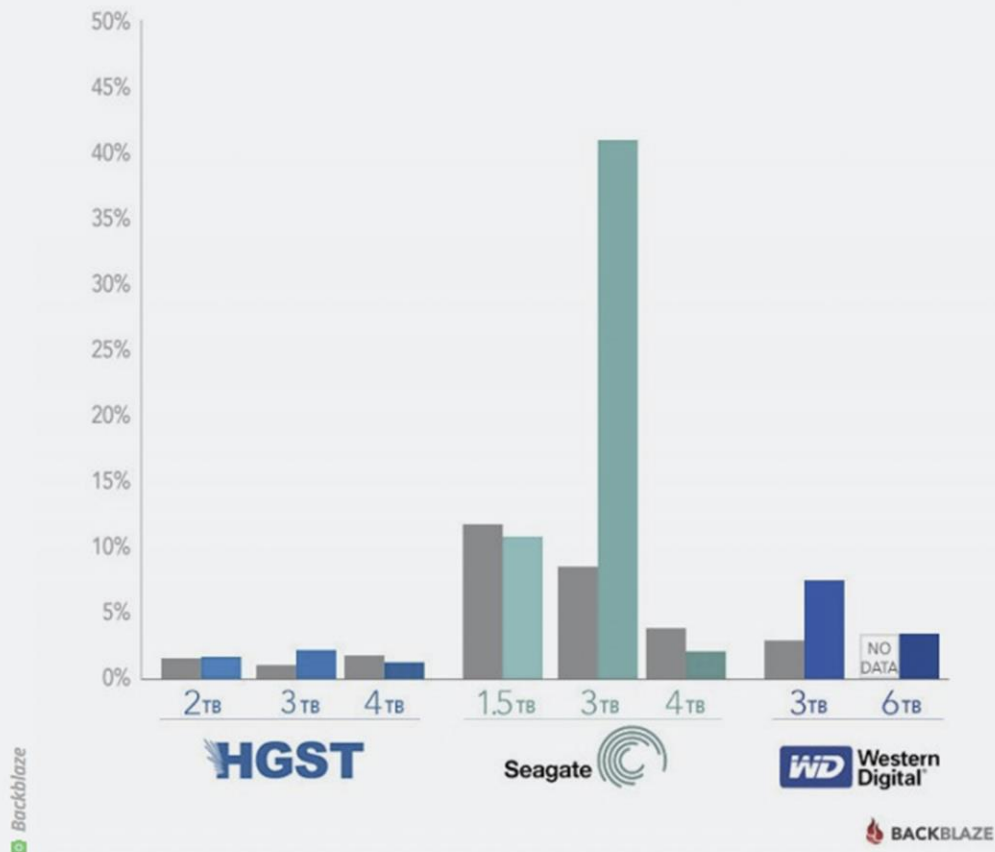
For a second year, the standout reliability leader was HGST. Now a wholly owned subsidiary of Western Digital, HGST inherited the technology and designs from Hitachi (which itself bought IBM's hard disk division). Across a range of models from 2 to 4 terabytes, the HGST models showed low failure rates; at worse, 2.3 percent failing a year. This includes some of the oldest disks among Backblaze's collection; 2TB Desktop 7K2000 models are on average 3.9 years old, but still have a failure rate of just 1.1 percent.

At the opposite end of the spectrum are Seagate disks. Last year, the two 1.5TB Seagate models used by Backblaze had failure rates of 25.4 percent (for the Barracuda 7200.11) and 9.9 percent (for the Barracuda LP). Those units fared a little better this time around, with failure rates of 23.8 and 9.6 percent, even though they were the oldest disks in the test (average ages of 4.7 and 4.9 years, respectively). However, their poor performance was eclipsed by the 3TB Barracuda 7200.14 units, which had a whopping 43.1 percent failure rate, in spite of an average age of just 2.2 years.

Backblaze's storage is largely split between Seagate and HGST disks. HGST's parent company, Western Digital, is almost absent, not because its disks are bad, but because they came out as consistently more expensive than those from Seagate and HGST.

Hard Drive Annual Failure Rate

Gray bars are through 2013. Colored bars are through 2014.



Enlarge / Seagate's performance is really the standout in this crowd, and not in a good way.

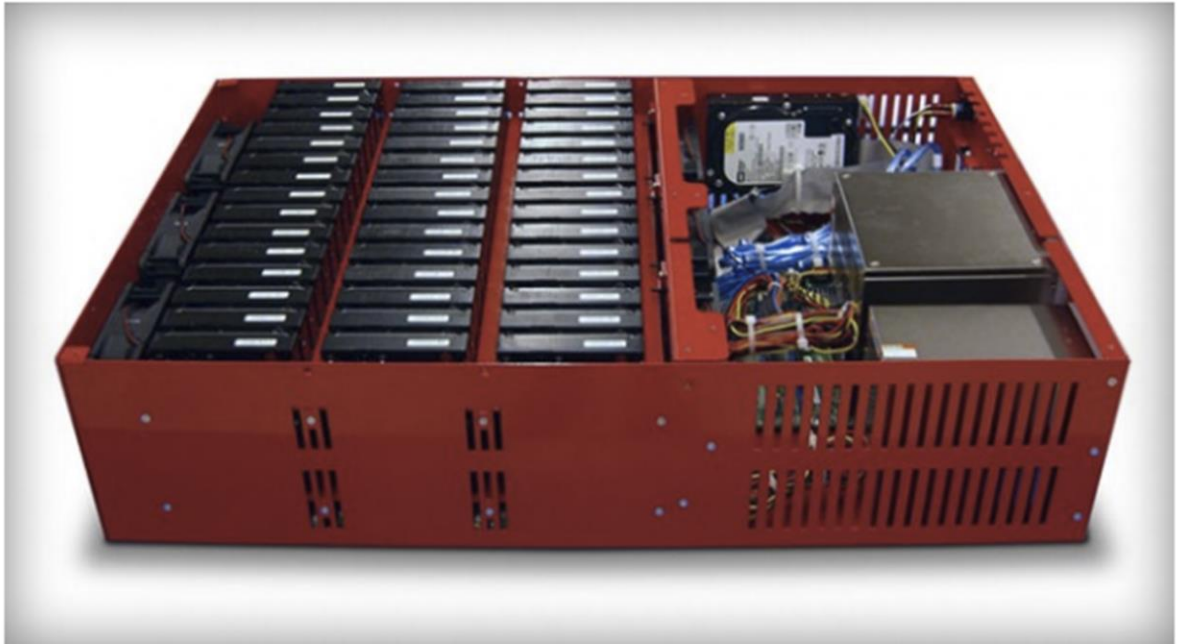
Newer Seagate disks also show more encouraging results. Although still young, at an average age of just 0.9 years, the 4TB HDD.15 models show a reasonably low 2.6 percent failure rate. Coupled with their low price—Backblaze says that they tend to undercut HGST's disks—they've become the company's preferred hard drive model.

As before, this doesn't mean that anyone with a Seagate disk is at risk of an imminent hard disk failure (though you should always have backups!). Backblaze operates disks outside of the manufacturer's specified parameters. Significantly, most consumer-grade disks aren't intended to be heavily used 24/7; they're meant to be operational for about 8 hours a day and replaced every 3 to 5 years. Most home usage environments are likely to be lower in vibration than Backblaze's 45-disk storage pods, too. In more normal conditions, the Seagates are likely to fare much better.

Hard drive failure rates point to clear winners and losers in 2014

By Joel Hruska on January 23, 2015 at 11:15 am | [76 Comments](#)

1.9K
shares

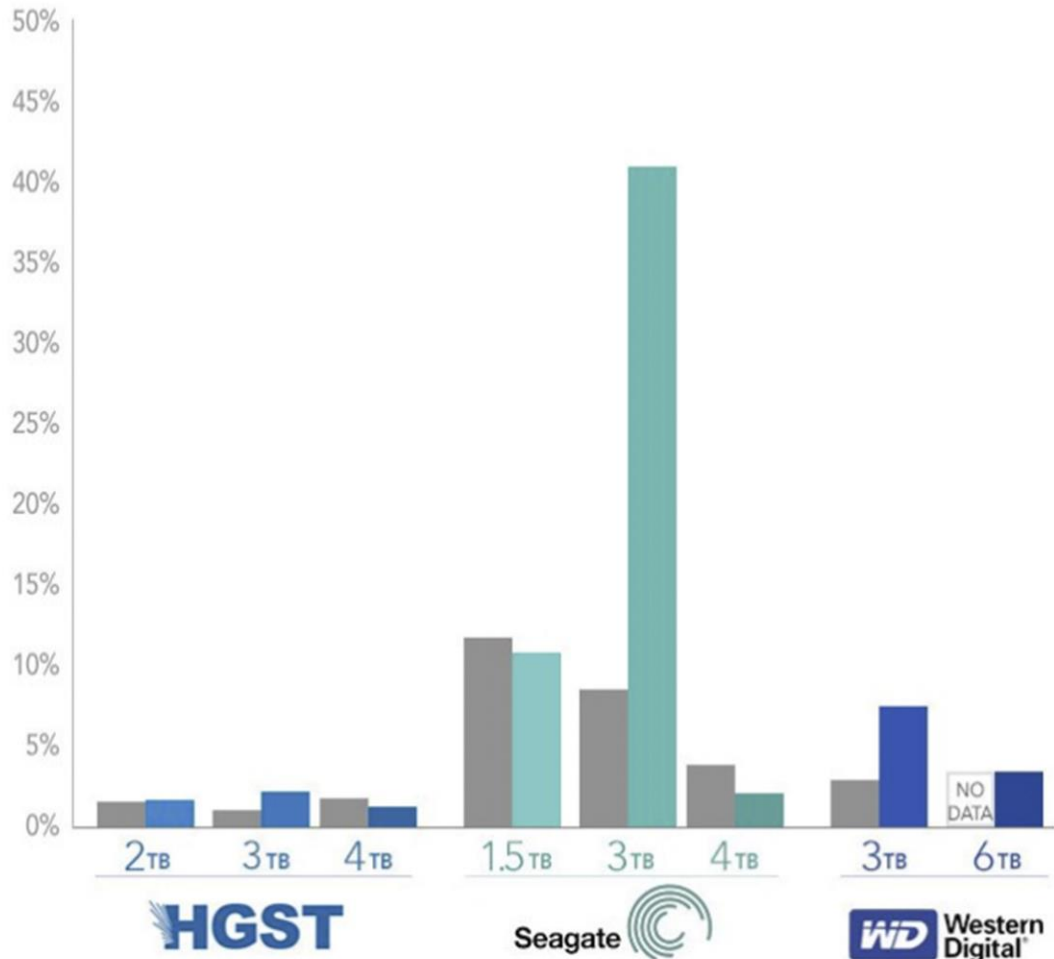


One of the most common questions we're asked about hardware reliability is whether there's a real difference between the various storage manufacturers. This information is typically locked up like Fort Knox, which is one reason why Backblaze's ongoing storage reports have garnered widespread attention. Most drive reliability studies are either small scale, take place over limited time scales, or refuse to reveal individual vendor ratings. Backblaze, on the other hand, comes right out and says what it has been testing and what the failure rates look like.

I've criticized Backblaze in the past for using data sets that compared drives with wildly different ages, workloads, and storage conditions, but this latest data set appears to be more standardized as far as workloads are concerned. Let's start with the big picture — which drives, from which manufacturers, fail the most (and least?)

Hard Drive Annual Failure Rate

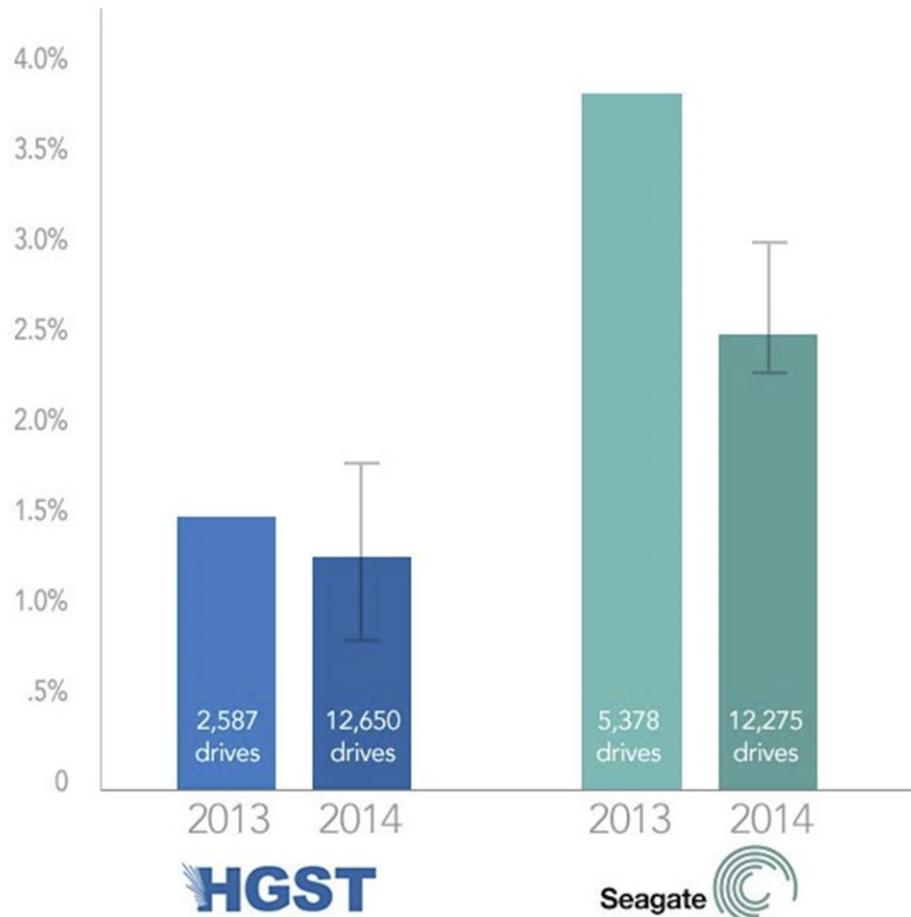
Gray bars are through 2013. Colored bars are through 2014.



Yes, the chart is to scale, and no, that giant Seagate column isn't a typo. The failure rate on many Seagate drives is simply abominable, from 9.5% on certain 1.5TB drives to 23.5% on the old 7200.11 series, to a whopping 43.1% on the Seagate 7200.14 drive family of 3TB products. Age alone does not account for it — the 7200.11 drives are nearly 5 years old with a 23.5% failure rate, while the 7200.14 drives are half that age with a 43% failure rate. Many of Seagate's problems, however, appear to be in the 1.5TB to 3TB range. At 4TB, Seagate is much better, with a failure rate of just 2.5% in 2014.

4 TB Failure Rate

Data gathered to December 31, 2014. Confidence interval for 2014 at 95%.
Confidence interval for 2013 not calculated.



HGST (formerly Hitachi) remains the strongest and most reliable vendor of the three that Backblaze tracks, though they do note that data on Western Digital products is very scarce. Backblaze doesn't source many WD drives because "Over the course of the last year, Western Digital drives were often not quoted and when they were, they were never the lowest price."

According to Backblaze, the Seagate 4TB drives are already tracking much better than previous models, with an estimated annual failure rate of 2.6% in their first year, compared to the original failure rate of 9.3% for Seagate's 3TB drives.

How much weight should consumers put on these results?

The Backblaze data is interesting, but it's *still* shot through with problems that limit just how much weight I'm willing to put on it. Backblaze has **redesigned its storage pods** several times since it began gathering data in an attempt to limit vibration. The company has an admitted habit of sourcing the *absolute* cheapest drives it can find, which virtually guarantees that some of the products its stocking are going to be used or refurbished units. Its relentless focus on price above all other characteristics makes sense for its own operating environment, but the company's use of consumer drives in enterprise-class deployments may create massive confounding variables.

It's entirely possible that the cheapest HGST drives include superior vibration dampening technology to the cheapest Seagate drives. This isn't a problem in consumer systems where there are rarely more than two physical discs, and those discs don't usually spin at the same time. It could be a profound problem when 45 drives are stacked in an enclosure. Compounding this issue is the fact that Backblaze's previous reports have acknowledged that different drives are put under different workloads, with apparently no regard for whether or not the stated workload matches the manufacturer's intended ratings for the disk. Price, not workload, governs Backblaze's decision process.

None of this is meant to imply that Backblaze's work is *wrong*, as such, but it's not at all clear **how applicable it is** to every day consumers and would-buy reliability hawks. We can be reasonably certain that Seagate's 3TB and 4TB drives don't fail at anything like 25-40% in the real world, or else the entire internet would be on fire with self-reported problems. We checked, and it isn't. Tweaktown wrote an article discussing many of these issues last year; **it's worth a read** if you want to explore them in more detail.

Backblaze could substantially address these concerns by pruning their data sets to only include drives that were housed in the storage pods and ran the same workloads. While this wouldn't resolve the fundamental mismatch between the manufacturer-intended use environment for the HDD and the demands of Backblaze's business model, it would at least give us enough information to make an apples-to-apples comparison.

Since the company seems unlikely to do that, I'm at least willing to say that HGST appears to come out of this comparison with a reliability gold star. If you're shopping for a new drive, I'd keep that in mind.

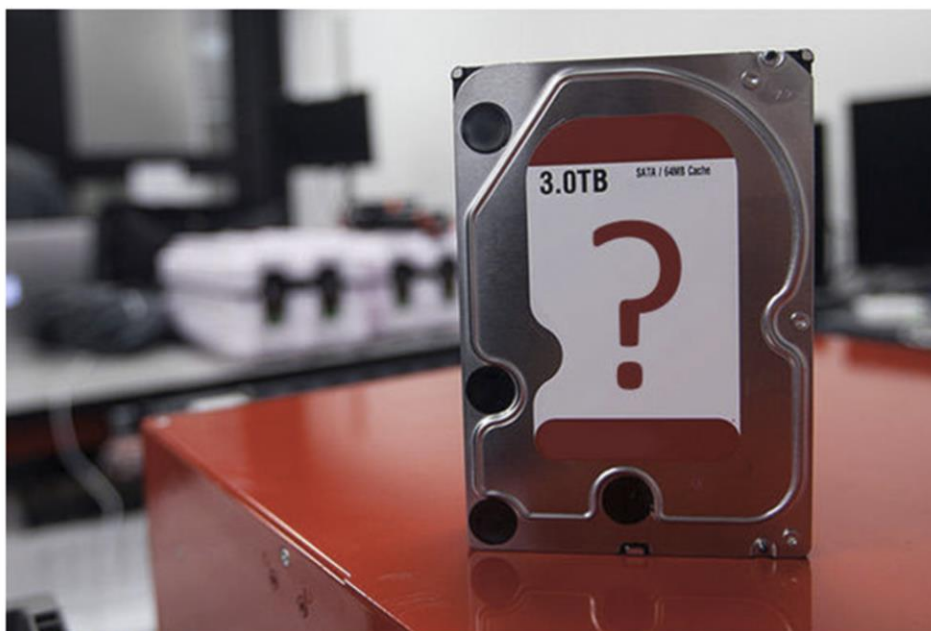
NEWS

Want a reliable hard drive? Splurge for 4TB, study of 40,000-plus HDDs finds



By [Jared Newman](#)

PCWorld | JAN 21, 2015 8:43 AM PT

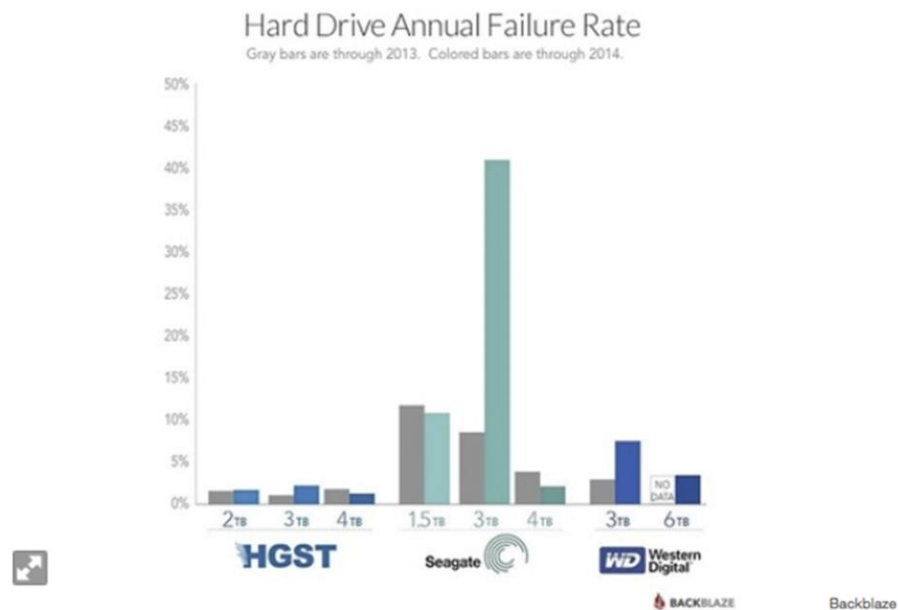


Credit: Backblaze

Spending a little extra on a 4TB hard drive doesn't just grant you more storage. It might also give you better reliability.

That's one conclusion from cloud backup provider Backblaze, which has compiled a new list of its [most reliable consumer hard drives](#). The firm, which [produced a similar study](#) last year, uses a mix of consumer drives from HGST, Seagate, and Western Digital, putting more than 40,000 drives under heavy use in its storage pods.

As with last year's study, HGST (formerly Hitachi, now a subsidiary of Western Digital) had the most reliable drives overall, with failure rates as low as 1.4 percent for its 4TB drives. Western Digital came in second place overall, followed by Seagate in third place.



HGST had the most reliable drives overall, but Seagate's 4 TB drives are cheaper.

But this year, Backblaze also found an interesting relationship between capacity and reliability. In the case of Seagate and HGST, their 4 TB drives were more reliable than any other storage option. Backblaze gave particular praise to the Seagate Desktop HDD.15, which hits a good sweet spot between reliability and price. (Backblaze didn't have enough 4 TB Western Digital drives in its storage pods to count toward testing, because they have generally been much more expensive than competing hard drives.)

That doesn't mean capacity is directly proportional to reliability. In the case of Seagate and HGST, 3TB drives were less reliable than 1.5TB drives, which weren't as reliable as 4TB drives. Seagate's 3TB drives performed especially poorly, with failure rates as 40 percent. Western Digital's 6TB drives have done fairly well so far, but Backblaze says it still needs to collect more data as it phases in this larger drives.

Why this matters: As my colleague Ian Paul pointed out last year, Backblaze is putting its drives through much more rigorous use than the average consumer, so you're unlikely to see the failure rates that Backblaze does. And in some cases, drives may have consumer-facing features (such as a power-saving mode) that aren't conducive to use in a commercial cloud storage environment. Still, the list provides a sense of which hard drives can withstand heavy use, and makes a case for spending a little more on a higher-capacity drive.

Why You Should Buy 4 TB Hard Drives and Skip the 3 TB Ones



Melanie Pinola

1/21/15 10:30am · Filed to: HARD DRIVES

119.6K

67

4



In a followup study to the insightful reports on the **most reliable hard drive brands** and consumer versus **enterprise hard drives**, Backblaze found some interesting data that could help you choose your next drive. One piece of advice: stay away from 3 TB drives.



The Most (and Least) Reliable Hard Drive Brands

Backblaze uses 25,000 hard drives for its online backup service. This has provided some interesting ...

[Read more](#)

The backup company evaluated their 41,213 disk drives (most of them consumer ones) for annual failure rates, and recommend 4 TB drives for their value and reliability:

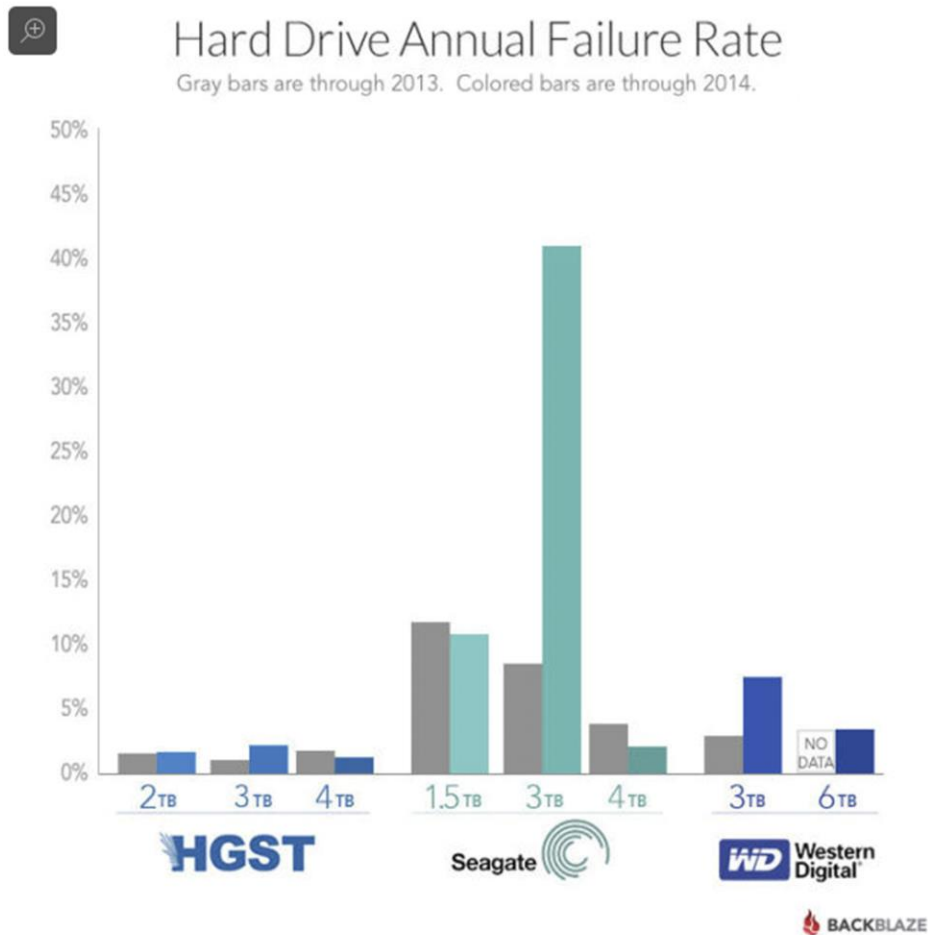
We like every one of the 4 TB drives we bought this year. For the price, you get a lot of storage, and the drive failure rates have been really low. The Seagate Desktop HDD.15 has had the best price, and we have a LOT of them. Over 12 thousand of them. The failure rate is a nice low 2.6% per year. Low price and reliability is good for business.

The HGST drives, while priced a little higher, have an even lower failure rate, at 1.4%. It's not enough of a difference to be a big factor in our purchasing, but when there's a good price, we grab some. We have over 12 thousand of these drives.

3 TB drives, across all the brands, though, aren't as great:

The HGST Deskstar 5K3000 3 TB drives have proven to be very reliable, but expensive relative to other models (including similar 4 TB drives by HGST). The Western Digital Red 3 TB drives annual failure rate of 7.6% is a bit high but acceptable. The Seagate Barracuda 7200.14 3 TB drives are another story. We'll cover how we handled their failure rates in a future blog post.

Here's a sneak peek at the Seagate 3 TB story, though:



Anyway, if you're looking to buy a new drive, Backblaze's experiment could help you get one less likely to crash on you. See the blog post below for the list of drives and their failure rates.

[What is the Best Hard Drive?](#) | Backblaze

How reliable are 4TB drives?

3TB drive reliability has been worse than expected, but the 4TB drives are shaping up nicely. Here's what you need to know.



By Robin Harris for Storage Bits | January 22, 2015 -- 12:19 GMT (04:19 PST) | Topic: Storage

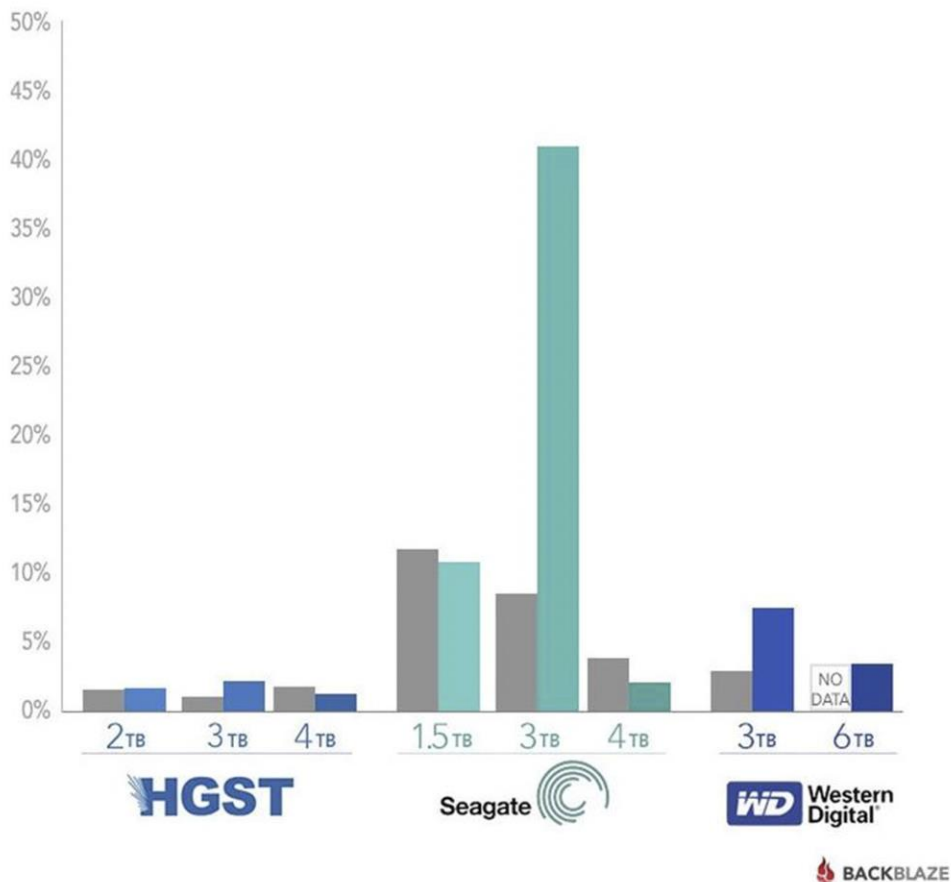
Key points:

- 4TB HGST and Seagate drives are much more reliable than 3TB drives, with an annual failure rate (AFR) of only 2.6 percent vs 9.3 percent for 3TB drives.
- They don't have good numbers for WD 4TB drives because they cost more, so they haven't bought many.
- HGST drives are more reliable than Seagate drives, but not enough for Backblaze to favor them over Seagate. But you might.
- 6TB drives are too new to have a track record, but they're buying more.

Here's a chart comparing failure rates in 2013 (gray bars) to 2014.

Hard Drive Annual Failure Rate

Gray bars are through 2013. Colored bars are through 2014.



THE STORAGE BITS TAKE

There were some teething pains with the 3TB drives, but it looks like the kinks were worked out with the 4TB drives. That's a good thing because my 3TB Seagate is filling up.

For those of buying one or two drives, this data is more comforting than conclusive. You never know if the couple of drives you buy come from a rare bad batch or got dropped by the shipping clerk.

But you improve your odds by following it. And it does confirm one piece of industry scuttlebutt: HGST makes high-quality drives.

WHEN IT COMES TO HARD DRIVE RELIABILITY, SIZE MATTERS

By Adrian Diaconescu — January 23, 2015 8:33 AM



Picking the perfect hard drive can be tricky. Unlike CPUs or GPUs, HDDs tend to randomly fail when least you expect it, and age doesn't seem to make a difference.

But what about capacity, brand and model? Do they have a say in hard drive durability, or is the whole thing a lottery? According to [online backup solution provider Backblaze](#), it's a yes across the board on the former question.

Related: [Seagate goes on a hard drive announcement spree at CES](#)

Believe it or not, HDDs offering more storage space kept their chins up better throughout 2014 in Backblaze's data center, especially those manufactured by Seagate. Which brings us to the second part of the equation – the name on the label.



Exactly like last year, Hitachi, now known as HGST (and a subsidiary of Western Digital), knocked it out of the park with microscopic failure rates, followed by Western Digital's own brand, which also performed above average. The ficklest HGST products were 3TB Deskstar 7K3000s, with a still reasonable bust score of 2.3 percent, while only half a percent of all 4TB Megastar 4000.Bs

bit the dust.

In Western Digital's camp 4TB models literally *never* failed, 3TB Reds broke 6.9 percent of the time, and 6TB Reds held their ground in 96.9 percent of cases. That may sound more impressive than HGST's results, but the sample size was much lower for Western Digital HDDs.

Backblaze only had a total of a little over 1,000 units for the latter manufacturer, and more than 23,000 Hitachis. Before you scream bias though, keep in mind the backup data specialist had a solid reason for playing favorites with HGST – low pricing.

Western Digital drives were “never” cheapest over the entire course of 2014, and generally, they were \$15 to \$20 costlier than the competition.

Related: [Can hard drive manufacturers keep up with the world's demand? Here's your answer](#)

As for Seagate, their drive reliability is extremely patchy, with 1.5 and 3TB Barracuda 7200s the clear losers. The latter unbelievably failed in 43.1 percent of cases, unlike higher-capacity 4TB Barracuda XTs and Desktop HDD.15s, which earned excellent scores of 1.1 and 2.6 percent respectively.

There's your answer then. If you're in the market for an affordable desktop hard drive, go HGST or, perhaps, a 4TB Seagate.

Latest Backblaze reliability data shows carnage for 3TB Seagate drives

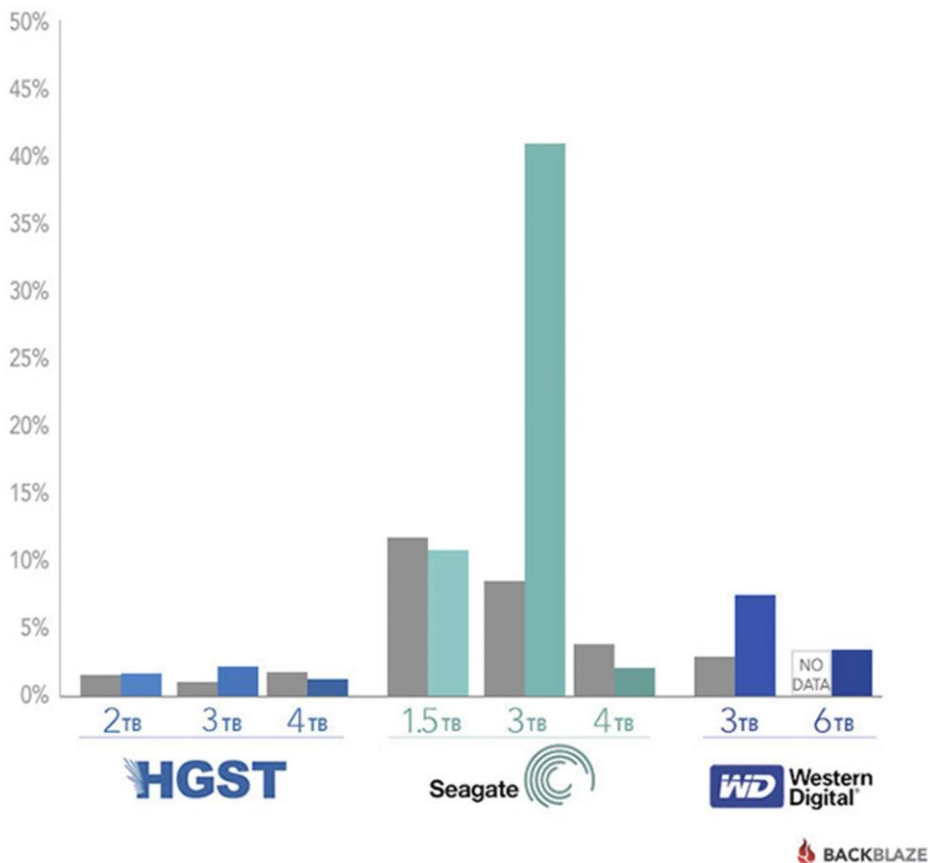
by [Geoff Gasior](#) — 7:00 AM on January 21, 2015

Online backup provider Backblaze made headlines last year with a [reliability study](#) based on over 25,000 mechanical drives. Unlike previous publications in this vein, the report listed failure rates for specific makes and models. The data confirmed a lot of the anecdotal evidence that suggested Seagate drives were less reliable than the competition. Now, there's [a new dispatch](#) with updated stats through the end of 2014.

The most interesting trend pertains to 3TB units. Drives with that capacity suffered higher failure rates regardless of the manufacturer, and there's a familiar face in the spotlight.

Hard Drive Annual Failure Rate

Gray bars are through 2013. Colored bars are through 2014.



Yikes.

The vast majority of the 3TB Seagate failures are tied to a single model: the Barracuda 7200.14. That drive's annual failure rate jumped from under 10% at the end of 2013 to over 40% a year later. There's no indication of why those 'cudas are failing at a dramatically higher rate, but the sample size is pretty big. Backblaze has over 1,100 examples with an average age of 2.2 years.

Although the 3TB contenders from HGST and WD also suffered higher failure rates over the past year, the overall percentages are much lower—especially for HGST. Drives from that manufacturer, which is owned by Western Digital, continue to be the most reliable in Backblaze's storage pods.

The numbers for Seagate's newer Desktop HDD.15 4TB provide some salvation for the company's battered reliability rep. Across over 12,000 units, the HDD.15's failure rate is now only 2.5%. The average age for those drives is less than a year, but they're failing less frequently than the 3TB 'cudas did at the same point in their lives. Perhaps the HDD.15's slower 5,900-RPM spindle speed is a factor.

Updated reliability stats on 17 different drives are available in [the full report](#), which is worth perusing. Do Backblaze's experiences continue to jibe with what TR readers are seeing in their own systems?

He only has one "pod" (meaning 45 drives) of Western Digital drives because their price is higher than other suppliers. "Generally the WD drives were \$15-\$20 more per drive," he wrote, adding: "That's too much of a premium to pay when the Seagate and HGST drives are performing so well."

Seagate provided a comment about the Backblaze blog:

We always value our customers' feedback and take it very seriously. It appears that Backblaze is reporting data from the same sample of drives from last year, which continues to be inconsistent with data received from other customers, and our large OEM installed base.

We absolutely stand behind the quality of our products with a best-in-class warranty, and we relentlessly test our drives for the workloads they were designed to support. We highly recommend that our enterprise and data center customers use the appropriate class of product to handle the workloads of enterprise environments.

Yet, as with previous data reported by Backblaze, desktop-class drives and some external drives were purchased and used in enterprise-class workloads – which they were NOT designed for nor tested to support. Therefore, we agree with Backblaze's comment that "It may be that those drives are less well-suited to the data center environment. Or it could be that getting them by drive farming and removing them from external USB enclosures caused problems."

Backblaze rates 3TB drives lower than 4TB ones: "The HGST Deskstar 5K3000 3 TB drives have proven to be very reliable, but expensive relative to other models (including similar 4 TB drives by HGST). The Western Digital Red 3 TB drive's annual failure rate of 7.6 per cent is a bit high but acceptable. The Seagate Barracuda 7200.14 3 TB drives are another story."

A transition to 6TB drives is starting and Backblaze has bought 270 Western Digital Red 6TB drives and 45 6TB Seagate SATA drives. The initial failure rates look okay but "we need to run the drives longer, and see more failures, before we can get a better number."

The Seagate 1.5TB and 3TB stats look to be something Seagate has recovered from. "All hard drives will eventually fail, but based on our environment if you are looking for good drive at a good value, it's hard to beat the current crop of 4 TB drives from HGST and Seagate. As we get more data on the 6 TB drives, we'll let you know."

And we'll be looking out for the info, you betcha. ®

Western Digital, HGST top the list of most reliable hard drives

Hard drive failure data from cloud backup service Backblaze has Western Digital and Hitachi coming out on top -- and Seagate upping its game



INFOWORLD TECH WATCH

By Serdar Yegulalp, Senior Writer, InfoWorld | JAN 22, 2015

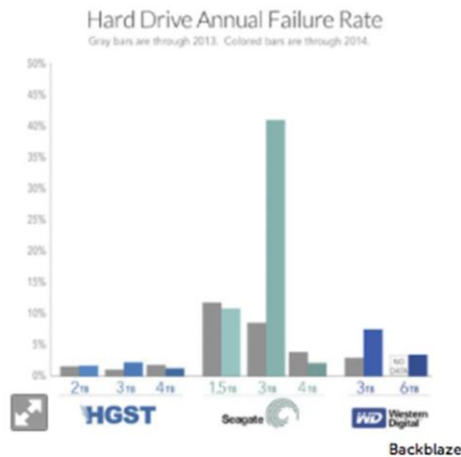


Last year, cloud backup service Backblaze crunched statistics about which makes and models of the tens of thousands of drives humming away in its data centers **held up best under stress**. Hitachi and Western Digital came out at the top; Seagate, not so much.

Now Backblaze is back with **another year's worth of stats**, harvested from the consumer-level drives running in its custom-designed and open-sourced **Storage Pod** drive racks. The results, assembled from a data set more than twice as large as the previous year's, square with the earlier findings.

Hitachi (now HGST, a subsidiary of Western Digital) has the lowest failure rates across the makes and models surveyed. Western Digital itself came in second, with numbers only slightly less impressive than HGST's. "It's hard to beat the current crop of 4TB drives from HGST and Seagate," Backblaze said in its blog post.

[Give yourself a technology career advantage with **InfoWorld's Deep Dive technology reports and Computerworld's career trends reports**. GET A 15% DISCOUNT through Jan. 15, 2017: Use code 8TIISZ4Z.]



Hard drive failures by manufacturer over the course of one year. HGST, a Western Digital subsidiary, did best, but stats on WD's 6TB drive line remain preliminary.

Seagate, on the other hand, is another story. Its drives didn't do well in the first roundup and this year sported failure rates as high as 43 percent annually. As with last year, its 4TB models were far more durable than its other offerings, failing at around half the rate of the previous year.

What constitutes a failure to Backblaze? Aside from obvious mechanical problems -- the drive won't spin up or be recognized by

the OS -- Backblaze included any drives that would not sync properly with a RAID array or reported SMART statistics that were out of the acceptable range. This last criterion can be tricky; Backblaze itself notes that **SMART stat reporting isn't consistent** between many drives. That said, the company believes a handful of the most critical criteria, such as the uncorrectable error count or the count of reallocated sectors, are reliable indicators of failure based on what it's seen in its drive pools.

The best results were with 4TB drives, which showed a marked decline in failure rates since the previous year's statistics -- both between HGST and Seagate. However, 3TB drive were less impressive, and Backblaze promised to dig into the story behind Seagate's striking failure rates there in a future post. Western Digital had no 4TB drives in the running, but Backblaze used 6TB drives from the company's line, the Western Digital Red. Its failure stats were less than 5 percent for the course of the year, but Backblaze cautioned it hasn't been using them for long enough to compute robust failure statistics.

Western Digital acquired Hitachi's hard drive business and turned it into HGST back in 2012; it was originally created in 2003 when IBM and Hitachi merged their hard disk manufacturing concerns. The HGST drives profiled in Backblaze's analysis were all Deskstar or **Megascale models**, the latter composed of 4TB drives designed for "low application workloads that operate within 180TB per year." Other drives in HGST's lineup include **helium-filled 8TB and 10TB** drives, with the helium providing **greater capacity and lower power consumption**, although Backblaze hasn't used those drives in its tests, preferring instead to stick with low-cost consumer drives purchased in bulk.

Backblaze has been using its data center as a source of eye-opening and sometimes hotly contested insights. Not long after its 2014 hard-drive reliability report, the company analyzed the effect of cooling on drive lifetimes. It found that keeping a drive cooler than its recommended operating temperature had **no discernible effect on its longevity**. Not everyone agreed with the conclusions, but few could find fault with Backblaze's underlying mission.

For those who want to crunch the numbers themselves, Backblaze plans to make available the raw data from the 2014 drive pool study in the next couple of weeks, along with more details on how it computed failure rates.

Latest hard drive reliability data reveals it may be best to avoid 3TB drives

By [Shawn Knight](#) on Jan 22, 2015, 12:30 PM | [41 comments](#)

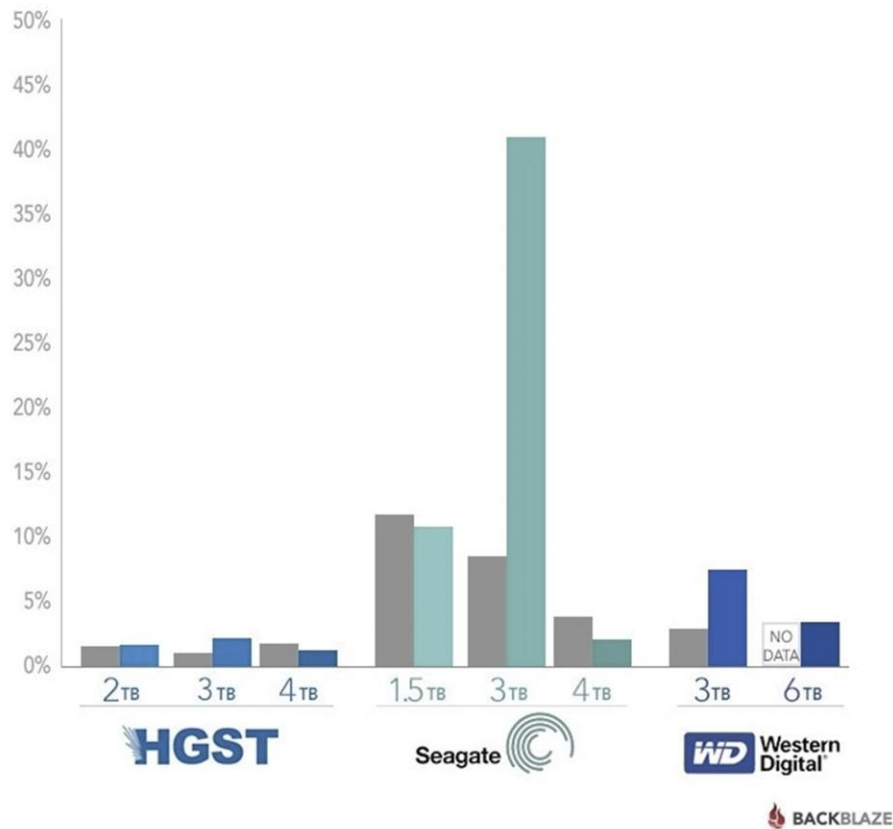


I've said time and time again that [solid state drives](#) are the future but the truth of the matter is, traditional spinning disks still have a place inside a modern PC as a storage / backup drive. The question then becomes, which drive / capacity combination is the most reliable?

Online storage provider [Backblaze](#) knows a thing or two about hard drives. After all, they had 41,213 disk drives spinning in their data center as of December 31, 2014, mostly consisting of a mix of makes, models and capacities from HGST (a subsidiary of Western Digital), Seagate and Western Digital.

Hard Drive Annual Failure Rate

Gray bars are through 2013. Colored bars are through 2014.



By recording the failure rate through 2014 (2013 data is thrown in for comparison), we can immediately see which drive to steer clear of: the Seagate Barracuda 7200.14 3TB unit.

But what else can we take away from the data?

Backblaze said they liked every single 4TB drive they bought last year because you get a lot of storage for the price and the failure rates have been really low. The company has more than 12,000 Seagate 4TB drives currently in service and the failure rate has been just 2.6 percent.

HGST drives, while priced a bit higher, have an even lower failure rate of 1.4 percent

Even with such a wealth of data, it's hard to draw any solid conclusions simply because some drives have been in service longer than others. For example, the HGST 2TB drives have been in service for an average of 3.9 years with a failure rate of just 1.1 percent while the Seagate 3TB units have only been in service for 2.2 years on average with a whopping failure rate of 43.1 percent.

The general takeaway is that HGST drives appear to be the most reliable albeit a little more expensive and the 3TB Seagate drives are worrisome.

Four TB good ,three TB bad, says disk drive reliability study

Some hard drives are more equal than others

23 Jan 2015 at 05:01, Simon Sharwood

We're not entirely comfortable with cloud backup outfit Backblaze's data on disk drive reliability, but the company has just popped out another year's worth of analysis on which drives hang around longest. With due scepticism, let's have a look.

For the uninitiated, Backblaze does cloud storage and backup using home-brew arrays called [Storage Pods](#) that it has open-sourced. Storage Pods can work with just about any kind of disk, be it intended for enterprise or consumer desktop use. The company regularly reveals selective bits of analysis about its rig, offering insights on [disk drive longevity](#) among other matters.

This week, the company offered up an analysis of the performance of its diverse disk drive fleet, which comprises 39,696 drives holding customer data (minus a few models represented by fewer than 45 drives). The data reports failure rates, with failures defined as either drive death, inability to work in a RAID array or failure to meet unspecified performance criteria.

Here's Backblaze's table of that data.

Backblaze Hard Drive Failure Rates Through December 31, 2014

Name/Model	Size	Number of Drives	Average Age in years	Annual Failure Rate	95% Confidence Interval
HGST Deskstar 7K2000 (HDS722020ALA330)	2.0 TB	4,641	3.9	1.1%	0.8% – 1.4%
HGST Deskstar 5K3000 (HDS5C3030ALA630)	3.0 TB	4,595	2.6	0.6%	0.4% – 0.9%
HGST Deskstar 7K3000 (HDS723030ALA640)	3.0 TB	1,016	3.1	2.3%	1.4% – 3.4%
HGST Deskstar 5K4000 (HDS5C4040ALE630)	4.0 TB	2,598	1.8	0.9%	0.6% – 1.4%
HGST Megascale 4000 (HGST HMS5C4040ALE640)	4.0 TB	6,949	0.4	1.4%	1.0% – 2.0%
HGST Megascale 4000.B (HGST HMS5C4040BLE640)	4.0 TB	3,103	0.7	0.5%	0.2% – 1.0%
Seagate Barracuda 7200.11 (ST31500341AS)	1.5 TB	306	4.7	23.5%	18.9% – 28.9%
Seagate Barracuda LP (ST31500541AS)	1.5 TB	1,505	4.9	9.5%	8.1% – 11.1%
Seagate Barracuda 7200.14 (ST3000DM001)	3.0 TB	1,163	2.2	43.1%	40.8% – 45.4%
Seagate Barracuda XT (ST33000651AS)	3.0 TB	279	2.9	4.8%	2.6% – 8.0%
Seagate Barracuda XT (ST4000DX000)	4.0 TB	177	1.7	1.1%	0.1% – 4.1%
Seagate Desktop HDD.15 (ST4000DM000)	4.0 TB	12,098	0.9	2.6%	2.3% – 2.9%
Seagate 6 TB SATA 3.5 (ST6000DX000)	6.0 TB	45	0.4	0.0%	0.0% – 21.1%
Toshiba DT01ACA Series (TOSHIBA DT01ACA300)	3.0 TB	47	1.7	3.7%	0.4% – 13.3%
Western Digital Red 3 TB (WDC WD30EFRX)	3.0 TB	859	0.9	6.9%	5.0% – 9.3%
Western Digital 4 TB (WDC WD40EFRX)	4.0 TB	45	0.8	0.0%	0.0% – 10.0%
Western Digital Red 6 TB (WDC WD60EFRX)	6.0 TB	270	0.1	3.1%	0.1% – 17.1%

The company's impressed by the four-terabyte drives it's bought lately, praising their reliability, bang-for-byte-and-buck and falling failure rates compared to drives it acquired in 2013. It's also very pleased with older 1.5TB Seagate desktop drives, which are hanging in there with impressively low failure rates.

3TB drives continue to disappoint, although as our previous analysis shows Seagate's acknowledged a problem in 2013-release drives.



HGST drives do better at Backblaze than those from Western Digital or Seagate, proving more reliable by a couple of per cent.

Backblaze's workloads aren't typical, it doesn't certify drives and it's not running an enormous fleet of drives by the standards of today's cloud operators. It is, however, the only entity currently releasing this kind of data. Google's done so in the past and Microsoft has of late been [candid](#) about some aspects of Azure's operations. Feel free to fling us some disk data, folks: Backblaze's results are interesting, but we'd like meatier numbers to work with.

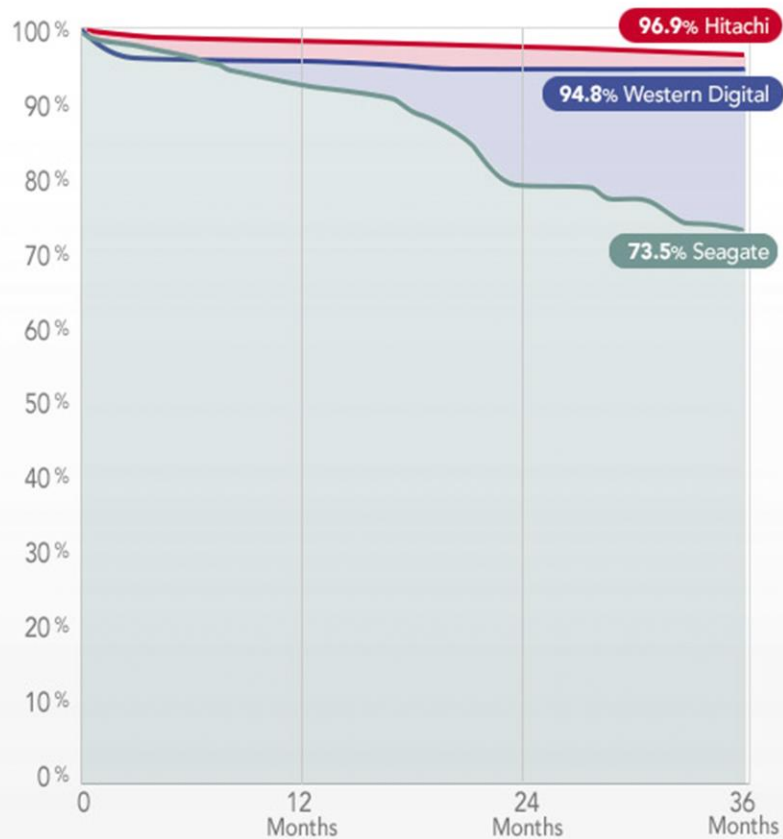
®

Backblaze HD reliability survey vs Newegg customer reviews

Moderators: sthayashi, Lawrence Lee, NeilBlanchard, Ralf Hutter

Author	Message
Michael Sandstrom  Joined: Wed Oct 13, 2004 4:03 pm Posts: 606 Location: Albany, GA USA	Post subject: Backblaze HD reliability survey vs Newegg customer reviews 📅 Posted: Thu Jan 23, 2014 6:11 pm I am in need of a new 2TB HD and my primary concern is reliability. For many years the only drives I bought were the good old reliable and quiet Samsungs. As most of you know, Backblaze released a HD reliability report based on their experience with thousands of Hitachi, Seagate and WD drives. In general the Hitachi units were best by far and the Seagates were terrible. WD was also not very good. I tried to verify Backblaze's results by checking Newegg customer reviews of some of the identical Hitachi, Seagate and WD drives. The newegg reviews were in the hundreds and they show terrible failure rates for all drives with WD being slightly more reliable than Hitachi or Seagate. A Hitachi drive that Backblaze reported an annual failure rate of less than 1% corresponded to a Newegg customer failure rate in excess of 50% based on a small sample size of 18 customers. I am left not knowing what to think. Please come back, Samsung.
faugusztin  Joined: Mon Mar 29, 2010 2:47 am Posts: 450 Location: Bratislava, Slovak Republic	Post subject: Re: Backblaze HD reliability survey vs Newegg customer review 📅 Posted: Thu Jan 23, 2014 7:20 pm <div>Michael Sandstrom wrote: As most of you know, Backblaze released a HD reliability report based on their experience with thousands of Hitachi, Seagate and WD drives. In general the Hitachi units were best by far and the Seagates were terrible. WD was also not very good.</div> WD not very good ? You are probably reading a different report than me... http://blog.backblaze.com/2014/01/21/wh ... uld-i-buy/


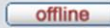


36 Month Survival Rate







 BACKBLAZE

In case of WD it is mostly "DOA / dies in first 2 months, otherwise it works for long time". It is pretty much only Seagate which are sub-par.

Customer reviews are usually a bad data source, as there are only two types of people writing reviews – superexcited ones writing positive reviews, and then the ones who had a major failure or DOA, with second group being more active. Customer reviews are by definition biased towards the bad end of the spectrum.

<p>xan_user</p> <p></p> <p>*Lifetime Patron*</p> <p>Joined: Sun May 21, 2006 9:09 am Posts: 2269 Location: Northern California.</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Thu Jan 23, 2014 7:32 pm</p> <p>and after all was said and done, what do they still buy a ton of???</p> <p>SEAGATE.</p> <p>Quote:</p> <p>The only thing holding Backblaze back from going with all Hitachi drives was the price, which was one reason why the company sticks with Seagate drives.</p> <p>Help SPCR keep the lights on, use these links when you buy: NCIX, Amazon and Newegg</p>
<p>CA_Steve</p> <p></p> <p>Moderator</p> <p>Joined: Thu Oct 06, 2005 4:36 am Posts: 6519 Location: Monterey Bay, CA</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Thu Jan 23, 2014 8:01 pm</p> <p>There's another thread about Newegg and HDD customer reviews. The short version is: While Newegg customers might show high failure rates for a particular drive, Amazon customers don't. The leading theory is Amazon does a better job of protecting the HDD during shipping than NewEgg. So, it isn't the drive that's bad - it's the e-tailer.</p> <p>1080p Gaming build: i5-4670K, Mugen 4, MSI Z87-G45, MSI GTX 760 2GB Gaming, 8GB 1866 RAM, Samsung Evo 250GB, Crucial MX100 256GB, WD Red 2TB, Samsung DVD burner, Fractal Define R4, Antec True Quiet 140 (2 front + rear) case fans, Seasonic X-560. 35-40W idle, 45-55W video streaming, 170-200W WoW, 200-230W Rift, 318W stress test (Prime95 + Furmark)</p> <p>Support SPCR through these links: NCIX, Amazon and Newegg</p>
<p>xan_user</p> <p></p> <p>*Lifetime Patron*</p> <p>Joined: Sun May 21, 2006 9:09 am Posts: 2269 Location: Northern California.</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Thu Jan 23, 2014 9:59 pm</p> <p>a lot of times its a misinformed e-user that rates a good product as bad.</p> <p>-buying a 2+tb drive for a system/OS that doesnt support it. or takes some hoop jumping to support it.</p> <p>-returning an item as DOA cause the didnt turn on that sata channel in the bios ect....</p> <p>Help SPCR keep the lights on, use these links when you buy: NCIX, Amazon and Newegg</p>
<p>CA_Steve</p> <p></p> <p>Moderator</p> <p>Joined: Thu Oct 06, 2005 4:36 am Posts: 6519 Location: Monterey Bay, CA</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Fri Jan 24, 2014 7:56 am</p> <p>xan_user wrote:</p> <p>a lot of times its a misinformed e-user that rates a good product as bad.</p> <p>That said, when there's a huge difference in customer feedback on the same item from two different vendors..</p> <p>1080p Gaming build: i5-4670K, Mugen 4, MSI Z87-G45, MSI GTX 760 2GB Gaming, 8GB 1866 RAM, Samsung Evo 250GB, Crucial MX100 256GB, WD Red 2TB, Samsung DVD burner, Fractal Define R4, Antec True Quiet 140 (2 front + rear) case fans, Seasonic X-560. 35-40W idle, 45-55W video streaming, 170-200W WoW, 200-230W Rift, 318W stress test (Prime95 + Furmark)</p> <p>Support SPCR through these links: NCIX, Amazon and Newegg</p>

<p>thierry.</p> <p></p> <p>Joined: Fri Nov 15, 2013 8:07 am Posts: 126 Location: Vienna - Austria</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Fri Jan 24, 2014 7:58 am</p> <p>Also, the survey from Backblaze is about consumer drives that they stress in storage pods (warm, vibrating, running 24/7). Maybe for our "normal" use, we don't "break" the Seagate so easily...</p> <hr/> <p><i>(sold in Dec. 2013)</i> Temjin TJ08-E / Be Quiet Straight Power E9 400W / GA-B75M-D3H / i3-3225 / 8GB / SSD 120GB / HDD 1TB / running Mac OS - Hackintosh</p>
<p>xan_user</p> <p></p> <p>*Lifetime Patron*</p> <p>Joined: Sun May 21, 2006 9:09 am Posts: 2269 Location: Northern California.</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Fri Jan 24, 2014 8:27 am</p> <p>Surprise, surprise, it looks like the seagates have magically gone on sale at most e-tailers....</p> <p>maybe i will replace my nas drives with new seagates (thats whats in there now). my nas has raid, is backed up to an external disk as well, and also to the cloud, so im willing to roll the dice. hmmm the savings could almost buy me a nice dinner out with the GF... valentines dinner and extra lan storage? Win-Win! 😊</p> <hr/> <p>Help SPCR keep the lights on, use these links when you buy: NCIX, Amazon and Newegg</p>
<p>Michael Sandstrom</p> <p></p> <p>Joined: Wed Oct 13, 2004 4:03 pm Posts: 606 Location: Albany, GA USA</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Fri Jan 24, 2014 10:49 am</p> <p>FYI, in November 2013 Newegg posted a youtube video touting their new shock-proof HD packaging so there may be fewer failures now.</p> <p>I guess I'll take a chance on a 2TB WD.</p>
<p>CA_Steve</p> <p></p> <p>Moderator</p> <p>Joined: Thu Oct 06, 2005 4:36 am Posts: 6519 Location: Monterey Bay, CA</p>	<p>Post subject: Re: Backblaze HD reliability survey vs Newegg customer review</p> <p>Posted: Fri Jan 24, 2014 12:54 pm</p> <div> <p>Michael Sandstrom wrote:</p> <p>FYI, in November 2013 Newegg posted a youtube video touting their new shock-proof HD packaging so there may be fewer failures now.</p> </div> <p>Good find. Maybe in a quarter or two some industrious soul will compare Newegg's 2013 ratings/DOAs to 2014 ratings/DOAs.</p> <hr/> <p>1080p Gaming build: i5-4670K, Mugen 4, MSI Z87-G45, MSI GTX 760 2GB Gaming, 8GB 1866 RAM, Samsung Evo 250GB, Crucial MX100 256GB, WD Red 2TB, Samsung DVD burner, Fractal Define R4, Antec True Quiet 140 (2 front + rear) case fans, Seasonic X-560. 35-40W idle, 45-55W video streaming, 170-200W WoW, 200-230W Rift, 318W stress test (Prime95 + Furmark)</p> <p>Support SPCR through these links: NCIX, Amazon and Newegg</p>

MattHelm	Post subject: Re: Backblaze HD reliability survey vs Newegg customer revie Posted: Mon Jan 27, 2014 1:20 pm
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">offline</div> <p> Joined: Fri Aug 27, 2004 5:38 pm Posts: 41 Location: Chicago, IL </p>	<ol style="list-style-type: none"> 1. Most people don't post positive reviews, but for a bad drive most will post a bad review. Why would you, the drive works, done, but if it doesn't, most want everyone to know. (wish they'd base all % by amounts sold, not number of reviews, so we could see real numbers) 2. Most people don't do any anti-static protection when installing drives. Bare drives need static protection until the PC case is closed. 3. I see a lot of bad reviews for green drives as either slow or doesn't work with RAID. That's they way they were designed, so I call all of those user error. 4. With regard to Amazon, you have to be careful with their reviews, as they sometimes mix many different manufacturers "part numbers" in the same "part reviews". (not always, but sometimes)

quest_for_silence	Post subject: Re: Backblaze HD reliability survey vs Newegg customer revie Posted: Mon Jan 27, 2014 1:54 pm
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">offline</div> <p> Joined: Wed Jun 13, 2007 10:12 am Posts: 5190 Location: ITALY </p>	<div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;"> MattHelm wrote: Bare drives need static protection until the PC case is closed. </div> <p>IME it's sort of urban legend.</p> <hr style="width: 20%; margin-left: 0;"/> <p>Regards, Luca</p> <p>Support SPCR, use these links when you buy: NCIX, Amazon and Newegg</p>

quest_for_silence	Post subject: Re: Backblaze HD reliability survey vs Newegg customer revie Posted: Mon Jan 27, 2014 2:15 pm
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">offline</div> <p> Joined: Wed Jun 13, 2007 10:12 am Posts: 5190 Location: ITALY </p>	<div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;"> thierry. wrote: Maybe for our "normal" use, we don't "break" the Seagate so easily... </div> <p>I've several Seagate 2.5 drives running (Momentus 7200.4, Constellation.2, and others), and since last six years I've had no failures among them.</p> <hr style="width: 20%; margin-left: 0;"/> <p>Regards, Luca</p> <p>Support SPCR, use these links when you buy: NCIX, Amazon and Newegg</p>

faugusztin	Post subject: Re: Backblaze HD reliability survey vs Newegg customer review	Posted: Mon Jan 27, 2014 7:05 pm
offline Joined: Mon Mar 29, 2010 2:47 am Posts: 450 Location: Bratislava, Slovak Republic	<p>Then you are lucky quest_for_silence, i had 2 of 3 Seagates in last 5 years die (1TB Barracuda LP 5900RPM and a 500GB in a Lenovo laptop). Sure, i had 7 of 8 WD20EARS die too – in same 5 year timeframe i had no WD10EADS (4), WD15EADS (4), WD20EARX* (6) or WD30EFRX (6) failures, at least not while i had the drives in my possession.</p> <p>* i RMA'd one as DOA, but i don't count that as death, but as a failed delivery as it was rectified within a week.</p>	

offline Joined: Wed Jun 13, 2007 10:12 am Posts: 5190 Location: ITALY	<p>faugusztin wrote:</p> <p>Then you are lucky quest_for_silence</p> <p>Or else you have been unlucky, faugusztin, who knows? 😊</p> <p>_____ Regards, Luca</p> <p>Support SPCR, use these links when you buy: NCIX, Amazon and Newegg</p>
---	--

faugusztin	Post subject: Re: Backblaze HD reliability survey vs Newegg customer review	Posted: Mon Jan 27, 2014 9:32 pm
offline Joined: Mon Mar 29, 2010 2:47 am Posts: 450 Location: Bratislava, Slovak Republic	<p>Considering the Backblaze experiences, i would vote for your luck 😊.</p>	

quest_for_silence	Post subject: Re: Backblaze HD reliability survey vs Newegg customer review	Posted: Tue Jan 28, 2014 12:14 am
offline Joined: Wed Jun 13, 2007 10:12 am Posts: 5190 Location: ITALY	<p>faugusztin wrote:</p> <p>Considering the Backblaze experiences, i would vote for your luck 😊.</p> <p>Considering your experience, if you allow me to misquote a saying of Oscar Wilde – "To lose some Seagate may be regarded as a misfortune ... to lose both some Seagate and some WD seems like carelessness."! 😊</p> <p>Definitely I think these jokes are pretty OT, so enjoy your WD Reds, faugusztin! 😊</p> <p>_____ Regards, Luca</p>	

<https://www.custompcreview.com/news/hard-drive-reliability-study-finds-hitachi-drives-reliable-seagate-drives-least/19904/>

HARD DRIVE RELIABILITY STUDY FINDS HITACHI DRIVES MOST RELIABLE, SEAGATE DRIVES LEAST

by SAM CHEN
JANUARY 23, 2014

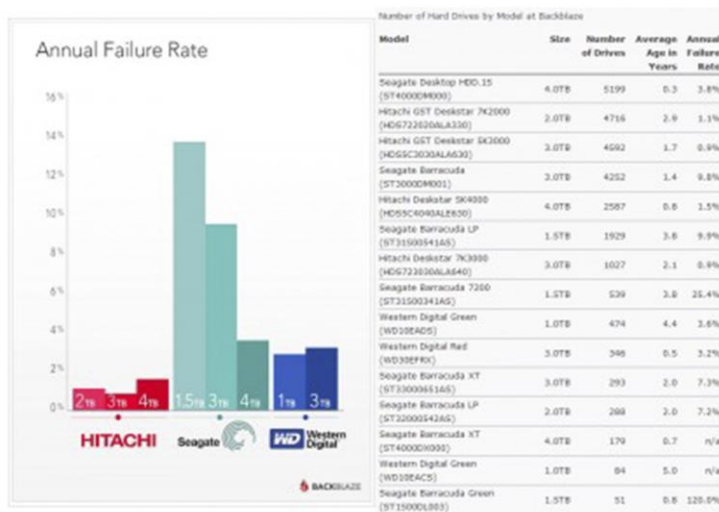


As product reviewers, we try our best to conduct thorough reviews of products. This generally means testing a certain product's features, performance, build quality, and implementation, but thing we can't always do right is reliability testing. Once we obtain or review products, we generally have only a couple weeks to thoroughly test it, and for products like hard drives, it's quite impossible to determine failure rates when you literally have two weeks and a sample size of one.

Fortunately, there are companies out there that do conduct long term internal testing of their hardware and thanks to cloud storage provider Backblaze's efforts, we're able to get a much better picture of who's producing the most reliable hardware and who's not.

Now, [Backblaze](#) is a pretty cool company. They're a cloud storage provider that does unlimited storage for \$5/mo, and to provide this kind of service, they run a whopping 27,000+ hard drives in their datacenter. What's most interesting about the hard drives that Backblaze runs is that Backblaze is using mostly consumer grade drives rather than drives designed specifically for the enterprise.

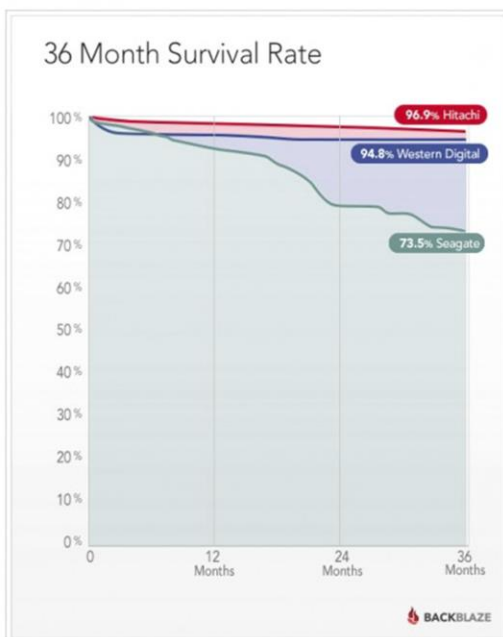
<https://www.custompcpreview.com/news/hard-drive-reliability-study-finds-hitachi-drives-reliable-seagate-drives-least/19904/>



Alright, so let's talk about Backblaze's hard drive reliability study.

From the results, we can see that Hitachi and Western Digital drives generally fared the best while certain Seagate models fared the worst. The least reliable drive, the Seagate Barracuda 7200 1.5TB model for example had an annual failure rate of 25.4% whereas the most reliable drive, the Hitachi Deskstar 7K3000 had an annual failure rate of only 0.9%.

That said, it's important to note that not all Seagate drives fared badly as the Seagate Barracuda 7200 1.5TB. The 4TB Seagate Desktop HDD.15 only had a failure rate of 3.8%, which is on par with Western Digital's 3TB Red and 1TB Green drives which had 3.5% and 3.6% annual failure rates respectively.



<https://www.custompcreview.com/news/hard-drive-reliability-study-finds-hitachi-drives-reliable-seagate-drives-least/19904/>

Here's a look at the failure rate for each hard drive manufacturer on a 36 month chart. Of all drives, Hitachi once again comes out on top with only a mere 3.1% of drives failing within 36 months while Western Digital followed close behind with only 5.2% of drives failing after 36 months. Seagate unfortunately has the worst reliability rating with a failure rate of 26.5% after 36 months, which is probably due to the high failure rates on the Seagate Barracuda 7200 1.5TB.

However, I think the most important takeaway here is that consumer hard drives are generally quite reliable, even when used in an enterprise/datacenter environment - an environment that consumer hard drives simply aren't designed to operate in. Well... that and I guess if you're looking to buy the most reliable hard drive on the market, go with a Hitachi.

Source: [Backblaze](#)

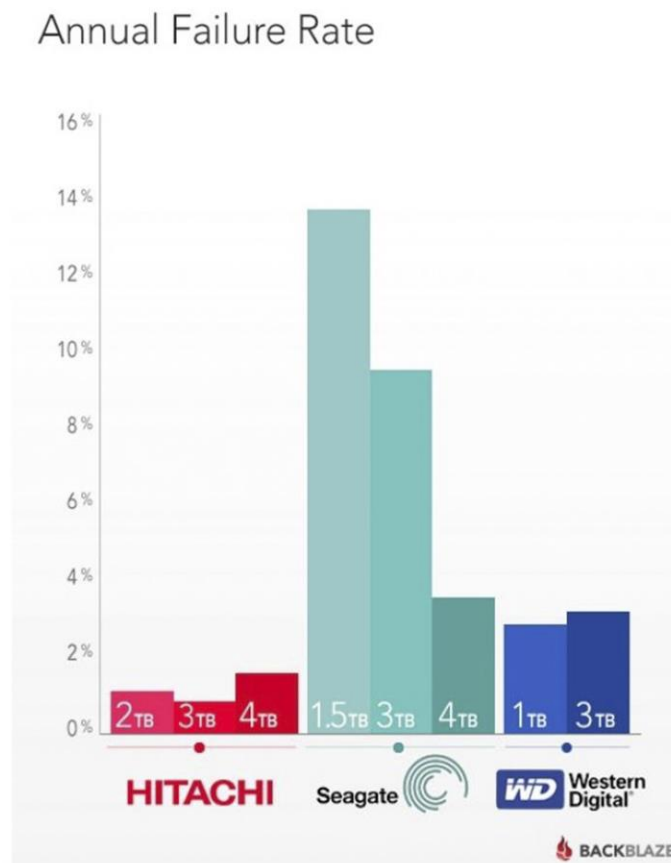
Backblaze publishes data on specific hard drive reliability

Posted 21 January 2014 18:47 CET by Kerry Brown

Backblaze is an online data storage company that uses thousands of consumer grade hard drives in their operation. A few months ago, they released some [interesting statistics](#) showing the rate of failure of their drives over time. But they did not show the failure rate of specific models at that time. The newest entry at the Backblaze blog does just that.

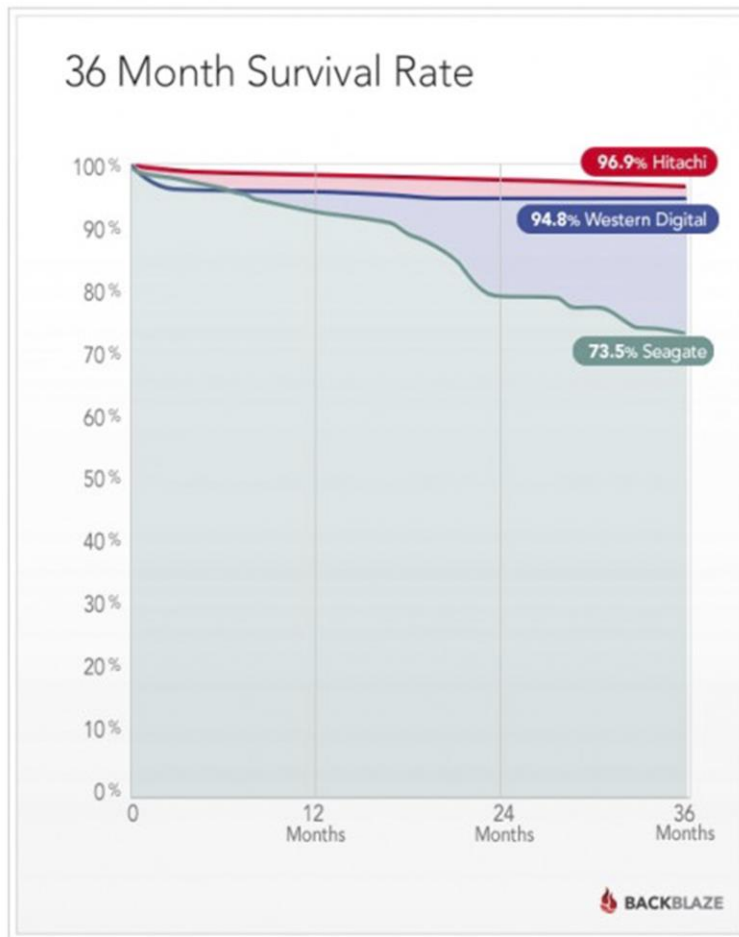
In 2013, Backblaze was using 27,134 consumer grade drives. They buy drives based primarily on price, and they had mostly Hitachi, Seagate and Western Digital brand drives. They did find that there were two specific drives that would not work well in their particular hardware configuration, and so they are no longer used by Backblaze. Those two drives are the Western Digital Green 3TB drives, and the Seagate LP (low power) 2TB drives.

Here is a graph showing the failure rate of their drives, broken down by brand:



<http://www.myce.com/news/backblaze-publishes-data-on-specific-hard-drive-reliability-70246/>

And here is the 36 month survival rate of the drives by brand:



The Seagate drives do not seem to be doing quite as well as the Hitachi and Western Digital drives overall, but there are still some individual models that Backblaze endorses from Seagate, including the Seagate 4TB Desktop HDD.15 (ST4000DM000).

Backblaze has provided quite a lot more information at their blog, with stats for individual models from these manufacturers. I recommend taking a look. Here is the link: [Backblaze Blog](#).



Backblaze: Backup your data online for \$5 a month

Posted on Saturday, April 19th, 2014 at 5:51 pm. PT

Written by [Jim Dalrymple](#)

Many thanks to Backblaze for sponsoring The Loop's RSS feed this week. Back up all your data with [Backblaze](#) online backup. It's unlimited, unthrottled, uncomplicated, and unexpensive. At just \$5/month for all your data it's a no-brainer.

Don't risk losing your music, photos, movies, code, docs and whatever else you're working on or editing. [Backblaze](#) continuously and securely backs up all the data on your computer and external hard drives.

Accessing and restoring files is easy. Quickly download and share files with the iPhone app. Need more of your data back? Use any web browser to download it or have Backblaze FedEx you a flash key or USB hard drive. Whether it's a broken hard drive, lost external, or a stolen computer, data loss happens all the time. For less than a cup of coffee, just \$5/month, Backblaze can back up all the data on your computer. It's easy. Stop putting it off. [Start your free trial, and get your backup started today.](#)



BY CHRISTO VAN GEMERT ON 22ND JANUARY • NEWS • READ

And the most reliable hard drive is...

Cloud backup provider Backblaze, which pioneered with its open-source Backblaze Storage Pod, has **released data on which, in its experience, is the most reliable hard drive – and which is the least reliable.**

While it's by no means a conclusive case study with data on every major hard drive model on sale, Backblaze's figures are quite telling. Of the hard drive brands it uses, Seagate, Hitachi, and Western Digital feature most prominently. Seagate has 12 765 drives in use, while Hitachi has 12 956 in Backblaze's servers. Western Digital has 2 838 drives. There's also a statistically-insignificant number of drives from Samsung and Toshiba.

It's worth noting that unlike other enterprises Backblaze uses consumer drives. In the post on its blog, one of the company's engineers explains that it uses the most affordable consumer-grade drives available, rather than pricier enterprise-level equipment. In cases where a more reliable can be had for not-that-much more money, those are used instead.

Seagate drives, in Backblaze's operation, are the least reliable. With a combined failure rate of 26.5% after three years in operation. Meanwhile, Hitachi is the most reliable, with only 3.1% of its drives having failed in a three year period. Western Digital comes in at a very respectable second, only 5.2% of its drives having failed after 36 months.

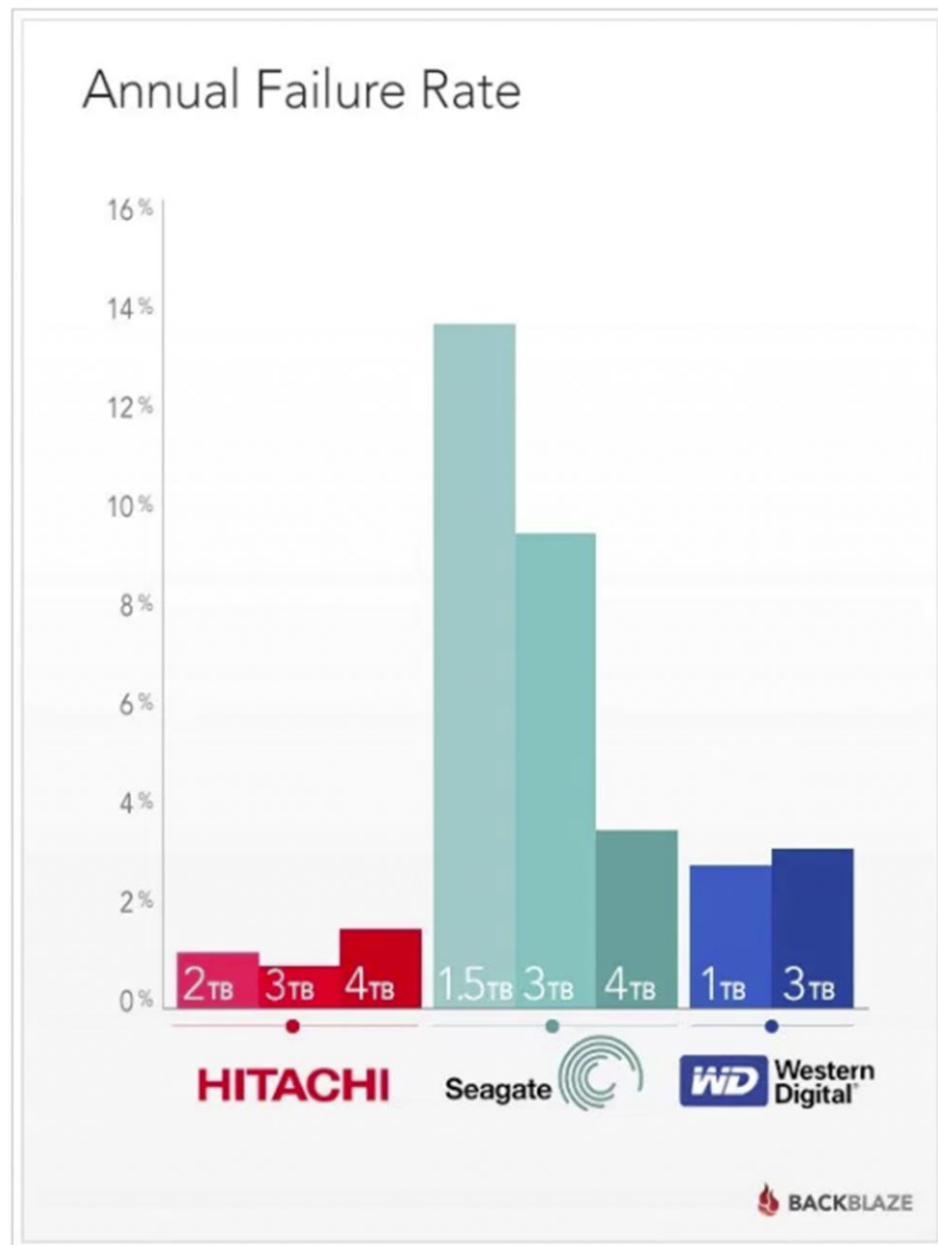


Image credit: Backblaze.

Those numbers don't tell the whole story, though. Backblaze has charts that track failures over time, and in those it's clearly visible that both Hitachi and Western Digital have the biggest drop within six months of deployment. After that very few drives fail and there is no sharp drop-off in reliability. Seagate's chart looks horrendous, with drives failing from the first month all the way to the last.

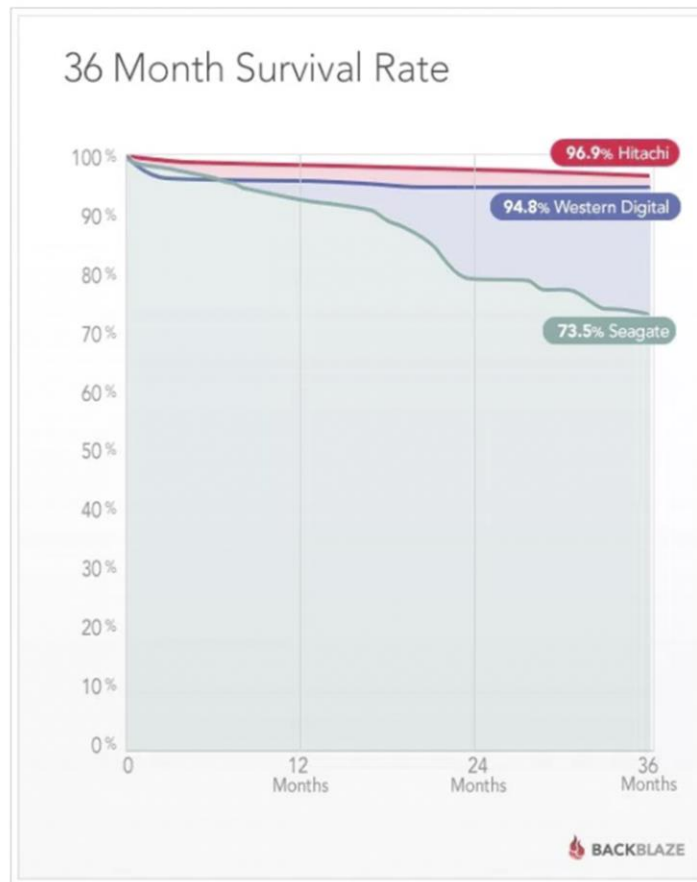


Image credit: Backblaze.

It's also noted that certain drives are not included in the data simply because those don't fit the criteria of what's needed by Backblaze. Seagate and Western Digital both have low-power drives that use less energy, and those are noted to be unsuited for write-intensive operations. However, Backblaze goes into detail about which exact models of drives are in use – typically high-capacity models. Anybody in the market for a few multi-terabyte drives would do well to at least consider some of this data, since these are consumer drives and it will apply to whatever you're considering for your storage needs at home.

Regardless of what hard drives are in use, though, users should always have backup measures in place. Having a more reliable drive simply reduces the risk of failure, but doesn't eliminate it. Use of cloud storage and a separate backup disk will keep your data far safer than any low-failure-rate hard disk ever will.

HARD DRIVE RELIABILITY BY BACKBLAZE

by PATRICK KENNEDY

JANUARY 21, 2014

Backblaze recently released results of its hard drive reliability study. We covered that [Storage Reliability Figures from Backblaze release](#) and one of the biggest questions was: aggregate numbers are great, but which hard drive manufacturer worked best. Backblaze finally released that information in a piece titled: [What hard drive should I buy?](#) The study is significant in that the company employs 27,134 consumer grade hard drives. That makes it one of the larger published reports of hard drive availability that we have read to date.

As a brief recap, Backblaze is a company that offers unlimited backup for \$5/month. While many other vendors offer cloud storage other major vendors (Box, Dropbox, Mozy, Google and Amazon for example) do not offer unlimited storage, especially at \$5/ month. There was a time when it appeared as though backup was heading to this type of model but a few things happened. Namely the cost of hard drives rose significantly after the Thailand flooding and the Western Digital - Hitachi and Seagate - Samsung mergers and some of the venture capital money started to wane as several players got securely established.

Backblaze took a somewhat different approach to its competitors insofar as it built its own low cost storage infrastructure. Enterprise storage is anything but inexpensive. Although heavily discounted (oftentimes upward of 60%) list prices for 1PB of enterprise storage in 2010-2011 were in the \$1 million range. Instead of going this route Backblaze built its own storage "pods" capable of holding 180TB of storage in a system that costs under \$2,000 excluding the cost of 45 drives.

<https://www.servethehome.com/hard-drive-reliability-backblaze/>



Backblaze Storage Pod (previous generation)

The company is now on their (at least) third major revision of the chassis which you can learn about [here](#):



The impact is that Backblaze is able to add drives to its network for approximately \$44/ drive. This is significantly lower than traditional enterprise solutions from vendors such as EMC, IBM and NetApp that often cost several times as much to connect per drive. The basic premise is to achieve the highest drive density at the lowest cost possible.

When the Thailand floods almost overnight raised hard drives specifically, Backblaze had to move towards purchasing any drive it could find, even pulling hard drives from [external enclosures](#).

These drives along with backup drives were then inserted into storage pods, tested, and eventually the pods were put into production.

All of this background helps explain a few things. First, Backblaze uses hard drives from all three major manufacturers. It also has a fairly unique environment where it is running drives 24x7 in RAID, in datacenters and rotated vertically on the connector. This is certainly not the intended market for the "consumer" drives but at least it provides a good population.

With that being said, the clear winner in their environment was Hitachi.

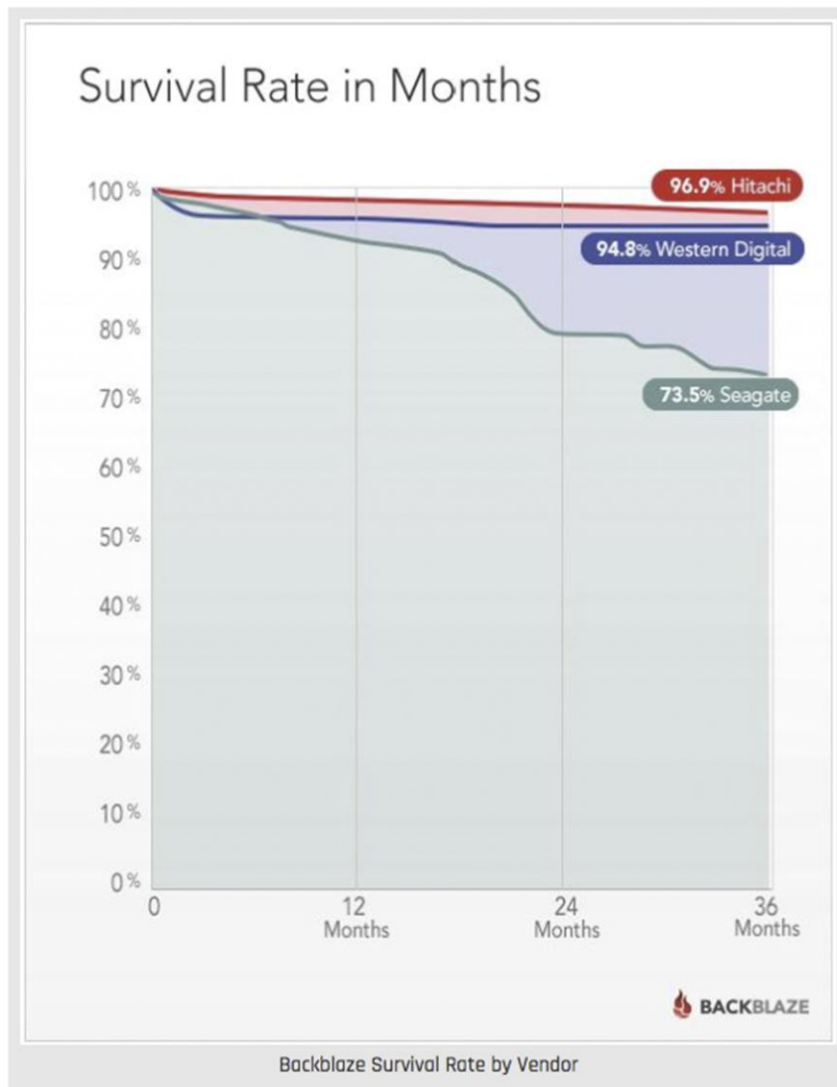
Hitachi Drives

If the price were right, we would be buying nothing but Hitachi drives. They have been rock solid, and have had a remarkably low failure rate.

Model	Size	Number of Drives	Average Age in Years	Annual Failure Rate
Hitachi GST Deskstar 7K2000 (HDS722020ALA330)	2.0TB	4716	2.9	1.1%
Hitachi GST Deskstar 5K3000 (HDS5C3030ALA630)	3.0TB	4592	1.7	0.9%
Hitachi Deskstar 5K4000 (HDS5C4040ALE630)	4.0TB	2587	0.8	1.5%
Hitachi Deskstar 7K3000 (HDS723030ALA640)	3.0TB	1027	2.1	0.9%

Backblaze Hitachi Drives

Overall the AFR picture looked like this:

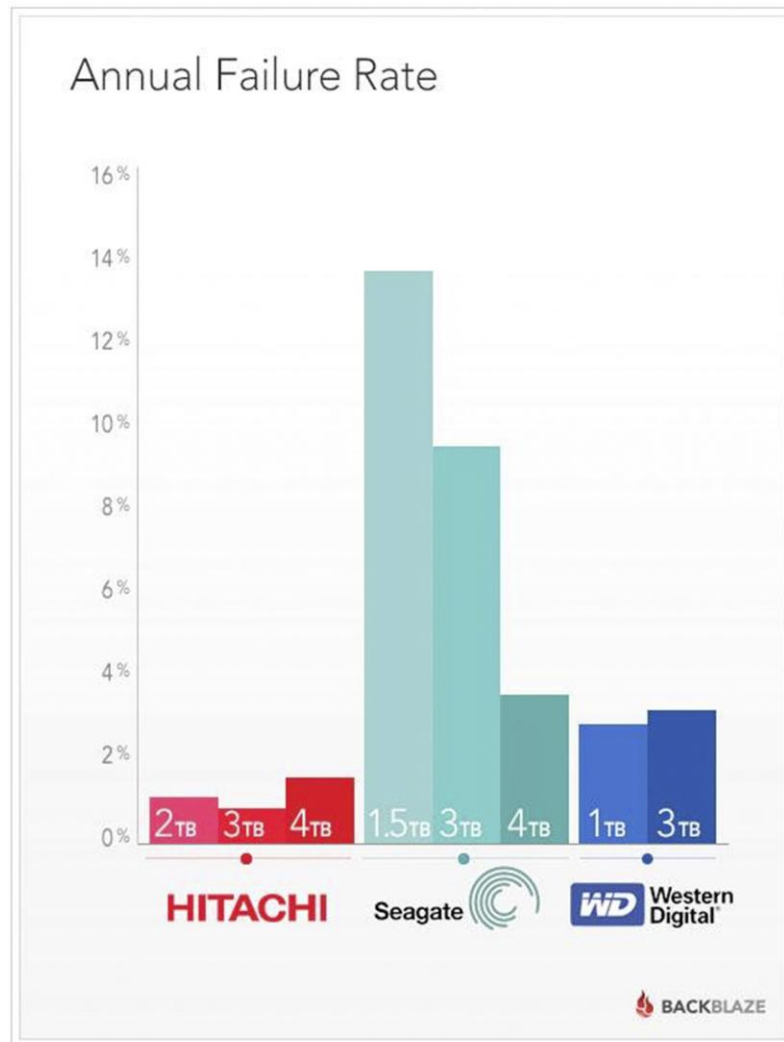


For the record, we have about 60x 2TB and 3TB Hitachi drives in the lab that have run perfectly for years. We had 20x of the Seagate 7200.11's that saw failures within the first few hours but have lasted over four years since. On the other hand, our 1.5TB Western Digital Green drives showed similar issues with all 8x failing within 16 months. After two failed quickly we actually had an early [STH post on the subject](#) over four years ago. An extremely small sample size with our 100 or so mechanical drives but we have seen some of these tendencies over time.

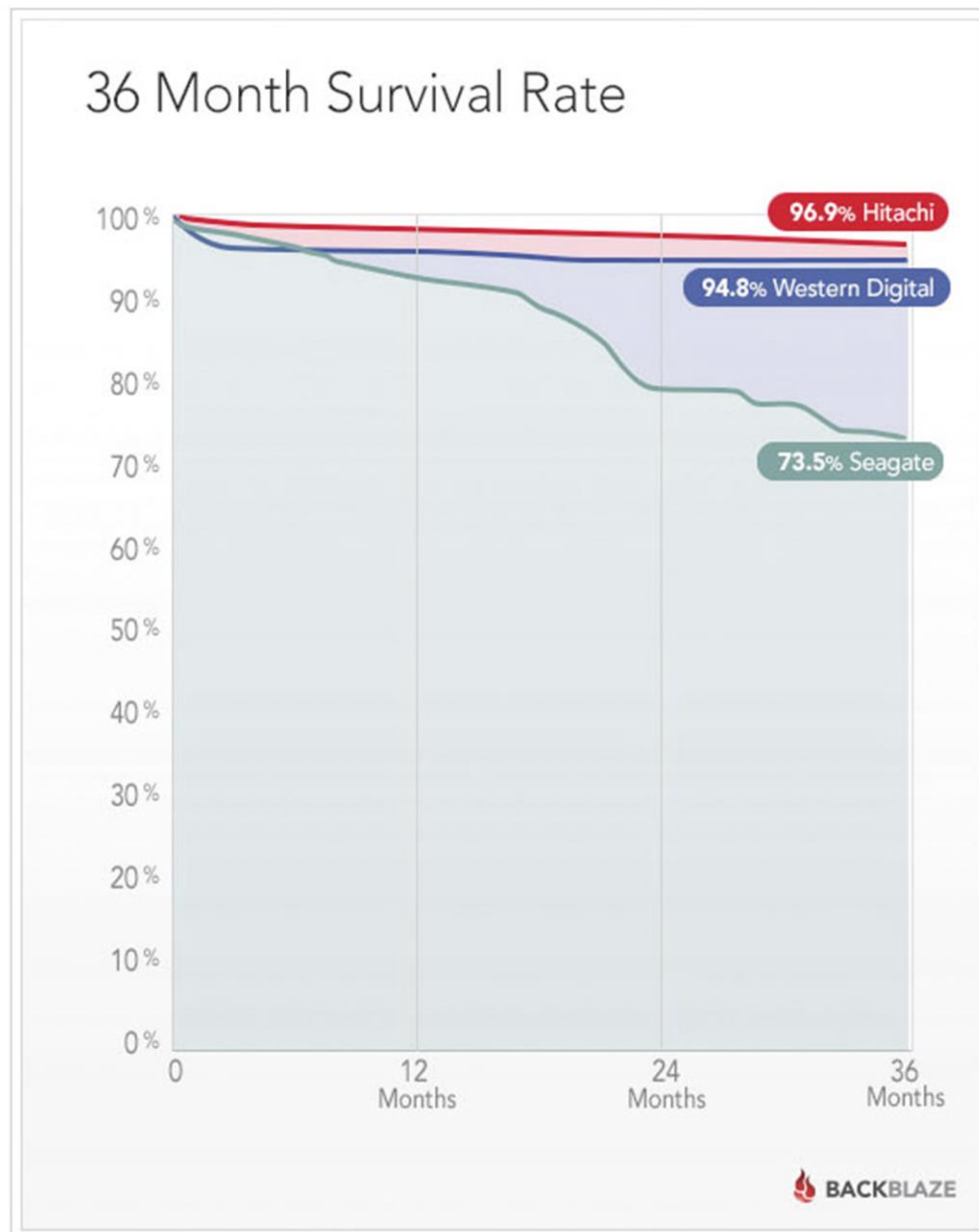
For anyone interested in storage reliability, this is certainly a study to look at. You can read the post in its [entirety here](#).

"What Hard Drive Should I Buy?" Backblaze Hard Drive Failure Study

By Michael Lavgorna • Posted: Jan 22, 2014



Regardless of how you look at the data, the truth of the matter is hard drives fail. Some sooner than others which is the good news/bad news aspect illustrated by this fairly exhaustive, more so for the Seagate drives apparently, 27,000+ drive study by cloud storage provider Backblaze. While this is certainly worth a full read since Backblaze talks about specific models (hint: if you want the most reliable, pick Hitachi) the take-away point that anyone with music stored on a hard drive should take away is—**Back Up Your Music!**



I'm in the process of upgrading my own storage and backup requirements since I've outgrown my current drives capacity of a measly 1TB (x 4). For reviewing purposes, I've got one NAS with AIFF versions of all of my music and another working copy with all FLAC (DSD resides on both). Each NAS are backed up to other drives and currently my Synology NAS is setup as a RAID array. Can you say overkill?

<http://www.audiostream.com/content/what-hard-drive-should-i-buy-backblaze-hard-drive-failure-study#ovP5FHThsFHvxZbd.97>




I've already got a new QNAP HS-210 2-bay NAS outfitted with a pair of 2TB Western Digital Red hard drives (WD20EFRX) for a total of 4TB of storage for my new AIFF library. This data will get backed up to a 4TB La Cie USB 3.0 drive which is en route as I type. Once this is all sussed, I'm going to reformat the Synology NAS and remove the RAID array so I can get 2TB of storage which I'll use for the FLAC library.

Read the entire Backblaze hard drive study [here](#).

Backblaze Ranks Hard Drive Vendor Reliability

by *Josh Centers*  

Online backup company Backblaze has produced another report on hard drive reliability, this time looking at specific vendors and models. Overall, drives from Hitachi (now owned by Western Digital) came out on top, with a 96.9 percent survival rate after 36 months. Second was Western Digital, whose drives had a quick initial die-off, but then stabilized with an overall 94.8 percent survival rate. In a distant third place was Seagate with a 73.5 percent survival rate. In spite of that, Backblaze is now buying mostly 4 TB Seagate drives due to their low cost and steady performance; the company also likes the Western Digital 3 TB Red drives.  [FOLLOW LINK](#)

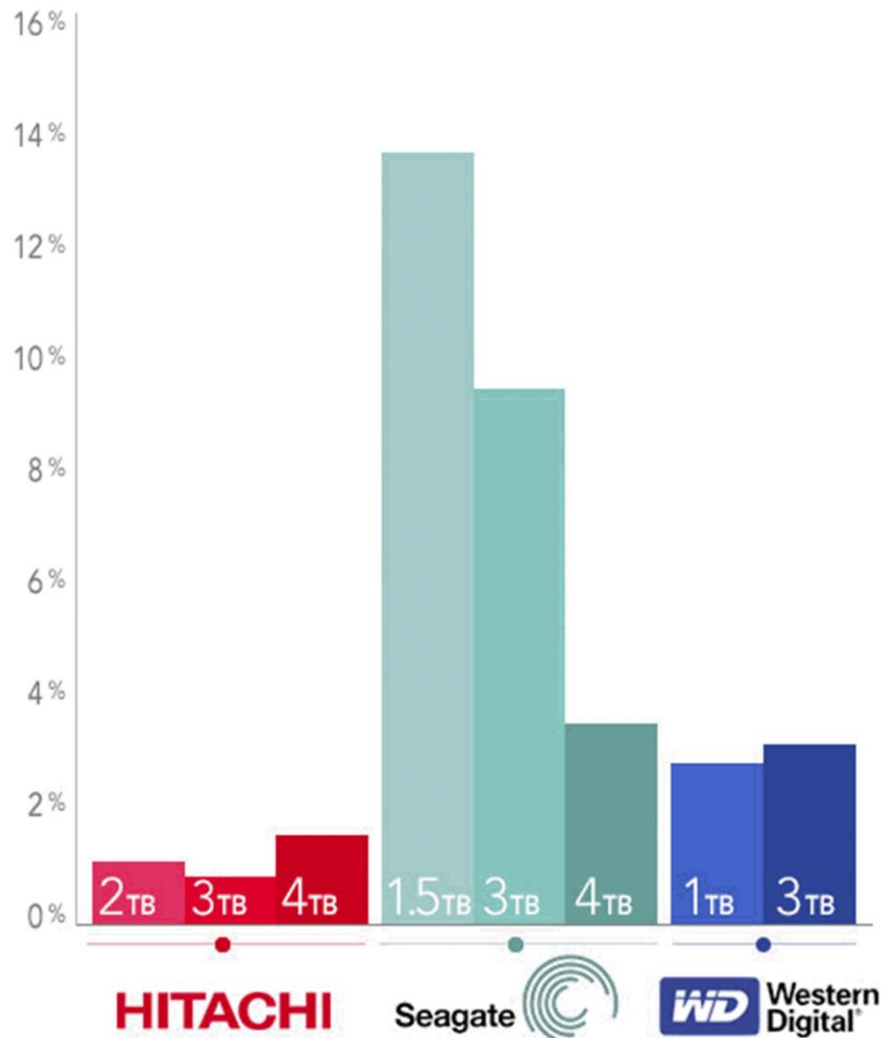
If you buy a 1.5TB Seagate HDD today, it will probably die within 3 years

by *Carl Nelson* January 21, 2014



Online backup provider **Backblaze** have published results from a study they have performed on drives used for their service. This study includes 27,134 drives, and use standard consumer models from Toshiba, Seagate, and Western Digital. So which hard drive should you buy? If their results are any indication, you could say "anything but Seagate". At least for the 1.5-3 TB range.

Annual Failure Rate



I would recommend reading [their blog post](#) for full details, as it's quite interesting to see their process. For what it's worth, they are still buying Seagate drives – they say the 4TB models are reliable enough, and the prices are lower than the rest. If you're in the market for a lower capacity drive though, you might want to spend a bit more to get a Western Digital or a Hitachi drive.

Backblaze: Among Its 27,000 Drives, Hitachi Most Reliable

By Barry Levine / NewsFactor Network



PUBLISHED:
JANUARY
22
2 0 1 4

What are the most reliable hard drives? That's a question any computer user might ask, but when you own and heavily use 27,134 of them, as online backup provider Backblaze does, the answer is critical. In recent blog postings, the company has decided to share its findings from the last three years.

The top two brands used in those 27,000-plus drives are Seagate and Hitachi, with nearly 13,000 each, followed by Western Digital with about 2,800. Toshiba and Samsung are in the mix with a few dozen representatives each. One aspect to keep in mind, of course, is that Backblaze is using these drives more heavily than any single consumer or business would.

In a blog post Tuesday on the Backblaze corporate blog, Principal Engineer Brian Beach said the company buys "the least expensive drives that will work," all of which are consumer grade, with sophisticated software maintaining backups in case of failure. He added that, when a new model is released, they buy some and test them with initial setup tests, a stress test and then a few weeks in production. If it passes those hurdles, the model assumes a position on the buy list, which, when the price is right, triggers a purchase.

'Spend a Bit More'

But, as one might expect, price is not the key factor at that point, since Beach said the company is willing to "spend a bit more" on more reliable drives. Some drives don't work in the Backblaze environment, for various reasons, including the Western Digital Green 3 TB drives and the Seagate LP (for low power) 2 TB drives. The company believes their incompatibility stems from a too-high vibration level in its storage pods, where the drives are housed.

Backblaze said that, "if the price were right, we would be buying nothing but Hitachi drives," because they have been "rock solid," with a low failure rate. The models used include the Hitachi GST Deskstar 7K2000 and 5K3000, and the Deskstar 5K4000 and 7K3000.

The Seagate Barracuda LP 1.5 TB gets praise for having a venerable average age of nearly four years, while larger Seagates in the 2 to 4 TB range are "solid workhorses," but they tend to wear out. The Seagate Barracuda Green 1.5 TB models, however, a warranty replacement for older drives, "are dropping like flies."

Hitachi, Least Trouble

The company said it wishes it had more of the Western Digital Red 3 TB WD30EFRX, although they came out after it already had a number of Seagate 3 TB drives.

In terms of untroubled operation of drives, Hitachi wins hands down, in particular the 3 TB Deskstar 7K3000, with a 0.9 percent failure rate, followed by the Deskstar 5K3000. The brand itself has an average 99.99 percent uptime, followed closely by Seagate at 99.72 and Western Digital at 99.83. Newer purchases are focused on 4 TB drives, notably the Seagate Desktop HDD.15 ST4000DM000 and the Western Digital 3 TB Red WD30EFRX.

Backblaze competes in the consumer-level, cloud-based, low-cost backup market with such services as CrashPlan. But it has also become known for open-sourcing its storage pod design, which it first did in 2009. These self-contained, metal cases with drives inside have had their designs updated by Backblaze several times, which custom-builds them after the company deemed the commercial versions too expensive.



Backblaze Storage Pod (previous generation)

A Closer Look At The Best And Worst Hard Disk Brands

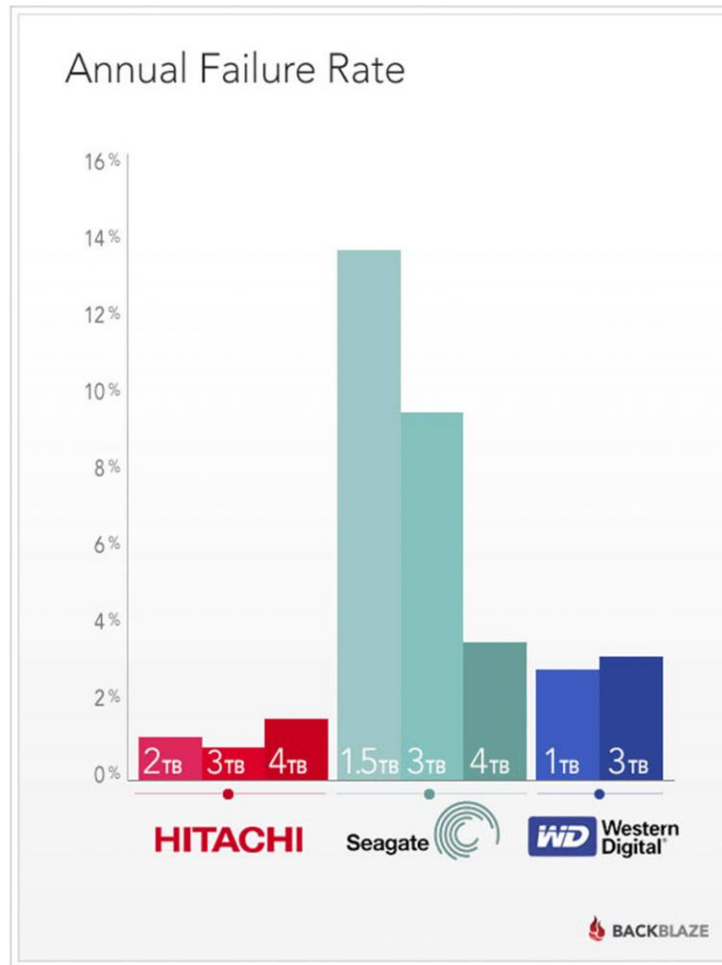
By [Saqib Khan](#) · on January 22, 2014 3:24 pm · in [Technology](#)

Ever wondered which hard disk brand is the best, and which brand should you stay away from? Blackblaze, an unlimited online backup company comes to the rescue to answer this difficult question, and the findings are indeed interesting.

[Blackblaze](#) currently has approximately 28,000 hard drives powered up and constantly spinning, and they have taken into account how the hard drives from different brands compare, which are the most reliable, and which are the least. As you can imagine, Blackblaze won't want to buy hard drives that are less reliable and stop working, which ultimately needs takes more effort to replace the drive with a new one.

Which is the most reliable hard drive?

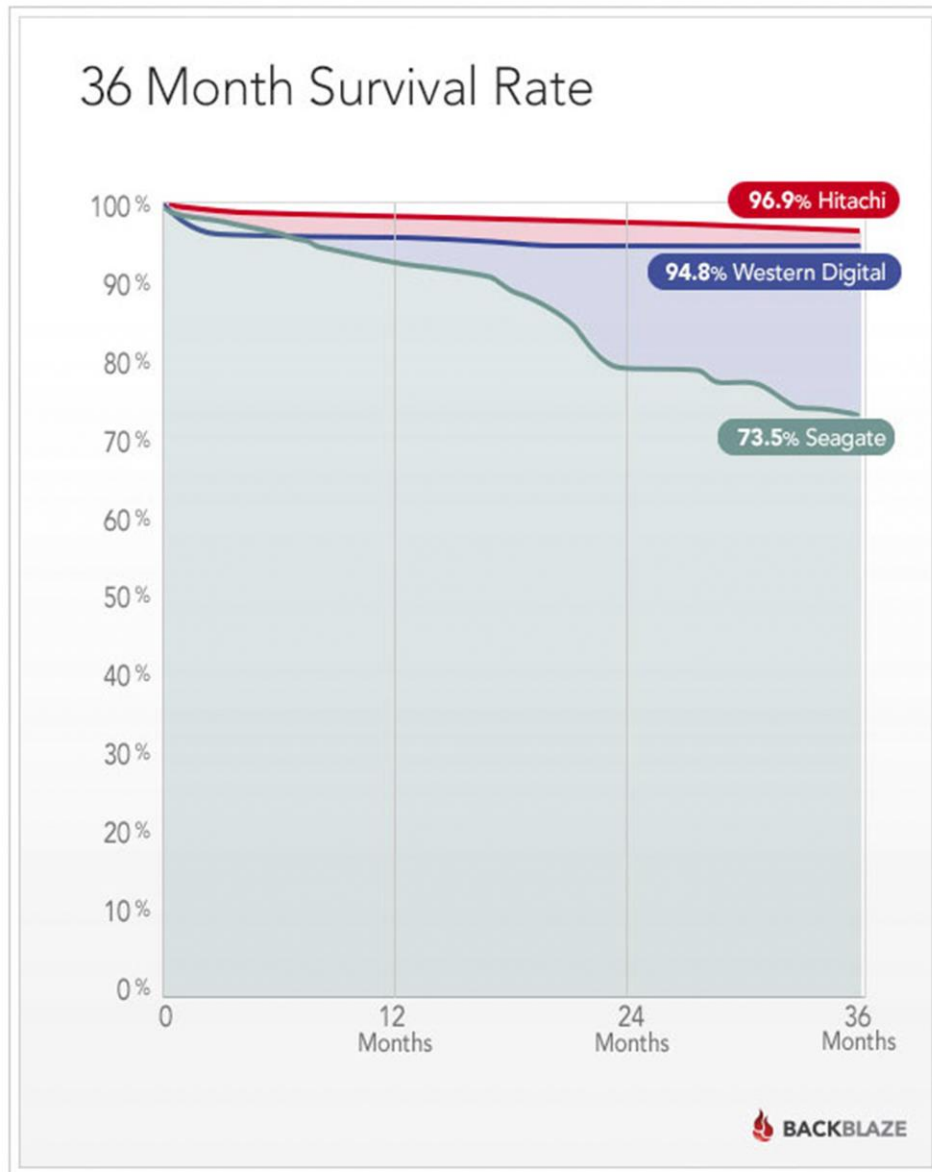
Blackblaze breaks down their data in two parts – by brands and by specific drive. At the end of 2013, they had 27,134 consumer-grade drives spinning in the Backblaze Storage Pods. There are 12,765 drives by Seagate, 12,956 drives by Hitachi and 2,838 drives by Western Digital. When a new drive arrives at the market, proper testing is done to ensure that it works in production. The company buys the drive only when the price is right.



Let's talk about failure rates. "We measure drive reliability by looking at the annual failure rate, which is the average number of failures you can expect running one drive for a year. A failure is when we have to replace a drive in a pod."

As per this chart, Seagate has the highest failure rate while Hitachi has the lowest which makes it the most reliable. After about 3 years of spinning up constantly, 96.9 percent Hitachi drives are still running. Whereas, 94.8 percent of Western Digital drives are still running. Seagate on the other hand scores low with only 73.5 percent of drives running.

Which hard drive brand survives the most, and least



Here's the chart, which shows survival rate for each brand. In the words of Blackblaze "Hitachi does really well. There is an initial die-off of Western Digital drives, and then they are nice and stable. The Seagate drives start strong, but die off at a consistently higher rate, with a burst of deaths near the 20-month mark."

Overall, most of the drives survived for at least 3 years, but the most reliable ones are from Hitachi and Western Digital with lowest failure rates, and for the time being, you might want to stay away from Seagate.

Backblaze on cheap hard drives: Buy Hitachi if you can afford 'em

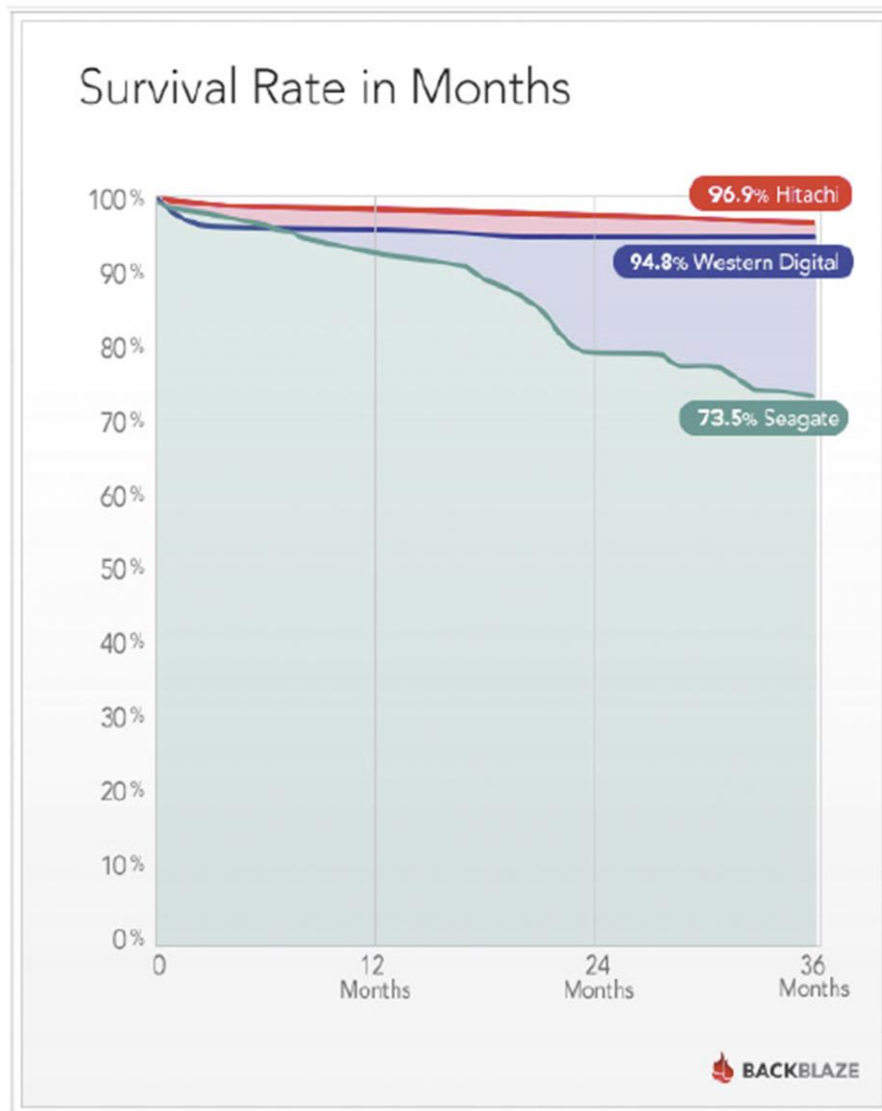
Derrick Harris Jan 21, 2014 - 6:00 AM CDT

A couple months ago, cloud backup provider Backblaze [wrote a blog post detailing the reliability of the consumer hard drives](#) it uses to underpin its service. It turns out they're seemingly as reliable as enterprise-grade hard drives for Backblaze's purposes, with most of the 25,000 it had purchased still running and storing about 75 petabytes of data. Now, Backblaze is breaking those drives down by brand.

On Tuesday, the company published a new blog post [detailing which models of hard drives last the longest](#) and deliver the most bang for the buck. You'll want to read the whole thing for all the details, but the gist is this: Hitachi drives last the longest ("If the price were right, we would be buying nothing but Hitachi drives," CEO Gleb Budman wrote), but Seagate is currently delivering the best performance for the price.

<https://gigaom.com/2014/01/21/backblaze-on-cheap-hard-drives-buy-hitachi-if-you-can-afford-em/>

This chart shows just how well the Hitachi drives perform.



As does this one, but it focuses on maintenance time rather than sheer survival rate.

Brand	Active	Trouble	Number of Drives
Seagate	99.72	0.28%	12459
Western Digital	99.83	0.17%	933
Hitachi	99.99	0.01%	12956

<https://gigaom.com/2014/01/21/backblaze-on-cheap-hard-drives-buy-hitachi-if-you-can-afford-em/>

Right now, though, the company is primarily buying 4-terabyte Seagate Desktop HDD.15 drives, Budman explains. It also really like the Western Digital 3TB Red, although Seagate and Western Digital also make the only two drives the company absolutely will not purchase again. The post also notes the hopefully positive ramifications — on both companies — of Western Digital buying Hitachi in 2012.

Tuesday's blog post is just the latest in series of posts by Backblaze breaking down what's running its cloud back up service, starting with the release of its open source designs in 2009. If you're unfamiliar, Google "backblaze storage pod" or [search "backblaze" on our site](#) (there, I did it for you) to get the whole story on its open source storage pods. Or, just listen to [our podcast with Budman](#) from October, which also includes a fun CIA story.

COMPUTING

Backblaze: Among Its 27,000 Drives, Hitachi Most Reliable

Posted January 22, 2014



What are the most reliable hard drives? That's a question any computer user might ask, but when you own and heavily use 27,134 of them, as online backup provider Backblaze does, the answer is critical. In recent blog postings, the company has decided to share its findings from the last three years.

The top two brands used in those 27,000-plus drives are Seagate and Hitachi, with nearly 13,000 each, followed by Western Digital with about 2,800. Toshiba and Samsung are in the mix with a few dozen representatives each. One aspect to keep in mind, of course, is that Backblaze is using these drives more heavily than any single consumer or business would.

In a blog post Tuesday on the Backblaze corporate blog, Principal Engineer Brian Beach said the company buys "the least expensive drives that will work," all of which are consumer grade, with sophisticated software maintaining backups in case of failure. He added that, when a new model is released, they buy some and test them with initial setup tests, a stress test and then a few weeks in production. If it passes those hurdles, the model assumes a position on the buy list, which, when the price is right, triggers a purchase.

'Spend a Bit More'

But, as one might expect, price is not the key factor at that point, since Beach said the company is willing to "spend a bit more" on more reliable drives. Some drives don't work in the Backblaze environment, for various reasons, including the Western Digital Green 3 TB drives and the Seagate LP (for low power) 2 TB drives. The company believes their incompatibility stems from a too-high vibration level in its storage pods, where the drives are housed.

Backblaze said that, "if the price were right, we would be buying nothing but Hitachi drives," because they have been "rock solid," with a low failure rate. The models used include the Hitachi GST Deskstar 7K2000 and 5K3000, and the Deskstar 5K4000 and 7K3000.

The Seagate Barracuda LP 1.5 TB gets praise for having a venerable average age of nearly four years, while larger Seagates in the 2 to 4 TB range are "solid workhorses," but they tend to wear out. The Seagate Barracuda Green 1.5 TB models, however, a warranty replacement for older drives, "are dropping like flies."

Hitachi, Least Trouble

The company said it wishes it had more of the Western Digital Red 3 TB WD30EFRX, although they came out after it already had a number of Seagate 3 TB drives.

In terms of untroubled operation of drives, Hitachi wins hands down, in particular the 3 TB Deskstar 7K3000, with a 0.9 percent failure rate, followed by the Deskstar 5K3000. The brand itself has an average 99.99 percent uptime, followed closely by Seagate at 99.72 and Western Digital at 99.83. Newer purchases are focused on 4 TB drives, notably the Seagate Desktop HDD.15 ST4000DM000 and the Western Digital 3 TB Red WD30EFRX.

Backblaze competes in the consumer-level, cloud-based, low-cost backup market with such services as CrashPlan. But it has also become known for open-sourcing its storage pod design, which it first did in 2009. These self-contained, metal cases with drives inside have had their designs updated by Backblaze several times, which custom-builds them after the company deemed the commercial versions too expensive.

Backblaze releases study results about 'longest-lasting' and 'most reliable' hard drives

Submitted by Sumit Yayavar on Wed, 01/22/2014 - 12:18



On the basis of the results of a comprehensive three-year study to ascertain which hard drive vendors' products last the longest, cloud service provider Backblaze has revealed that hard drives from Western Digital are the longest-lasting drives on average, followed by Hitachi and Seagate drives. However, a few of the Hitachi models perform better in terms of reliability.

For the study, Backblaze gathered details from more than 28,000 hard drives which it uses in its data centers. The company used 12,956 Hitachi drives; 12,765 Seagate drives; 2,838 Western Digital drives; and 58 and 18 drives respectively from Toshiba and Samsung.

According to the findings of the Backblaze study, the average life of Western Digital's drives is 2.5 years; while that of Hitachi drives is 2 years, and Seagate drives is 1.4 years.

With regard to reliability of the drives, the study showed that two of Hitachi's models are the 'most reliable' drives. These models are: the Hitachi 3TB Deskstar 7K3000 (HDS723030ALA640) and the Hitachi Deskstar 5K3000 (HDS5C3030ALA630). Both the drives have a 0.9 percent failure rate; and the average lifetime of the two models is 2.1 years and 1.7 years respectively.

About the annual failure rate based on manufacturer and capacity, Backblaze said in its official blog post: "Hitachi does really well. There is an initial die-off of Western Digital drives, and then they are nice and stable. The Seagate drives start strong, but die off at a consistently higher rate, with a burst of deaths near the 20-month mark."

Read this before you buy another hard drive

Lucas Mearian

Data storage service provider Backblaze [yesterday revealed failure rates](#) among more than 27,000 consumer-class hard drives it uses in its data center.

The breadth and depth of Backblaze's data has given consumers unprecedented access to specific hard drive failure rates across the three largest vendors of the technology: Seagate, Hitachi and Western Digital. It offers an unvarnished look at hard drives (models and serial numbers included), and even details which drives Backblaze will no longer use because they're so unreliable.

While users should check out the actual data for more granular information, the big picture boils down to this: Over a three-year period, 3.1% of Hitachi's drives failed; 5.2% of Western Digital's drives died; and a sizable 26.5% of Seagate's drives failed.

"Hitachi does really well," Backblaze said in its blog. "There is an initial die-off of Western Digital drives, and then they are nice and stable. The Seagate drives start strong, but die off at a consistently higher rate, with a burst of deaths near the 20-month mark."

The study includes data on 15 drive models totaling more than 12,000 drives each from Seagate and Hitachi, and almost 3,000 drives from Western Digital. There were also several dozen drives from both Toshiba and Samsung, but not enough for solid statistical results.

Healthy skepticism

IT vendors often pitch studies and "user surveys" to the press. Most of the time, those studies are overtly self-serving. For example, my colleagues and I regularly get study and survey pitches from security software makers on consumer data vulnerability -- i.e. "your data is vulnerable, buy our software to protect it."

Professional journalists typically ignore these kinds of reports, unless they can be used in concert with objective data. So why make a big deal over Backblaze's data?

Gleb Budman, Backblaze's co-founder and CEO, told Computerworld today that his company lives by the ethos that, when it can, it will openly share information that helps others. And no, that doesn't include customer data.

"We use Linux, we use Tomcat, we use Apache. We use a variety of open-source software and information people publish about technology or marketing. So we like to give back when can," he said.

Now, for a grain of salt. Obviously, on some level Backblaze compiled the drive failure-rate data to draw attention to its \$5-a-month storage service. The message is simple: If hard drives fail, yours could, too. So go out and sign up for the cloud storage service.

But in this one case, the data offered by Backblaze is still compelling.

Racks of Backblaze's Pods - storage arrays filled with consumer-class hard drives

It goes without saying that the hard drive industry is an incestuous one where companies regularly acquire one another's technology. Going back to the early 2000s, Maxtor acquired Quantum's drive division; Seagate acquired Maxtor; then it purchased Samsung's and LaCie's. In 2009, Toshiba bought Fujitsu's drive business. In 2011, Western Digital purchased Hitachi's drive facilities and then sold them to Toshiba. You can try to keep up, but it's not easy.

So even with Backblaze's hard and fast data on drive failure rates, you might still be left uncertain as to which products are best.

But, assuming Backblaze's failure-rate data is not skewed (and there's no reason it would be), it is still hugely beneficial to consumers: Basically, it offers an evaluation of 15 drive models, details how many BackBlaze used and which ones failed over three years in its data center. And it details the vendors whose products had the best overall reliability.

With that information, buyers can make a vastly more informed choice on which hard drive they'll want in a computer. Although the drives listed by Backblaze are older, Budman said his company plans to release updated failure rates on a quarterly basis.

"That will add data points in terms of drives already in this study as they will get older. We'll also be adding three petabytes of storage capacity per month to our data center, so there's new data to be collected," he said. "So as new drives come out, there will be new data released on them."

The company may also begin reporting how drives failed -- for example, whether a read/write head or an internal motor died. That data may be culled from the Self-Monitoring, Analysis and Reporting Technology (SMART), an internal drive monitoring software most manufacturers include in their products.

One class of drive the company hopes to add once they're more affordable is [helium-filled models](#). Helium drives will offer up to 6TB of capacity compared to today's 4TB, air-filled drives. Helium reduces friction, so manufacturers can pack more drive platters into a smaller area without overheating.

Unfortunately, because solid-state drives (SSDs) are so much more expensive than hard drives, Backblaze doesn't plan to include those in any studies any time soon -- not until SSDs achieve price parity with hard drives, Budman said.

Backblaze likes to buy its hard drives on the cheap: it purchases the least expensive drives from consumer sites such as [Pricegrabber.com](#), [Newegg.com](#) and [Amazon.com](#).

Because it buys from retail sites, Backblaze is not beholden to drive suppliers or any pressure they might apply to fend off bad publicity. That said, when Backblaze released its latest blog, Seagate retweeted it. Kudos to Seagate.

Backblaze sticks its consumer drives into RAIDed storage arrays it calls "Pods." That's where it stores customer data. Because the storage servers use RAID, drives can fail and data can be rebuilt because its been striped across multiple drives. In other words, data generally isn't lost when a drive fails.

The company only uses 313 enterprise-class drives in its Dell PowerVault storage systems for corporate data. Even so, last year it published a [compelling report](#) comparing enterprise and consumer drive failure rates. It showed the annual failure rate of expensive enterprise-class drives (4.6%) was about the same as cheap consumer-class drives (4.2%).

That blog post went viral, and rightfully so. That kind of information is highly useful, just as the data released this week is. It absolutely deserves your attention.

Backblaze lists most reliable hard drives based on its massive cloud study

Lucas Mearian
January 21, 2014
Computerworld US

[Cloud](#) service provider Backblaze has been **busily releasing** [data](#) over the past several months from a massive study of more than 27,000 hard drives it uses in its data centers.

Last November, **the company released** the first batch of data showing that 22% of more than 25,000 consumer-grade hard drives in its rack-mounted servers die in their first four years.

Today, the Backblaze released what is arguably the most important information yet: which vendor's hard drive products last the longest. The result are based on a study that lasted three years.

At the end of 2013, the company had 27,134 consumer-grade drives spinning in **Storage Pods**. A storage pod is an array of RAIDed disks made up by either 2.5 or 3.5-in, hard drives used to storage customer data. Each Pod stores up to 180TB in a 4U rack-mounted configuration.

The company filled the Storage Pods with drives from Seagate, Hitachi and Western Digital; it also used drives from Toshiba and Samsung, but their numbers were so small as to be statistically insignificant. For example, the company used 12,765 Seagate drives, 12,956 Hitachi drives and 2,838 Western Digital drives. It only used 58 drives from Toshiba and 18 from Samsung.

The results from three years of use were revealing: Western Digital's drives lasted an average of 2.5 years, while Hitachi's and Seagate's lasted 2 and 1.4 years, respectively. Even so, some of the individual Hitachi models topped the reliability charts.

Annual failure [rate](#) based on manufacturer and capacity (source: Backblaze)

"Hitachi does really well. There is an initial die-off of Western Digital drives, and then they are nice and stable. The Seagate drives start strong, but die off at a consistently higher [rate](#), with a burst of deaths near the 20-month mark," Backblaze wrote in **its official blog**. "Having said that, you'll notice that even after 3 years, by far most of the drives are still operating."

It's also important to note that Backblaze is using the drives in an environment that sees far more input and output activity than the average desktop or laptop [computer](#) would produce; the drives are continuously in use in what is an enterprise-class environment.

Backblaze measured reliability by looking at the annual failure rate, which is the average number of failures you can expect running one drive for a year. A failure is when a drive in a pod must be replaced, the company said.

<http://www.computerworlduk.com/it-vendors/backblaze-lists-most-reliable-hard-drives-based-on-its-massive-cloud-study-3498258/>

The company included specific drive models and their capacities in their results. It listed 15 different drive models from Western Digital, Seagate and Hitachi.

Topping the list for reliability was Hitachi's 3TB Deskstar 7K3000 (HDS723030ALA640) with a 0.9 percent failure rate and an average lifetime of about 2.1 years.

The second highest in reliability was also a Hitachi drive, the Deskstar 5K3000 (HDS5C3030ALA630); it also had a .09% failure rate with an average lifetime of 1.7 years.

The drive model with the highest failure rate was Seagate's 1.5TB Barracuda Green (ST1500DL003). It averaged only a 0.8-year lifespan, which gave it an annual failure rate of 120%.

Drive survival rate over 36 months of use (source: Backblaze)

Not all Seagate drives performed so poorly.

Backblaze said it has been [happy](#) with Seagate's Barracuda LP 1.5TB drives.

"We've been running them for a long time - their average age is pushing 4 years. Their overall failure rate [9.9%] isn't great, but it's not terrible either," the [company](#) stated. "The bigger Seagate drives have continued the tradition of the 1.5TB drives: they're solid workhorses, but there is a constant attrition as they wear out."

Western Digital, while performing the best on average, also suffered hits on some of specific drives as well.

"The drives that just don't work in our environment are Western Digital Green 3TB drives and Seagate LP (low power) 2TB drives. Both of these drives start accumulating errors as soon as they are put into production. We think this is related to vibration," Backblaze stated.

The company said it will continue to measure the performance of its drives and release [data](#) periodically on those metrics.

Lucas Mearian covers storage, disaster recovery and business continuity, financial services infrastructure and health care IT for Computerworld. Follow Lucas on Twitter at [@lucasmearian](#), or subscribe to [Lucas's RSS feed](#). His email address is lmearian@computerworld.com.

[Read more about data storage](#) in Computerworld's Data Storage Topic Center.

The Most (And Least) Reliable Hard Drive Brands

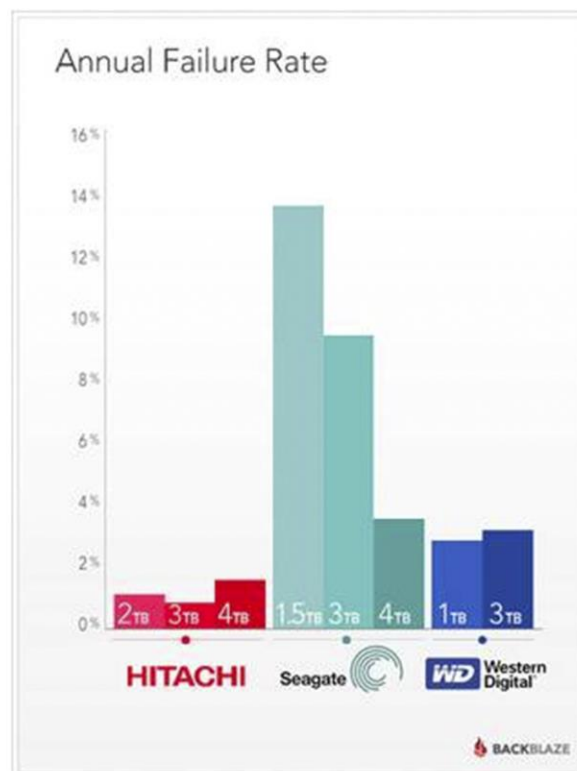
Melanie Pinola , Gawker Media

Jan 21, 2014, 10.30 PM IST

Backblaze uses 25,000 hard drives for its online backup service. This has provided some interesting information, such as **how long hard drives are likely to last** and the **difference in reliability between enterprise and consumer drives** . Today, Backblaze has spilled the beans on which drive manufacturers are the most reliable.

The comparison is between Seagate, Hitachi, and Western Digital. (The company has a few Toshiba and Samsung drives, but not enough for analysis.) Backblaze says they buy the least expensive drives that perform well, based on stress tests and a few weeks in production.

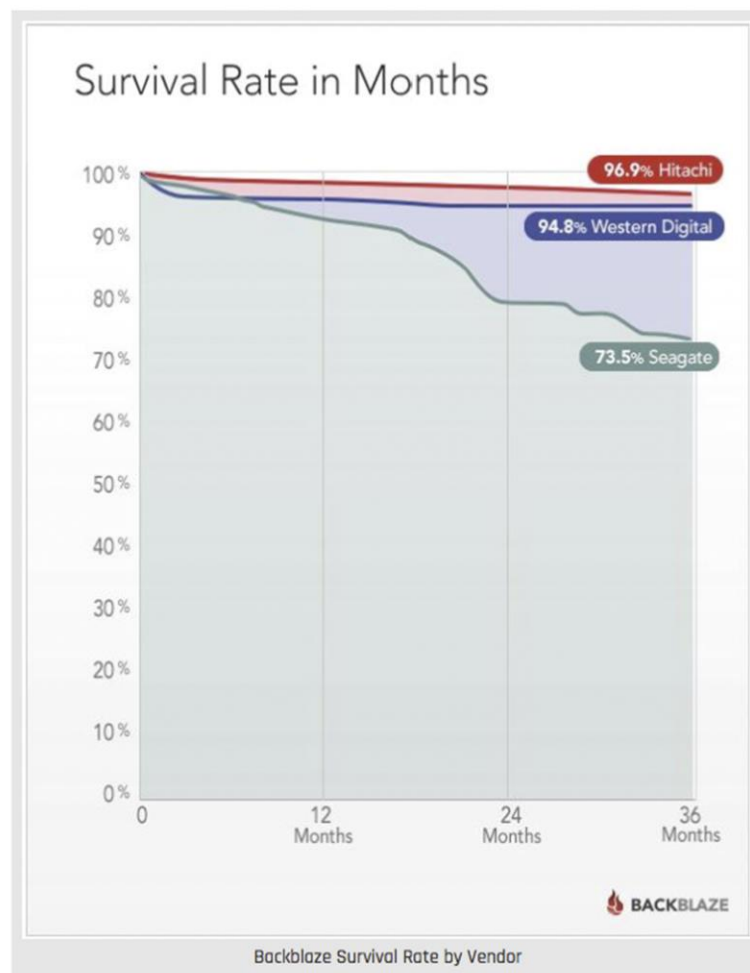
As with the previous analyses, Backblaze measured the reliability of the drives by looking at the annual failure rate, the average number of failures while running a drive for one year. Here is a pretty telling chart:



The company has also broken it down by drive model on their blog. The Hitachi GST Deskstar (7K2000, 5K3000, and 7K3000) had the lowest annual failure rates, from 0.9% to 1.1%. Meanwhile, the Seagate Barracuda Green had a whopping 120% annual failure rate (an average age of 0.8 years). While those were warranty replacement drives-likely refurbished ones already used-the other Seagate drives had failure rates between 3.8% and 25.4%.

Overall, most of the drives survived for at least three years, but looking at this data, you might want to consider going with a Hitachi or WD drive instead of Seagate, unless you read other reviews of a specific drive's reliability.

What Hard Drive Should I Buy? | Backblaze



Seagate Spins Out as the Least Reliable Hard Drive

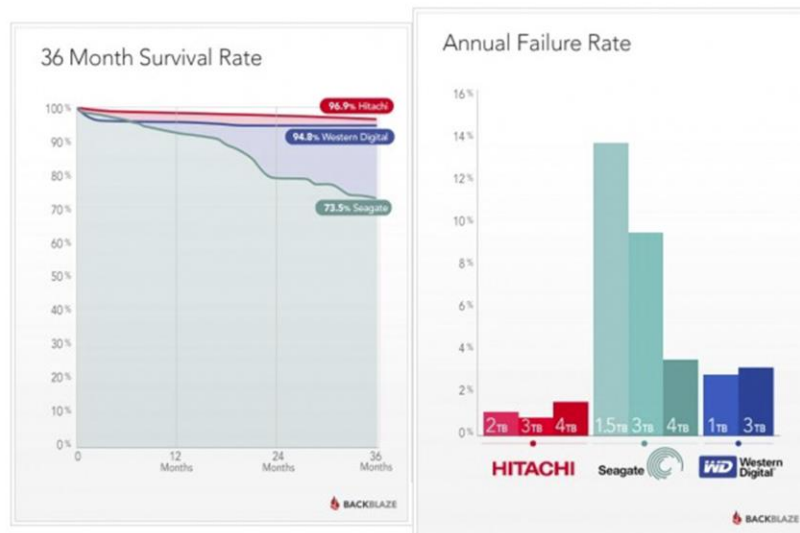
BRIAN MURPHY - JANUARY 23, 2014

Let's face it. As gamers, hard drives are the key to our survival. Ok, not quite to that extreme but equipment reliability is something that should be on everyone's mind when choosing equipment for that new gaming tower, HTPC, or console. Many of us have been there when an old disc drive starts to click and whine, and as all of us know the repercussions can be devastating. So which brands are reliable and which fall short?

[Backblaze](#) is one of the main names in online data backup so it's safe to say they use a few hard drives, over 25,000 drives in fact. Yesterday the company released information detailing which hard drives they use and their reliability. The most unreliable of the stack is Seagate, with the Barracuda Green writing the largest annual failure rate at 120%.

Backblaze also uses many Hitachi and Western Digital hard drives in their data center and those have shown a much lower failure rate than their Seagate cousins. Toshiba and Samsung were mentioned as well but there isn't enough data for viable statistics on those brands. But the early numbers for each of these brands are very promising.

Backblaze goes into full detail; listing each drives' average age, annual failure rate and more. You can get the full breakdown on their [blog](#).





Backblaze: Among Its 27,000 Drives, Hitachi Most Reliable

By Barry Levine / NewsFactor Network

PUBLISHED:
JANUARY
22
2 0 1 4

What are the most reliable hard drives? That's a question any computer user might ask, but when you own and heavily use 27,134 of them, as online backup provider Backblaze does, the answer is critical. In recent blog postings, the company has decided to share its findings from the last three years.

The top two brands used in those 27,000-plus drives are Seagate and Hitachi, with nearly 13,000 each, followed by Western Digital with about 2,800. Toshiba and Samsung are in the mix with a few dozen representatives each. One aspect to keep in mind, of course, is that Backblaze is using these drives more heavily than any single consumer or business would.

In a blog post Tuesday on the Backblaze corporate blog, Principal Engineer Brian Beach said the company buys "the least expensive drives that will work," all of which are consumer grade, with sophisticated software maintaining backups in case of failure. He added that, when a new model is released, they buy some and test them with initial

setup tests, a stress test and then a few weeks in production. If it passes those hurdles, the model assumes a position on the buy list, which, when the price is right, triggers a purchase.

'Spend a Bit More'

But, as one might expect, price is not the key factor at that point, since Beach said the company is willing to "spend a bit more" on more reliable drives. Some drives don't work in the Backblaze environment, for various reasons, including the Western Digital Green 3 TB drives and the Seagate LP (for low power) 2 TB drives. The company believes their incompatibility stems from a too-high vibration level in its storage pods, where the drives are housed.

Backblaze said that, "if the price were right, we would be buying nothing but Hitachi drives," because they have been "rock solid," with a low failure rate. The models used include the Hitachi GST Deskstar 7K2000 and 5K3000, and the Deskstar 5K4000 and 7K3000.

The Seagate Barracuda LP 1.5 TB gets praise for having a venerable average age of nearly four years, while larger Seagates in the 2 to 4 TB range are "solid workhorses," but they tend to wear out. The Seagate Barracuda Green 1.5 TB models, however, a warranty replacement for older drives, "are dropping like flies."

Hitachi, Least Trouble

The company said it wishes it had more of the Western Digital Red 3 TB WD30EFRX, although they came out after it already had a number of Seagate 3 TB drives.

In terms of untroubled operation of drives, Hitachi wins hands down, in particular the 3 TB Deskstar 7K3000, with a 0.9 percent failure rate, followed by the Deskstar 5K3000. The brand itself has an average 99.99 percent uptime, followed closely by Seagate at 99.72 and Western Digital at 99.83. Newer purchases are focused on 4 TB drives, notably the Seagate Desktop HDD.15 ST4000DM000 and the Western Digital 3 TB Red WD30EFRX.

Backblaze competes in the consumer-level, cloud-based, low-cost backup market with such services as CrashPlan. But it has also become known for open-sourcing its storage pod design, which it first did in 2009. These self-contained, metal cases with drives inside have had their designs updated by Backblaze several times, which custom-builds them after the company deemed the commercial versions too expensive.

Backblaze Completes 500 Petabyte Data Center

BY [JOHN RATH](#) ON FEBRUARY 5, 2014



Rows of storage units inside the new Backblaze data center in the Sacramento market. (Photo: Backblaze)

Online backup provider **Backblaze** has completed a 500 petabyte data center, at the Sungard Availability facility just outside of Sacramento, California, the company said in a [blog post](#). After out growing its 40 Petabytes of storage in a caged facility in Oakland, the company set out in 2012 to find a new home. After reviewing proposals from all over the nation, Sungard was selected, and the staff went to work installing the company's signature Storage Pods. The data center also has SAS 70 Type II and ISO 9001 certifications and is PCI-DSS compliant.

The Sacramento data center has been quietly receiving customer data, and by September of last year all new customer accounts were being serviced there. Backblaze expects to store 500 petabytes of customer data at the new facility.

The Sacramento data center has been quietly receiving customer data, and by September of last year all new customer accounts were being serviced there. Backblaze expects to store 500 petabytes of customer data at the new facility.

The extremely cost-efficient Backblaze Storage Pod 1.0 caught the interest of many in 2009, and its current [3.0 Pod](#) packs 180 terabytes in a re-designed 4U chassis with many upgraded



components. Having shared their design ideas on the Storage Pod architecture, other companies such as [Netflix](#) were inspired to design their own custom storage appliances. The complete story of Storage Pod 3.0, the architecture, specs, and economics are in [this](#) February 2013 blog post.