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Problem Solved.

Modern Data Centers Need 10GbE

Solve the problem of complex, costly legacy infrastructures with an upgrade to 10GbE and unlock 350% more VMs.[1]

intel inside™ XEON®

Table of Contents

Organizations are looking to deploy new hybrid and private cloud service models, but legacy infrastructure that is four years old or more simply can't handle the performance demands of modern business tools. The time is now for a refresh cycle and IT managers are looking for the right combination of hardware and software upgrades to get the performance they need, while also meeting tight budget constraints. However, the problem of legacy hardware can't be solved by one server product alone.

Investing Where it Matters Most

Data center budgets are tied up in operating expenditures such as energy, cooling, maintenance, and support costs. Something to consider is that legacy hardware plays into a downward spiral of cost: as workload demands become heavier, servers are gobbling up more energy just to keep up. This only increases the budgetary drain, which in turn makes it difficult to free up capital for new investments.

To combat this, IT managers may consider upgrading their configurations one piece at a time to help save on cost while alleviating performance woes. However, this can lead to new hurdles in the form of data bottlenecks elsewhere in the platform.

Paving the Way

In a 2013 report, Principled Technologies set out to test just how effective a piecemeal upgrade strategy could be. They started with a baseline configuration using components that were four years old, and then replaced the processor and operating system, hard drive, and network adapter, one after the other. In between each upgrade, they measured server performance to isolate the effect of each new component.

Not surprisingly, the results showed that the server performed best when all of the products were upgraded at once. These were not just incremental gains in performance, either. The fully upgraded platform was able to support 350% more virtual machines (VMs) and mailbox users, in addition to lowering network latency.[1]

Now we will examine the results in depth to find out why a consolidated upgrade strategy is the best strategy for a server refresh, and to demonstrate how the only thing that works better than an Intel® server product is a host of Intel® server products working together.

Upgrade Strategy: Processor and Operating System

After upgrading the processor and operating system to the Intel® Xeon® processor E5-2600 product family and Windows Server* 2012, server performance increased by 230%.[1] The baseline configuration was only able to support eight VMs, but the upgraded configuration could support 18. The number of supported mailbox users increased as well, from 2,000 to 4,500.[1]

Now, the bad news: processor utilization – that is, how much of the processor's computing power is being utilized on average by the server at any given time – dropped from 60% down to 37%.[1] This means that the new processor was only being used at two-thirds of its optimal level, while one-third went to waste.

Under ideal circumstances, processor utilization should float around 60%, which allows some headroom for workload spikes. Running at lower than 60% indicates the presence of I/O bottlenecks that are slowing the system down. For the IT manager, this also means they're not getting the full value out of their hardware investment.

Dollar for dollar, we want to maximize the value we get out of hardware investments, especially where budget is a top priority. This is why upgrading just the processor and the operating system falls short: one-third less utilization means that one-third of the capital investment also goes to waste.

Upgrade Strategy: Solid-State Drive

To address bottlenecks in the storage layer, the best solution is to replace aging hard disk drives (HDDs) with the Intel® Solid-State Drive DC S3700 Series. This Solid-State Drive (SSD) was designed exclusively to handle data center workloads, with end-to-end data protection, exceptional reliability and uptime, and read/write speeds that are on a magnitude of several thousand times greater than a typical HDD.[2]

In conjunction with the upgraded processor and OS, the new SSD increased the number of VMs supported from eight to 24, or a 300% increase.[1] Similarly, mailbox users supported grew from 2,000 to 6,000.[1]

The SSDs add bonus efficiency on top of these gains. Compared to spinning disk drives, SSDs use up to 16 times less energy and generate one-third less heat, which translates into lower energy bills and lower cooling costs.[3,4]

Upgrade Strategy: 10 Gigabit Ethernet

Even with the storage upgrade, processor utilization was still capped at 50%.[1] The final bottleneck was in the storage network. By upgrading from 1 Gigabit to 10 Gigabit Ethernet using the Intel® Ethernet Converged Network Adapter X520, the configuration was able to boost density to its highest level.

Total VMs supported went up, from eight in the legacy configuration to 28 in the upgraded configuration. That's a 50% additional increase on top of what was gained with the upgraded processor, OS, and SSD, for a grand total of 350% more VMs.[1]

With most of the bottlenecks removed, the processor was able to reach a veritable "sweet spot" of up to 62% utilization.[1] This level of utilization means businesses that deploy this combined solution will derive the maximum benefit out of their hardware investments, while still having room to take on workload spikes and accommodate growth.

Faster, More Responsive Networks

In addition to supporting more bandwidth and more users, these upgrades also helped reduce latency. In the legacy configuration, average Microsoft Exchange* latency was approximately 12ms, or twelve milliseconds from the time a packet or "request" was sent to the server and then responded to.[1] After upgrading the processor, OS, and the hard drive, latency dropped by approximately 33%, going down to 8ms.[1]

But when the Intel® Ethernet Converged Network Adapter X520 Series was added in, latency dropped by 87%, from 12ms to 1.6ms.[1] And this was while supporting 5,000 additional mailbox users.[1] An 87% drop in latency means that employees aren't left waiting for their inboxes to update. They can access their email and download important attachments much faster, enabling greater productivity throughout the workday.

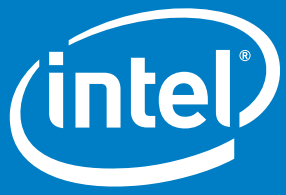
The Total Package

When it comes to a server refresh, the right upgrade plan can make a big difference. A configuration that addresses key bottlenecks with upgrades to processor, storage, and network will help ensure that budgets are being used in the most effective way possible, rather than succumbing to the hidden costs or productivity drains created by underutilization.

When upgraded together, Intel® server products empower data centers to achieve higher performance levels, create denser platforms, and consolidate more workloads, which translates into a more positive impact on the bottom line.

Help your customers plan and deploy a 10GbE solution today. Intel® Ethernet. It just works.

Learn more at www.intel.com/go/10gbe



Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance

1. See whitepaper for full configuration details. Source: "Increase Density and Performance with Upgrades from Intel and Microsoft." Principled Technologies, 2013. www.intel.com/server_game

2. "Consistently Amazing." Intel, 2012. http://www.intel.com/content/dam/www/public/us/en/documents/product-briefs/ssd-dc-s3700-brief.pdf

3. Comparison basis: Intel® SSD DC S3700 Series uses .65 watts at idle compared to 11 watts used by Seagate Cheetah 15K.7*. IOPS comparison based on publicly available IOPS measurements of Intel SSD DC S3700 series drives and Seagate Cheetah 15K.7*. Source: "Tame Data Center Challenges with Intel SSDs and Symantec Software." Intel and Symantec, 2013. https://intel.symantec.com/system/files/Managed%20Performance%20SB%20Final.pdf

4. "Accelerating Data Center Workloads with Solid-State Drives," Intel, 2012.
http://www.intel.com/content/dam/www/public/us/en/documents/best-practices/accelerating-data-center-workloads-with-ssd.pdf