



# Neuralytix™

## The Business Value of NVMe



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## Executive Summary

*NVMe is the next generation of flash interconnect. It offers higher speed, and the ability to be connected into a fabric. But all this technology is meaningless unless it offers business value. In this Insight, Neuralytix examines the business value of NVMe. We look at the positive business outcomes NVMe provides, and several real-life use cases where NVMe has been successful.*

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## What is NVMe?

Non-Volatile Memory express (NVMe), is a specification that allows a solid-state drive or SSD to make effective use of a high-speed PCIe bus in a server.

Like SCSI and SATA drives, NVMe is designed to take advantage of the unique properties of pipeline-rich, random access, memory-based storage. The specification also reflects improvements in methods to lower data latency, which is a key element when talking about solid state technology of any kind.

All in all, NVMe is great for increasing performance. This is perfect for all sorts of workloads from traditional enterprise applications such as Oracle Database, Microsoft SQL Server, or SAP ERP systems to VDI as well as Big Data workloads.

With the increasing the availability and affordability of multi-core, multi-socketed servers, this enables the density of applications to increase dramatically, being able to run more workloads per server is a cost saving driver. However, the number of applications on a server also puts tremendous pressure on the I/O subsystem, which has been traditionally a laggard in the IT infrastructure space – potentially increasing wait times and latency.

## PCIe

So, essentially, we take the now ubiquitous PCIe bus, and populate with NVMe SSDs, and what we end up with is better IOPS and throughput, and lower latency and power consumption (since a single SSD consumes a fraction of the power compared to a bunch of magnetic rotating hard disk drives. One single SSD can perform at least an order of magnitude better than a bunch of hard drives).

Not only do SSDs consume less power than hard disks, because a single SSD can replace a bunch of hard disks, this also reduces footprint in the datacenter, helping to reduce the cost of running the datacenter (e.g. real estate costs, cooling, etc.)

So, databases run faster, more data can be transferred at a higher speed (such as for media and entertainment applications), and we can be environmentally friendlier in the datacenter, all with essentially little to no cost difference. This is clearly a win-win-win situation.

Even better is the fact that NVMe is not limited to a single server. We can scale with NVMe.

## Scaling with NVMe/F

NVMe can be run over a network or a fabric, which allows NVMe to scale across multiple nodes. The best thing about scaling is that it is an invest-as-needed approach. Which means that one only needs to buy the amount of NVMe capacity or performance as one needs.

As needs increase, simply increase by the number of storage controllers or storage capacity. This allows for independent scaling of performance, capacity and cost. This makes NVMe over fabric ideal for growing environments, and allows costs to be aligned with corporate growth.

All this technology is great, but what we really need is to understand the business value of NVMe.

One way to think about this is the performance of DRAM merging with the persistence of storage. When we think about memory, we don't think snapshots or remote replication, but we think blazing

fast performance. Bringing these two ideas together results in storage-class memory.

## Use cases for NVMe

Let's look at several use cases to see how NVMe can improve business value.

To start, let's look at VDI. As an increasing number of enterprises deploy VDI, the success of these deployments is often measured by the satisfaction and productivity of the users leveraging VDI sessions. To improve productivity, and to improve the density of the number of VDI sessions per server, the biggest bottleneck for performance and by extension performance, is the underlying storage system.

No matter the number of sessions, the ability to serve up as many I/Os as possible will result in an improvement in the productivity of the users. And when one moves from a physical desktop or laptop to a VDI session, latency becomes critical, since the change from traditional desktop/laptop to VDI should be completely seamless. For the user, there should be no change in the experience. If VDI sessions become latent, then users start to complain.

NVMe will help reduce the latency associated with VDI, giving users a better and more productive session. Additionally, an NVMe based storage system can act as additional virtual memory allowing more VDI sessions to be hosted on a single physical server while maintaining performance.

Another use case are business applications – this includes traditional business applications such as ERP systems, for example, SAP. It also includes ecommerce platforms for transacting over the web. By improving the performance of these systems, more transactions can be performed. This turns into optimized supply chain operations, reduced latency for the buyer, which leads to a better web buying experience, that ultimately leads to increases in revenue.

All these business applications typically run on databases such as Oracle and SQL server. The faster the databases can run, the more transactions that can

be processed. Processing more transactions means quicker results and in many cases *better* results.

This is especially true when thinking about analytics. The ability to do more analytics as quickly as possible, and fail and succeed as quickly as possible, will lead to improve competitiveness.

These use cases are not unique to any industry or vertical. But in every case, NVMe can improve not only the performance of the IT infrastructure, but the resulting business metric that goes along with it.

In today's world, many businesses are already exploring the opportunities afforded by globalization and the Internet of Things (IoT). IoT generates an ocean of data points that can number in the billions and trillions. The ability to process IoT data is not only a function of the amount of compute power is available, but more specifically how quickly we can collect, and feed the CPUs with data. The high-performance nature of solid state disks augmented with the low latency of NVMe means that we can leverage the knowledge we gain from IoT to improve an enterprise's ability to compete and respond to the changing needs of the business and its customers.

## Use Case Examples

### Life Sciences

NVMe performance can help pharmaceutical companies model their research faster. This means more calculations in a shorter amount of time. The result is simple – faster time to market, an opportunity to cure more diseases, quicker!

But the only way they can do this is to collect and process massive amounts of data. Storing and parsing through that data requires storage and fast reads and writes. NVMe's efficiency pushes the envelope on performance.

Compared to using traditional disk based technology, life sciences companies can take processing of sequencing and modeling from days to hours just by converting to flash. With NVMe, Neuralytix expects to see this move from hours to minutes.

This exponential improvement in performance has other ramifications too. It essentially allows organizations to *fail fast, fail often*; a principle that allows organizations to test more and more hypotheses to optimize their ability to innovate.

### Retail

You walk into your local supermarket. The scanners at the entrance reads your RFID enabled loyalty card, and advises you through your mobile phone that there are specials that are personalized for you.

These could be tailored to your ethnicity, frequency of purchase, and even the likelihood of you running out of a particular item in your pantry.

Next generation stores will be able to understand the items you pick, and determine the type of recipe you might be cooking and help direct you to better choices or variations on the recipes that you can try.

All this requires the correlation of multiple datasets from transactional databases, IoT sensors, and predictive analytics. And, in order to achieve the real-time analytics, performance is key, which in terms drives organizations to investing in flash, and ultimately in NVMe.

## Guidance and Conclusion

With NVMe, we can improve productivity, increase revenue, be more competitive, and transact more. This gives us the ability to respond better, and increase our competitiveness in the market.

Additionally, NVMe and NVMe over fabric allows us to scale in a pay-as-you-grow model.

All of this results in an enterprise's ability to lower initial capital expenditure, lower the ongoing operational expenses (which by the way, means a lower TCO), while significantly accelerating the business' applications.

And, at the same time, provide new opportunities for revenue growth, improve time to market to gain a competitive advantage.