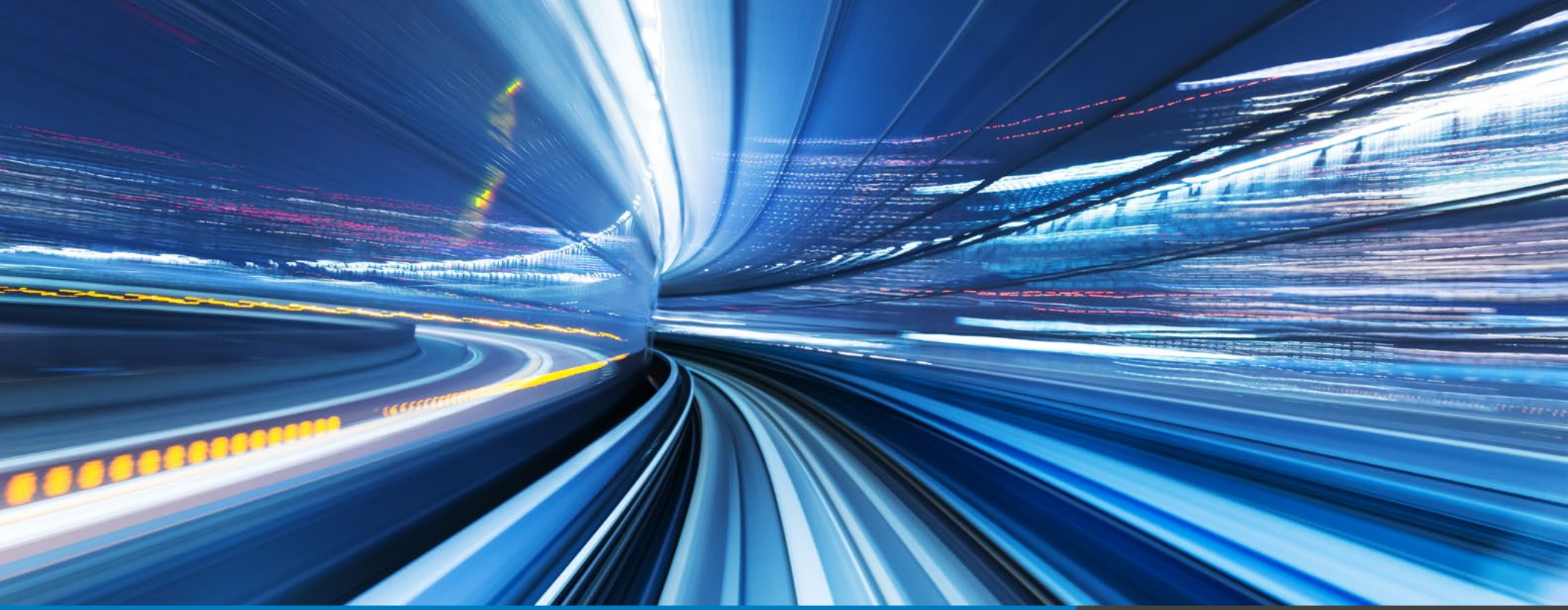

Don’t let flash blind you to the facts.

Solving data storage performance issues with flash alone is not the answer. OpenDrives delivers end-to-end NAS solutions to speed up your production workflow by up to 10 times with a proprietary file system that optimizes flash like no one else.

opendrives

Faster Performance

Most storage vendors have incorporated flash technology into some or all of their storage solutions. The reason for this is that flash helps to create faster performance and increased reliability. Nobody would dispute the assertion that flash is a major innovation for storage vendors to leverage in their product lines. But let's just ask the hard question. Does flash on its own create all the efficiencies and speed boost necessary for a high-performance storage solution? We at OpenDrives don't think so. We believe that many other factors contribute to overall performance, speed, and efficiency. Designing a storage solution from the ground up with an eye toward the efficiencies that flash can bring is more important than just swapping in flash drives and hoping for the best.

High Performance

and value are created by more than flash technology.

Introduction

The introduction of flash-based drive technology was a major leap forward for the overall storage industry. Flash drives achieve a much higher level of performance due to their non-moving parts and lower-latency operational specifications. Flash drives perform read and write operations much faster than their spinning-disk counterparts, so they noticeably speed up many of the functions carried out by operating systems and business applications. In general, flash accelerates overall storage performance.

Storage vendors have been quick to implement flash technology and to tout this aspect of their overall solution architectures, often at the expense of other, equally important architectural factors. They promote their premium flash-based storage solutions—which also carry a premium price tag, by the way—as the be all end all for their business customers who need speed as much or more as capacity or reliability. If you're one of these customers, you might want to pause and take a more circumspect approach to flash and its role in the overall storage solution. You might find that you're being blinded by the glitz of flash and not seeing the overall picture.

The prevailing wisdom in the storage industry is that high-performance solutions need to incorporate flash drives. This assumption is based on the fact that flash drives can perform read and write operations faster than traditional "spinning disk" drives. This feature greatly reduces latency in the overall data storage process. Flash drives also use less power, have a longer shelf life, and decrease maintenance needs in the long run. Given all these benefits, why is it even a question whether to swap out your (slower) HDDs for (faster) SSDs in order to boost performance. It makes perfect sense, doesn't it? Slower storage components slow down the system, while faster ones speed it up, right?

But hold on a minute. You have to consider many other factors when you are trying to assess overall system performance and speed. Saying that you can drop flash drives into a storage solution and then qualify it as a high-performance system is similar to placing a Ferrari engine into a stock compact car and then calling it race-worthy. Sure, the engine generates enormous amounts of horsepower, but speed depends on a lot more than just the engine. And the phrase "race-worthy" is about as subjective and qualitative as "high performance."

Flash drive technology can radically improve overall storage performance, but only when the entire architecture is designed to take advantage the performance gains.

Let's roll with this comparison a bit farther down the road (pun definitely intended). For our souped-up compact car, performance gains start and abruptly stop with the cranking of that high-performance engine. It may put out the horsepower, but can the stock transmission accommodate additional torque? What about the body design—is it light and aerodynamic enough to sustain those speeds while still gripping the road? And what about the tires? Can they handle the much-increased stress at speed, or do they just blow themselves out at the first opportunity? Riding this to its logical conclusion means conceding that, while the engine may be faster, the overall architectural design must be taken into consideration to create a high performing, race-worthy car.

You should consider one other issue in this analogy: cost. If you're willing to spend the money not only for that high-performance engine but also to make all the necessary retrofits, you could conceivably turn that loveable little compact car into greased lightening incarnate. That's probably not the best use of your money, though. If speed and high performance are what you want, you're probably better off building that race car from the ground up, or at least investing in something that was designed at every possible turn to contribute to high performance and to work seamless together. You'd probably spend a lot less in the long run as opposed to the retrofit scenario, where improvements are merely a bolt-on fix.

All these points apply back to storage and the role that flash potentially plays in creating high-performance solutions. Flash drives can perform those read/write operations much faster than HDD drives. However, without other complementary components within the solution that are capable of taking advantage of that speed, the bottleneck just gets moved to somewhere else in the overall storage solution. And this is the problem with the assertion that simply retrofitting flash technology into older storage architectures creates a higher-performing solution. It's simply not true.

The simple realization is that the flash drives alone don't create the performance gains. A fully developed storage solution incorporating flash drive technology needs to factor in the controlling logic and other aspects of the overall architecture. Otherwise, the performance gains are going to fall far short of the potential. Accelerating the other parts of the overall storage solution is paramount.

This is the reason that OpenDrives has obsessively sweated the specific details of our storage solutions. We create our products from the ground up with an eye toward flash technology and the performance gains associated with it. Every part of our storage solution is included to mesh together to facilitate speed, performance, and reliability and take full advantage of flash. This is not the case with many of our competitors. Their architectures potentially extend back prior to the market introduction of flash technology, meaning that it's just a bolt-on for them that the other parts of their solutions aren't optimized to use most efficiently. And we've already talked about how that approach probably works out.

NVMe

Another huge step forward in storage technology is the incorporation of NVMe into solution architectures. NVMe is a specification-based protocol that enables much more efficient data storage on flash-based drives using existing local bus technologies such as PCIe. In essence, it allows for vast performance gains over existing local transport channels by both reducing latency and simultaneously increasing throughput capabilities. NVMe is driving this increased adoption of flash drive technology.

OpenDrives incorporates NVMe into OmniDrive, our media accelerator to ensure the highest performance possible from our storage solutions. With our NVMe-based OmniDrive, multiple concurrent users on a post-production team can collaborate on the same project and project files at the same time, with increased loading performance gains for all users. This type of performance gain would not be possible with just flash drive technology alone. By leveraging NVMe, we can help users achieve load times for project files in just seconds rather than minutes. As a matter of fact, our OpenDrives storage solutions combined with our NVMe-based OmniDrive can speed up post-production workflows up to 10x faster. Our competitors who are just swapping in flash drives without further architectural refinements can't achieve this level of performance gains.

NVMe is not a static technology, either. The base specification has evolved to overcome additional obstacles in distributed storage systems. PCIe as a transport mechanism is ideal for transport in local environments (think within the server environment itself). With distributed storage architectures, PCIe can introduce extreme bottlenecks. To overcome this, forward-thinking vendors are starting to introduce NVMe-oF, or NVMe over Fabric. The emerging NVMe-oF specification extends the benefits of the NVMe protocol (discussed above) to distributed server environments leveraging a variety of transport fabrics and network topologies.

OpenDrives is committed to using the most advanced storage technologies to bring the fastest storage solutions to market. Our Media Accelerator leverages base NVMe to increase workflow throughput and reduce latency. The imminent implementation of NVMe-oF in OpenDrives solutions will continue this forward-leaning trend.

So flash is fine and good, and we've optimized for it within our storage solutions to leverage performance gains. However, our superior performance is not completely predicated and dependent on flash. One significant aspect of our overall architecture, the software platform and operating system, improves performance radically regardless of whether it's flash or traditional HDD componentry installed in the storage system. Our fully integrated operating system was designed around a "memory and flash first" principle, utilizing the fastest memory and flash capabilities before anything else.

Unlike other storage solutions, though, OpenDrives has smart logic embedded within its operating software that privileges memory caching and high-speed secondary caching. This technique increases the effective IOPs (Input/Output Operations) by an order of magnitude. For example, when files are written to the storage, they land in memory first and then are subsequently committed to disk. However, they also stay in memory, so if you're reading the file immediately then you don't have to wait for any HDDs to spin around to get that data back. This response is nearly instantaneous, and the performance gain applies not just to flash-based solutions but to all our solutions.

Similarly, when data is read from disk (either HDD or SSDs), our software puts that data into memory at the moment it's read, and it stays there. That way, if your application requests that data again, it's read directly from the much faster memory cache. Even more than that, OpenDrives uses predictive algorithms to carry out "pre-fetching" of data. When a file sequence is being read, our software preloads the next file into the faster tier so that it's ready even before the requesting application requests it. The operating system is constantly evaluating the files in memory, and as the files you're using become less active over time, they eventually are retired from cache to make room for new pre-fetched data. All of this activity is embedded at the operating system level, is completely transparent to the user, and does not depend on a specific type of drive (flash or HDD). What you get here is automatic acceleration of performance with no effort, with flash and with HDD technology.

OpenDrives has an entire product line meant to address the varying needs of our customers. For our customers in workflow-intensive industries such as media and entertainment, we have all-flash solutions that are faster than any other NAS solution on the market, and still at a economical price point. Other OpenDrives customers have less need for extreme performance in their workflows, so we have hybrid solutions combining flash and HDD technology that achieve an even lower price point, but without sacrificing on performance due to the factors explained above. Our hybrid storage solutions achieve all-flash-like performance due to optimizations throughout the solution architecture. So you don't have to sacrifice performance for cost. But if you need that race car, we got you covered!

In the same way we're encouraging you to ask the tough questions to other vendors, we want you to ask those questions to us! We're always happy to explain how OpenDrives designs our solutions from the ground up with performance, speed, reliability, and economy in mind. We can also provide you with demonstrations of our technology, because nothing works better than showing. Just reach out to us—we're here to help.

OpenDrives designs our solutions from the ground up with performance, speed, reliability, and economy in mind.

“Your fast is too **slow.**”

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