IBM Power Systems rapid cold start for SAP HANA

The IBM NVMe adapter helps SAP HANA systems load data quickly for better business results

Highlights

- Execute SAP HANA cold starts 4.6x faster than typical flash storage systems
- Increase business agility by moving your SAP HANA instance from development to test and from test to production with limited interruptions
- Perform scheduled maintenance and upgrades with the least amount of business disruption possible and improved quality of service levels

In today's business world, with data continuing to pour into IT systems in unprecedented amounts, being able to capture and act on that data quickly plays an important role in determining the overall success of an organization. SAP HANA is one solution that is helping organizations across the globe stay closer to their data. As an in-memory database, SAP HANA removes the need to access data on external storage systems, and therefore greatly reduces latency.

While the inherent benefits of the SAP HANA system are clear, organizations can only take advantage of these benefits when the system is up and running properly. Since SAP HANA is often used for mission-critical applications, it's especially important to support it with a highly available and resilient platform such as IBM® Power Systems™.

Even if you take the appropriate precautions, there are certain instances in which having to restart your SAP HANA instance is unavoidable. For this reason, having a platform that can execute rapid cold starts—loading data back into SAP HANA as quickly as possible—can lead to a number of important business benefits.

Fortunately, Power Systems can help SAP HANA users in this regard as well. Thanks to the IBM Non-Volatile Memory Express (NVMe) adapter, Power Systems is able to provide significantly faster cold starts in the aftermath of an SAP HANA upgrade or limited interruption.

About the IBM NVMe adapter

NVM Express is an optimized, high-performance host controller interface designed to help organizations that are running Peripheral Component Interconnect Express (PCIe) solid-state storage. The IBM NVMe adapter was developed to bring this groundbreaking technology to Power Systems servers.

When compared with older interface options such as Serial ATA or Serial Attached SCSI, NVMe is able to offer much higher bandwidth, more input/output operations per second (IOPs), and significantly lower latency. In addition, NVMe is efficient, streamlined, and scalable, making it the perfect option to support modernized storage stacks based on next-generation non-volatile memory technology.

Performance results

A recent IBM performance test demonstrated the speed of cold starts with the NVMe adapter in quantifiable terms. The test compared two different storage configurations: the first being an NVMe setup with 10 NVMe adapters, and the second a traditional midrange flash storage setup (See Figure 1).

The two systems were compared based on how long it took them to load 95 percent of the data in a two-terabyte SAP HANA database after a cold start. The standard midrange flash setup took 690 seconds to complete the test, while the IBM NVMe setup was able to accomplish the same goal in only 150 seconds. Based on the results of the test, the addition of the NVMe adapters helped SAP HANA execute the cold start 4.6x faster.

These results are illustrated in Figure 2, which plots the rate of I/O over time for both of the systems studied in the performance test.

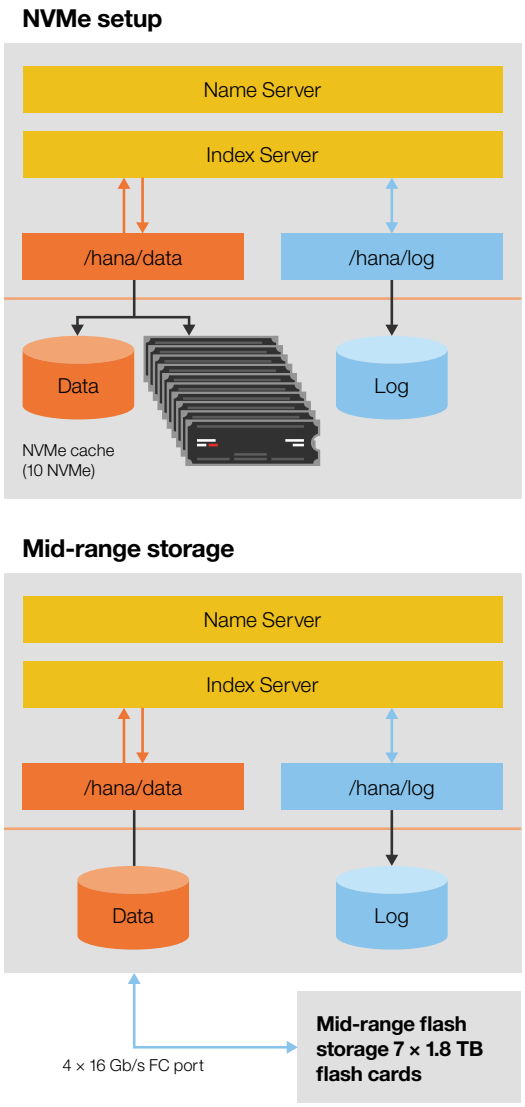

Figure 1: IBM NVMe setup versus midrange flash storage setup

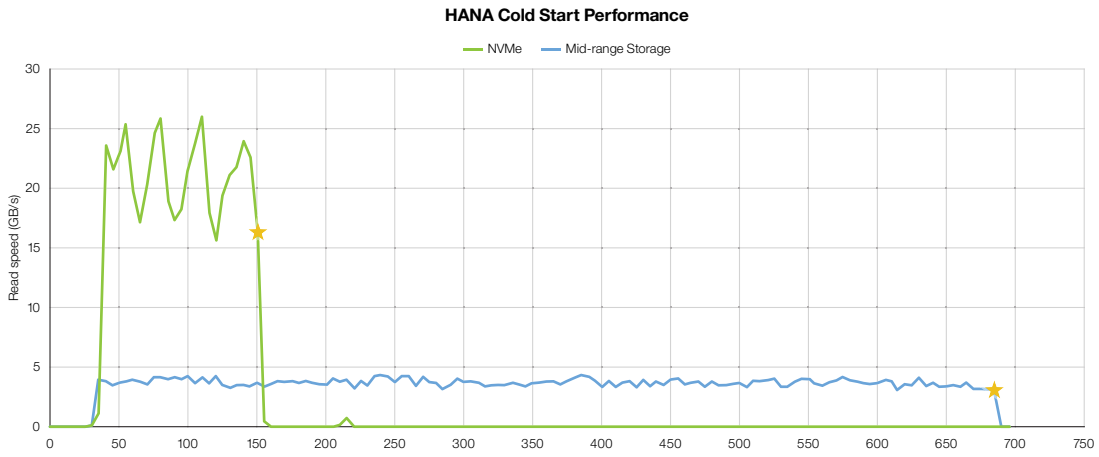

Figure 2: IBM NVMe setup I/O versus typical midrange storage over time

As a result of the faster cold starts demonstrated in this performance test, the IBM NVMe adapter is able to help organizations enjoy better business results in two main use cases:

- Planned maintenance and upgrades
- Moving from development to testing to production quickly

Planned maintenance and upgrades

Performing maintenance and upgrades is an important part of keeping any database system running to its full potential. Unfortunately, these tasks also require the system to restart completely. In the case of SAP HANA, this means that all data must be reloaded into the system from a cold start. The longer the cold start takes to complete, the less productive the organization will be.

While these kinds of outages are unavoidable, IBM Power Systems with the NVMe adapter can help make them as brief as possible. By executing cold starts significantly quicker than traditional flash storage systems, the IBM NVMe adapter helps organizations balance their need to perform regular updates with their need to keep SAP HANA running at a high quality of service (QoS) as often as possible.

Moving to production faster

Every time you move your SAP HANA database from one environment to another—whether it's moving from development to testing, or from testing to production—you will experience some lost productivity as SAP HANA loads data back into memory. This provides another example of how executing cold starts is an unavoidable part of operating an SAP HANA database, and why being able to execute these cold starts quickly can lead to quantifiably better results.

In order to ensure business agility and productivity, organizations must move their SAP HANA environments into production as quickly as possible. The performance testing of the NVMe setup mentioned above proves how important rapid cold starts are to meeting this goal. An organization running the same database environment from that test would experience a productivity boost of almost 80 percent every time it reloads data. Assuming most organizations have to reload data on a regular basis, it's easy to understand how quickly the productivity benefits of the NVMe setup can accumulate.

Higher bandwidth

The IBM NVMe adapter's ability to execute rapid cold starts for SAP HANA databases can primarily be traced to the high levels of bandwidth it offers. The read bandwidth of an individual NVMe device is about 3.0 GB/s, and this bandwidth can scale linearly as data is striped across multiple NVMe devices. This makes it very easy for organizations to plan ahead for SAP HANA outages by creating a level of bandwidth that is appropriate for the size of their database.

During a cold start, the length of time it takes to load data and achieve a high QoS is dependent both on the size of the database and the level of bandwidth the storage system provides. As a result, the larger a database is, the more it can benefit from NVMe's high bandwidth and linear scalability.

In addition, SAP HANA users can take advantage of the bandwidth benefits of the NVMe adapter in parallel with their existing traditional storage environment. This allows users to capitalize on high-end storage for the data that can benefit the most from that storage, while also using the storage they already have for other types of data. Combining the two into a single integrated storage platform helps IBM Power Systems users experience a unique blend of better performance and lower total cost of ownership.

In an era when even milliseconds of interruption can have a tremendous effect on business results, the fact that IBM NVMe can perform SAP HANA cold starts hundreds of seconds faster than other systems speaks volumes about its potential to deliver better business results. These rapid cold starts provide yet another indication of why IBM Power Systems is the ideal platform to support SAP HANA environments, alongside its built-in flexibility, reliability and performance benefits.

For more information

To learn more about IBM Power Systems for SAP HANA, contact your IBM representative or IBM Business Partner, or visit the following website: ibm.com/power/hana.

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