SAP HANA Tailored Datacenter Integration Phase 5

Enabling greater efficiency and flexibility for IBM Power Systems clients

Contents

For years now, deploying SAP HANA as a Tailored Datacenter Integration (TDI) rather than deploying as an appliance has given users the opportunity to maximize flexibility, openness and efficiency in their SAP HANA environments. The announcement of SAP HANA TDI Phase 5 at the SAP TechEd conference in September 2017 marks the start of a new era in TDI.

The most crucial difference between Phase 5 and previous iterations of SAP HANA TDI is that the new deployment approach allows for client workload-driven sizing based on the SAP Application Performance Standard (SAPS). In the past, SAP placed strict core-to-memory ratio requirements on all SAP HANA environments. In effect, this meant that the number of cores you used in your SAP HANA environment was directly correlated to the size of your source database.

At the time these requirements first went into effect, they made perfect sense from the SAP perspective: not much was known about the loads clients were likely to experience, and SAP still hoped to provide direct access to analytics capabilities for all client employees. Since then, it's become clear that the actual CPU loads clients experience are almost always lower than the ratios set by SAP would have predicted.

For SAP HANA users, this was like owning a super-fast sports car, but not being able to take it above fourth gear: the results were good, but not nearly as good as they could have been. Clients were often stuck running many more cores than they actually needed, with typical utilization rates of 25 percent or lower. In turn, this kept hardware costs higher than they needed to be, and robbed SAP HANA users of the flexibility to build an infrastructure designed with their own unique needs in mind.

The core-to-memory ratio requirements affected SAP partners such as IBM as well. If we wanted to build more power or flexibility into our infrastructure solutions for SAP HANA, we would need to ensure those solutions were built according to the limitations created by the ratio. While we were still able to offer our clients solutions that helped deliver great results for SAP HANA, we knew the potential to do more existed.

That's why the announcement of TDI Phase 5 is so exciting, both for us and for our IBM® Power Systems™ clients. For the first time, SAP HANA users will be able to customize the amount of memory and number of cores they use in their systems, based on the memory capacity of their SAP HANA database.

Instead of having to constrain their systems to a specific core-to-memory ratio, clients now need only to keep each SAP HANA instance under a particular size. They can accomplish this by getting an SAP HANA sizing report, and sharing the results with their chosen hardware partner. The partner would then work with the client to jointly determine how many cores and how much memory would be optimal for their SAP HANA workload. In short, SAP HANA clients are finally able to throw things into fifth gear for the first time, and the potential to drive higher utilization and lower costs is clear.

A look at TDI Phase 5 in action

To build a deeper understanding of what the TDI Phase 5 announcement means, let's look at some examples.

Suppose you have two production workloads, one SAP BW/4HANA and one SAP S/4HANA, which require 4TB and 3TB of memory respectively. For each workload, you'll need high availability, development, testing, sandbox and QA capabilities.

Prior to the announcement of TDI Phase 5, the 4TB BW system would have required roughly 82 cores, due to the 50GB/core ratio requirement SAP set for BW environments. The 3TB S/4 workload would have been subject to the 96GB/core ratio previously in place for S/4 instances, and would therefore have required roughly 33 cores. If you include HA and non-production, you might end up with a system similar to the one shown in Figure 1.

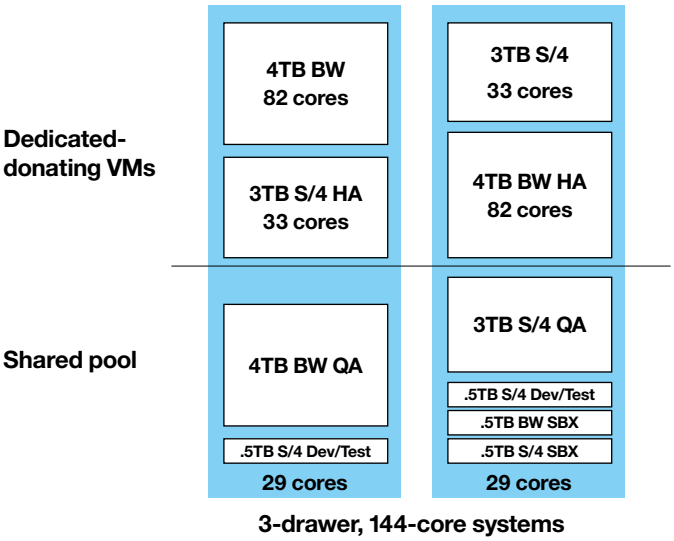

Figure 1:Typical TDI Phase 4 infrastructure

In this example, you would end up with a relatively small number of cores available in the shared pool. Some clients in this situation might elect to use an even larger system or deploy additional systems to help create a larger shared pool.

By contrast, the new SAPS-based sizing would allow you to handle the same workloads using fewer cores: potentially as few as 70 cores for the BW workload and 21 for the S/4 workload. (These numbers are both estimates based on early sizing examples. Further analysis would be needed to determine actual core requirements.)

Figure 2 shows what the smaller TDI Phase 5 infrastructure might look like.

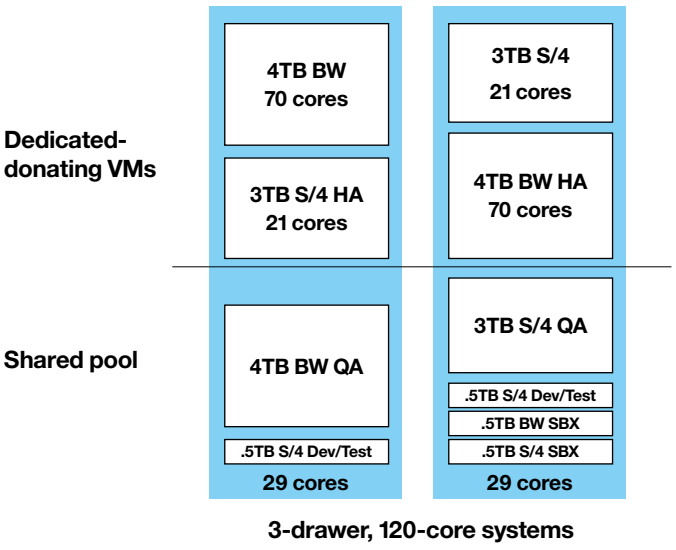

Figure 2: Typical TDI Phase 5 infrastructure

This example shows how the new TDI Phase 5 announcement could help you cut costs by running 24 fewer cores per system. However, it is up to the client and their chosen hardware partner to determine the number of cores required to support their unique workloads. It is entirely possible that some clients might be able to support the workloads discussed here while running even fewer cores than shown in the example.

Choosing the right hardware technology can help maximize the benefits of TDI Phase 5

While support for TDI Phase 5 is universal across all certified SAP HANA hardware partners, not all hardware technology will derive equal benefits from the changes the new standards represent. Simply put, TDI Phase 5 is not that big of a deal for most organizations that run x86 hardware technology.

To start with, there's the obvious issue that many x86 vendors focus on deploying SAP HANA as an application, and therefore wouldn't be doing TDI in the first place. For the majority of x86 users, what they can and can't do with TDI will be of no concern whatsoever.

Even for x86 users who do deploy SAP HANA using TDI, the benefits of Phase 5 will be limited. While it is possible for x86 users to reduce core requirements in a manner similar to the example we looked at previously, they would also need to use VMware in order to do so. This is potentially problematic for a number of reasons.

Limitations of VMware when applied for TDI Phase 5

First, VMware is incapable of running multiple production VMs on a single socket, due to SAP requirements that mandate socket isolation in situations where any HANA VM must be larger than half a socket. This means that the simple act of reducing core requirements for VMware environments does not necessarily mean that a client will be able to utilize fewer sockets. VMware users would likely find themselves forced to continue running underutilized cores to support all their VM instances, which would contribute to significantly lower system utilization, as well as higher costs.

In addition, VMware can't mix production and non-production VMs in the same socket. This is both because SAP doesn't allow it, and because most clients would be reluctant to try this mode of operation even if it were allowed. Clients recognize it's not a good idea to run production workloads on VMware due to the following limitations:

- Capacity restrictions (14 percent of CPU capacity must remain empty for OLAP workloads[1])
- Performance penalties (degradation of 12 percent or more, when compared to bare metal[2])
- Security holes (118 identified vulnerabilities for VMware ESX, and 69 for VMware vSphere[3])

Separating out production on bare metal and non-production on VMware would generally be the preferable option. The result is that unused capacity within the VMware environment will continue to go unused. This represents yet another missed opportunity for x86 users to benefit from TDI Phase 5.

We can see the potential issues with the 12 percent performance penalty by returning once again to our example of a system running 70 cores for BW and 21 cores for S/4. If we were to consider that as a VMware environment rather than a bare metal one, we could expect for that system to perform as though it were only 61 cores and 18 cores, best-case scenario. This means that the core requirements of VMware systems will be even higher than they appear to be on paper.

Finally, all VMware clients must be aware of the strict capacity and performance limitations that are inherent in their systems. For instance, if the maximum memory in a VM is 4TB, the BW instance in our example environment would not be able to grow at all without exceeding the available capacity. In addition, clients would be required to carefully test the I/O throughput of their system in order to ensure it can deliver load times, log writes, save points, snapshots and backup speeds that are acceptable to the business.

For all the reasons named here, VMware clients most likely won't notice much of a difference between the way they currently run SAP HANA on TDI, and how they will in the aftermath of the TDI Phase 5 announcement.

Power Systems is the ideal environment to benefit from TDI Phase 5

In contrast to the limitations of running TDI Phase 5 on x86, IBM Power Systems is uniquely positioned to offer new benefits to its users.

While most x86 clients have traditionally deployed SAP HANA as an appliance, SAP HANA on Power Systems has never been offered as an appliance. This means that getting maximum flexibility and efficiency from their TDI deployments has always been a priority for Power Systems clients. For many of these clients, a utilization rate of 25 percent or lower just wasn't good enough. As a result, the Phase 5 TDI announcement should be music to their ears.

IBM's virtualization offering, IBM PowerVM®, provides a number of benefits when compared to VMware. For one, it does allow multiple production workloads on the same system—up to eight per system, in fact.

In addition, PowerVM allows users to mix and match by running up to seven production SAP HANA workloads alongside a shared pool of CPU resources to support non-production workloads. There's almost no limit to what kinds of other workloads could run within the shared pool, including production or non-production SAP Application Servers, QA, dev/test, non-SAP HANA production database servers, non-SAP workloads, and even workloads from other OSs, such as IBM AIX® or IBM i.

This capability has existed in PowerVM for a while now, and although it helped increase utilization some, it was never really the game changer it could have been. That all changed with the announcement of TDI Phase 5. Now, the only limitations placed on Power Systems clients as they aim to maximize consolidation and increase utilization are their own sizing requirements and the response time agreements they've made with their end users.

With their newfound freedom to experiment with different configurations, Power Systems users stand to gain immensely. If we think back once again to our example configuration from earlier in the document, we can see what might happen if a Power Systems client goes beyond the basic TDI Phase 5 arrangement we looked at (70 cores for BW, 21 cores for S/4, and 29 cores for the shared pool) to further consolidate cores and increase utilization.

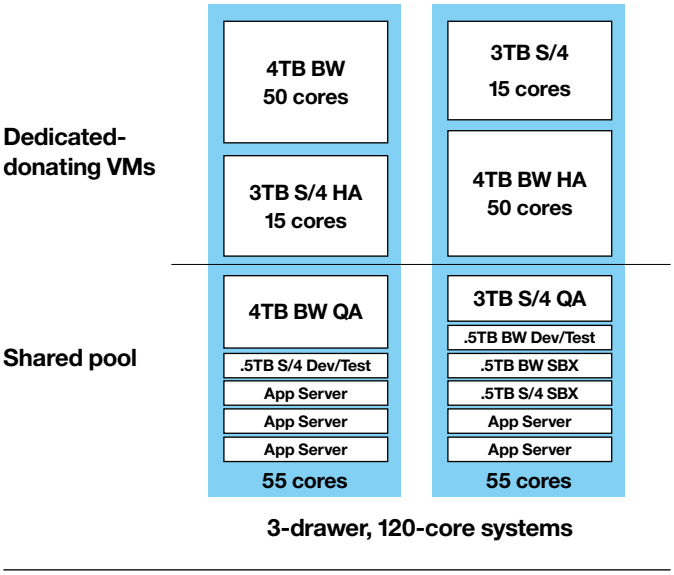

Figure 3: Hypothetical consolidated TDI Phase 5 environment

In Figure 3, we can see how the client in this example has nearly doubled the size of their shared pool (55 cores instead of 29), without affecting the size of the overall system. Since PowerVM allows them to consolidate numerous non-production workloads in the shared pool, a larger shared pool logically means more opportunity to drive efficiency.

When the capacity benefits of Power Systems for TDI Phase 5 allow users to run application servers and DB servers on the same system, as shown in the example, it can help drive down latency significantly. This is because it cuts down on the need for the small, yet very latency-heavy accesses that must be made between the two servers when they reside on different systems. This is a key factor in allowing users to get the high performance they need to be successful with SAP HANA.

"Our priority was increasing speed with new functions and faster cloud deployment. IBM POWER8 gives us much more flexibility to meet our priority, while allowing our clients a way to self-deploy."

— Eric Thorwirth, Senior Manager, Server Services, Bosch

IBM Power Systems for TDI Phase 5 supports lower total cost of ownership

By handling the same workloads using fewer cores, Power Systems clients will spend less on management, energy and floor space for their server environments. In addition, clients will save on the cost of software licenses for all support programs that are licensed on a per-core basis.

Consolidation also helps clients maintain higher availability in their server environments, as fewer components in the system logically means less potential for things to go wrong. This translates to lower costs by keeping unproductive downtime—and thus, wasted resources—to a minimum. It also removes the need for expensive and time-consuming repairs to bring failed systems back online.

For all these reasons and more, a consolidated Power Systems environment that takes full advantage of TDI Phase 5 can offer a significantly lower total cost of ownership than any x86 environment could. We're also proud to document those savings by performing a free assessment of your current server environment. This assessment will show how much you could save by running fewer cores for the same workload. Contact your IBM representative or IBM Business Partner to schedule your assessment.

Why IBM Power Systems for TDI Phase 5

Whether you're a new Power Systems client or an existing one, taking advantage of TDI Phase 5 is like adding new systems capacity at no additional cost. If you want to look like a genius in front of your CFO, Power Systems with TDI Phase 5 is a great way to do it. Best of all, you can take advantage of these new consolidation capabilities while continuing to enjoy the performance, reliability and scalability that Power Systems servers have always been known for.

In addition, working with IBM for your SAP HANA needs allows you to take advantage of our deep and proven partnership with SAP. Both companies recognize that in the modern era of computing, partnerships and strong technology ecosystems are essential to innovation that creates higher value for clients. IBM maintains a close relationship with SAP's technical and business teams. This collaboration continues to drive interoperability, optimization and innovation, allowing our joint clients to grow and thrive.

For more information

To learn more about IBM Power Systems solutions for SAP applications, contact your IBM representative or IBM Business Partner, or visit ibm.com/power/saphana.

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[1] SAP Note 2393917—SAP HANA on VMware vSphere 6.5 in production

[2] SAP Note 1995460—Single SAP HANA VM on VMware vSphere in production

[3] National Vulnerability Database, http://nvd.nist.gov/home.cfm.

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