

Solving Data Infrastructure Inefficiency Leads to Manufacturing Quality Improvements

Manufacturers are pushing the limit for greater speed, scale, and efficiency across every operational area. Real-time analytics is an essential catalyst to achieving these goals, but today's data volumes have exposed the inefficiencies of compute and storage in legacy architecture. The CPU is overloaded, and NVMe SSDs are underutilized. This problem is only getting worse with the transition to faster SSDs. A new approach is needed to deliver a more responsive solution at a substantially lower cost.

Challenge

The exponential growth of quality data at a Top 5 IT Equipment Manufacturer put increasing pressure on their server and storage systems hosting MySQL and Redis data services. There was growing demand for user scalability and real-time data analytics, but the system's poor performance was impacting productivity and limited insights for quality control and other critical analytics.

Likewise, the company found itself storage capacity challenged. Application enabled data compression was not yielding expected results and consumed excessive CPU resources. The company also needed to address its sprawling infrastructure resulting from the traditional approach of adding more servers and storage to scale performance and storage capacity.

Solution

The company engaged Pliops to address growing challenges within their data infrastructure. Deploying XDP into their environment saw outstanding performance improvement in relational and in-memory database solutions with the ability to increase its actionable dataset size, support more people using existing infrastructure and eliminate server downtime from SSD failures.

Results

The company's engineering team completed extensive testing in their environment, and the measured results were impressive. For MySQL with Pliops Drive Failure Protection, the team found they could achieve 1.5x higher queries per second (QPS) with a 4.5x reduction in latency. Even with higher overall performance, the QPS per CPU core was reduced by 1.7x, giving the systems more headroom for higher user density.

Storage capacity increased by 3x due to XDP's advanced data management and reduction technologies. In addition, the team found that write amplification was reduced by 8x opening the possibility to use low-cost high-density quad-level cell (QLC) SSDs. Pliops Full Performance Drive Failure Protection improved node-level

Highlights

Pliops XDP delivers increased performance and space savings with higher endurance at lower cost:

MySQL

- 1.5x improvement in QPS
- 4.5x reduction in latency
- 3x higher storage capacity
- 8x lower write amplification

Redis

- DRAM-like performance with SSD economics
- 10:1 server/instance reduction
- 75% lower cost
- Expanded insights from weeks to months



resilience by protecting critical data from multiple drive failures. The engineering team observed XDP's performance was still 1.2x faster than RAID 0, even during a drive rebuild.

While Redis has become a very popular in-memory NoSQL database due to its sub-millisecond latency and high throughput, scaling with DRAM is very expensive. As the company's need for real-time data analysis grows, they wanted to expand their Redis in-memory database environment to support six months of actionable data, up from one week of data. That's a 6TB dataset.

Figure 1 shows that it would take on the current path—ten servers running ten Redis instances, delivering 920K IOPS at ~1ms (four-nines) latency per instance. The substantial cost to do this was not acceptable. Figure 2 shows what a Pliops optimized solution delivers for the same 6TB dataset -- a single server with one Redis instance using NVMe SSDs to expand capacity. With Pliops XDP, they can achieve nearly the same performance with IOPS at 910K and four-nines latency of 1.1ms.

XDP's ability to scale capacity using NVMe SSDs without a performance penalty enabled a 10:1 reduction in footprint, thereby lowering cost by 75%, as shown in Figure 2. Engineering teams can now quickly analyze past data for patterns from a much larger dataset without accessing slower databases. Lastly, eliminating SSD-related server downtime provides users with a better and more predictable experience.

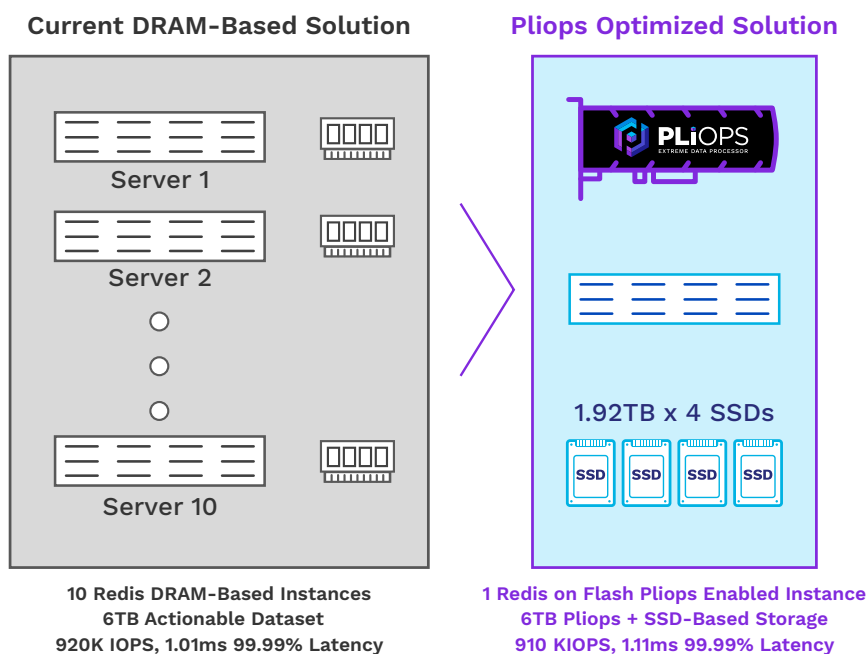


Figure 1: Reduction in Infrastructure Footprint

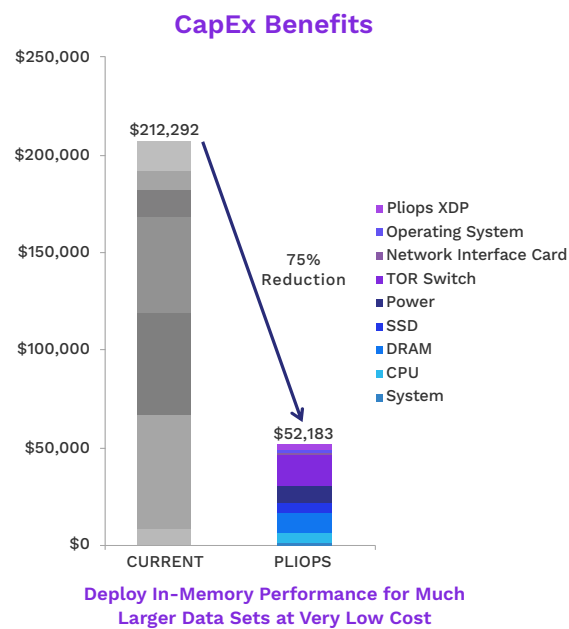


Figure 2: CapEx Savings with Pliops

About Pliops

Pliops multiplies the effectiveness of organizations' infrastructure investments by exponentially increasing datacenter performance, reliability, capacity, and efficiency. Founded in 2017 and named as one of the 10 hottest semiconductor startups by CRN in 2020 and 2021. Pliops global investors include NVIDIA, Intel Capital, SoftBank, Western Digital, KDT, and Xilinx. **Learn more at www.pliops.com.**