

**ORACLE
WORKLOADS
THRIVE ON VIOLIN**

- Faster transactions drive customer satisfaction
- Quicker reports allow real-time business decisions
- Business continuity brings peace of mind
- Predictive analytics allow proactive performance management
- Efficient, consistent high performance isn't a luxury - it's paramount and saves you money

Be a Superhero for your Oracle team with VIOLIN®

It might seem like it would take super powers to meet all the storage requirements of your Oracle infrastructure without breaking your budget. Your Oracle team asks a lot from storage: from consistent high performance for production and analytics workloads, to enterprise data features and management tools, to high reliability and availability, to speeding application deployment and testing and development. VIOLIN can help you be that kind of super hero.

Why Better Business Performance

VIOLIN has been synonymous with consistent, high performance as a pioneer in all-flash arrays, but it's no longer enough to bring only speed to your database team. With VIOLIN, you bring all the data services that an enterprise operation needs with highly granular control. Plus, VIOLIN storage solutions are surprisingly cost-effective, and their high performance can actually save you money by allowing you to do more (more transactions, more reports, rapid time to insight) with less power, less cooling, and even less software license spend.

What Really Matters & What's The Measure

Most database applications are either performing some type of on-line transaction processing (OLTP) —think order entry or general ledger— or they are doing some kind of analytics (i.e., running reports). For OLTP, the lower the latency of any transaction, the quicker the transaction completes. If it's a live customer at the other end, when their request is handled faster, they are happier. If it's an automated trading application, the faster the transaction is handled, the better the price and the higher the profit. So, the speed of those individual transactions can be extremely important. And the sum of all of those transactions impacts your throughput, or in OLTP, your transactions over time. The more transactions you can perform at a time, the more business you can do.

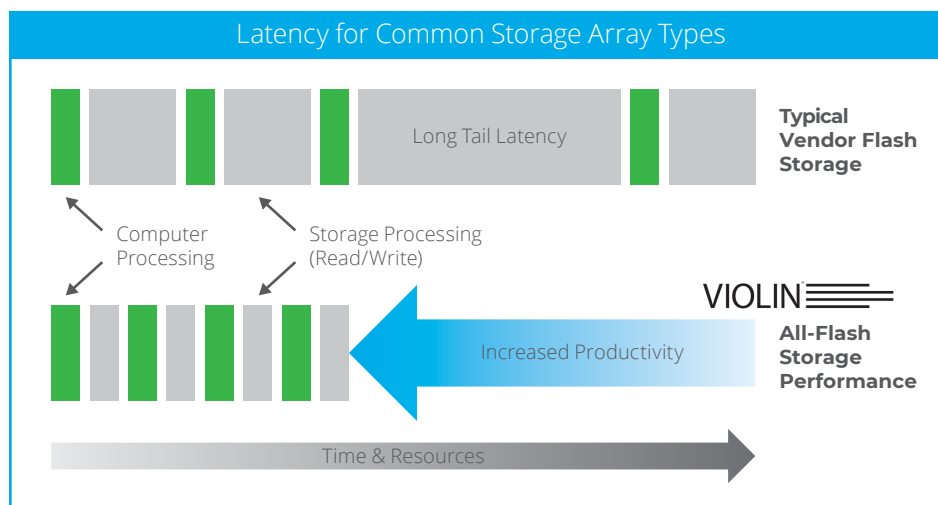
The time needed to read or write data to storage directly impacts database performance. When data is requested, the database engine and the operating systems must read from or write to the storage medium, transfer responses across the network, and copy them into the database memory buffer. The requesting process must wait until this operation is complete before beginning another process.

Consistent Latency for Consistent CX

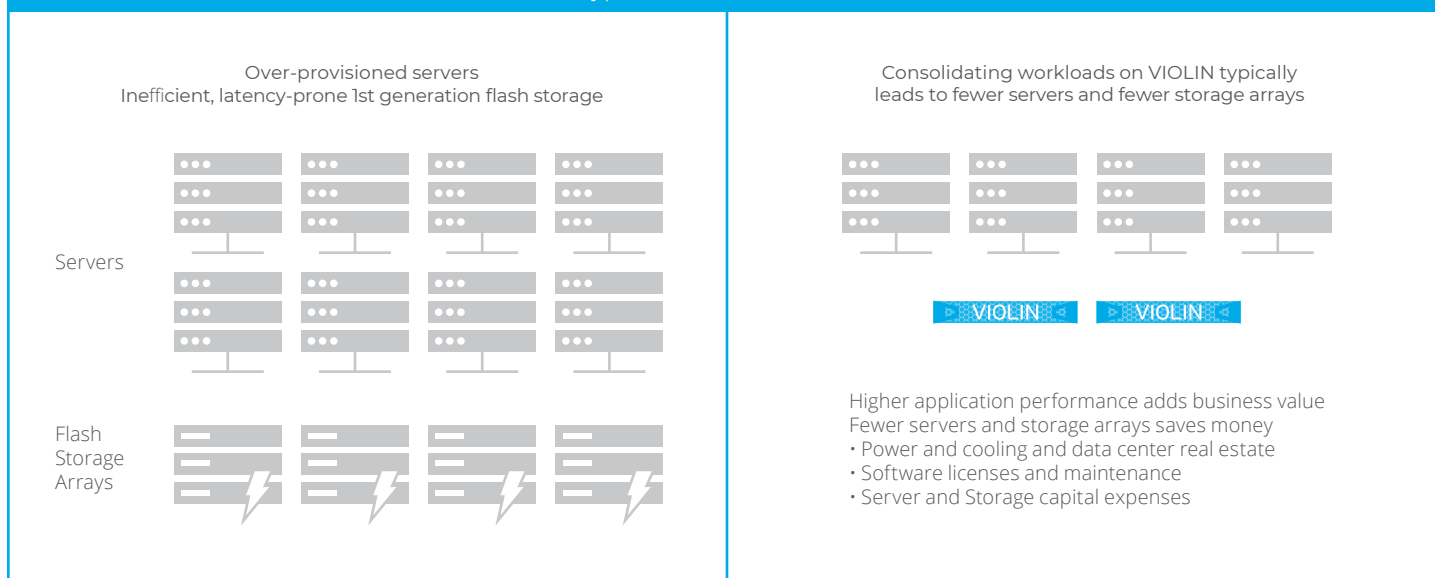
IOPS and latency are usually the numbers vendors advertise. IOPS is the peak number of input/outputs an array can perform in a second. It's a ceiling that you can't really go past. If your applications start asking for more IOPS than your storage can handle, then things start going very wrong. IOPS is an important number for scaling your overall requirements, but it doesn't really tell you how well the storage system will support your Oracle database during normal or peak conditions. That depends on latency. Latency is the total amount of time to perform a single operation. Vendors will usually tell you about their average latency, which isn't as useful as it sounds. Average latency in most flash devices is not a normal distribution with the classic bell-shaped curve, rather there is a surprisingly large amount of very large latencies. These long-tail latencies, as they are called, can have a disproportionate impact on the overall performance of the database and the applications running on it. Most database transactions are made up of several storage operations. Any delays (latency) in one operation will have a cascading effect, delaying the entire database operation. Say you need to read a record. The record will be stored on several blocks in storage. The database will return the record when it has received all of the blocks from storage. If all of the blocks arrive in the expected latency, no problem. But if even one of the blocks is delayed due to flash garbage collection (a typical reason), then the entire database lookup is delayed.

And the compute and write operations that were waiting for that record will also be delayed. It is the cascading nature of database transactions that make inconsistent latency such a problem. That is why VIOLIN focuses on consistent, low-latency. The cascading effect ultimately can negatively affect not only the application the database is supporting, but also the end customer of said application, leading to customer satisfaction issues, escalations and even loss of customers and business.

VIOLIN doesn't deal with long-tail latency by throwing lots of RAM or a complicated caching system at the problem. VIOLIN eliminates long-tail latency at fundamental architectural design level, working around the inherent limitations of the traditional SSD. VIOLIN uses a proprietary virtual RAID technology and their own Flash components to ensure that reads and writes can continue without latency, even while flash management activity (AKA "garbage collection") is taking place. For most all-flash arrays, the SSDs are a "black box", where the array has no option but to wait for the SSD to perform its own internal flash management tasks and reply to the request when it finishes. VIOLIN's solution manages the process inside the Flash components and ensures reads and writes continue even when Flash management activities are taking place. Since operations are delayed by flash management activity, "long-tail" is almost completely eliminated.



Typical Oracle Workloads



VIOLIN Enterprise Data Services

Oracle database infrastructure is the backbone of a business's most important applications. Oracle databases store the data behind your revenue, and your customers, and your costs, and your key business transactions. It also holds important privacy related data (e.g. credit card numbers, and health records). Those applications can't stop working. That data can't get lost or mis-used. And you have to ensure all of those things while still running your applications at higher and higher speeds and with ever smaller teams managing it. This is why you need tried, tested and trusted Enterprise Data Services.

Enterprise Data Services means 'Business Continuity'. VIOLIN provides instant replication of your data onto a secondary array, so the application won't stop in the event of a storage or server failure. It means snapshots that take so little time and make little to zero impact on performance that you can run ridiculously low RTO (Recovery-Time-Objective) and RPO (Recovery Point Objective) targets. And it means that integration technology (for example RESTful API) is in place so that if you want your backup software to tell VIOLIN when to do snapshots or recovery, it can.

Cost Savings, FROM Performance

The idea that you have to pay a lot for high performance is an old idea in Enterprise IT. "Faster, better, cheaper – you can pick two" is the old joke. And it's often true, until you change something fundamental in the system. Flash storage technology was that level of fundamental change. At first flash performance was expensive. But as flash manufacturing technology improved and costs came down, something interesting happened.

"We're also talking about a dramatic decrease in rack space utilization. We were and are landlocked in our three main data centers. There is no more room in the existing footprint. Expanding our data centers is a massive, massive expense, so our ability to deliver the fastest available performance in a smaller footprint was really important."

– CIO, Healthcare Services

People realized that they'd been overprovisioning to get the performance they needed. The overprovisioned storage, short-stroking massive amounts of disks. The overprovisioned servers with tons of CPU and RAM to get around the storage bottleneck. And the heavyweight servers forced a high software license tax as well. So, when that storage bottleneck was removed, more things happened than just the applications speeding up. CPU utilization went up since they weren't sitting around waiting for data. Reporting systems that previously ran all night were finishing early and leaving systems idle. Supplemental application instances were sitting idle because the primary system could now manage the full load. A higher price was paid up front to bring in these early flash storage systems, but users saw the potential to lower their future storage, server, and even software license costs with this new technology.

And now, the same thing is happening again as people start to look at VIOLIN to replace their first-generation all-flash arrays.

VIOLIN customers have seen very specific cost savings in infrastructure. Due to the high performance and consistent low latency of the VIOLIN storage solution, customers are able to consolidate multiple databases onto a single instance. Customers who had been hesitant to run key databases on virtualized systems due to performance concerns have moved to 100% virtualized environments.

Customers have seen system refreshes where rows have become racks, providing huge savings in power and cooling. And when faced with high maintenance renewal fees on older all-flash arrays, some customers are finding it less expensive to swap in a brand-new VIOLIN array instead!

Summary

Under-performing databases lead to lost productivity and can directly hurt the bottom line. Over-provisioned servers, storage systems or inefficient first-generation flash systems take up way too much rack space, costly power and cooling and they can't provide the consistent low latency your applications need. With VIOLIN, you get a non-disruptive installation that provides high performance, consistent latency, the enterprise data services you've come to rely on, and it can save you money overall as well.

Applications speed up, productivity improves, costs go down. You may not get to wear a cape, but by bringing in VIOLIN, you'll definitely be the Oracle team's Superhero....That's Why.

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– Director of IT Operations, Manufacturer

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