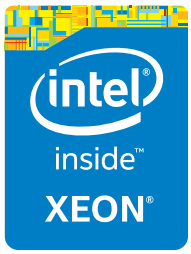
Intel® Solutions
Reference Architecture

Simplified Microsoft Exchange* Deployments Using Maxta Hyper-converged Solutions



Intel® Xeon® Processor E5-2600 v3 Product Family

maxta

Abstract

This whitepaper describes a simplified and cost-effective way of deploying Microsoft Exchange solution in a mid-range IT organization.

Audience

This solution reference architecture is intended to assist IT decision makers in deploying a simplified and cost effective Microsoft Exchange solution, by implementing a hyper-converged storage solution that showcases improved application level performance achieved by running MxSP, Maxta Storage Platform, on the Intel® Xeon® processor E5-2600 V3 platform with Intel® Data Center PCIe (NVMe) SSDs, and the Intel® Ethernet Converged Network Adapter.

Executive Summary

One of the key challenges with designing larger Microsoft Exchange environments is making the right hardware choices that provide the best value over the anticipated life of the solution, while simplifying storage management, and providing the ability to scale on demand. This solution utilizes a hyper-converged architecture, on the Intel Xeon E5-2600 v3 platform, with Intel Data Center SSD P3700, a PCIe (NVMe) SSD with excellent low latency performance characteristics that meet Exchange requirements. Additionally, the solution leverages the Intel 10 gigabit Ethernet Converged Network Adapter to provide improved network performance with lower power consumption. The software-only implementation of MxSP is architected to support any hypervisor, any IA based server, and any storage device.

January 2015

Table of Contents

Introduction

Hyper-converged storage platforms are disrupting traditional storage architectures (SAN & NAS) in the enterprise storage market. Enterprises, ranging from SMB, SME and large enterprises are beginning to deploy a hyper-converged scale-out model for their next generation datacenter. The hardware building blocks are industry standard rack mount servers with internal drive bays that can be populated with direct attached disk drives and SSDs. Maxta Storage Platform software runs alongside the applications in each server node, abstracting and aggregating the pool of storage across the server cluster. Using this approach, separate SAN/NAS storage can be eliminated, delivering significantly reduced deployment cost, and simplified storage management. The distributed architecture provides the ability to scale compute performance and storage capacity on demand. In many application segments, this approach can offer superior performance, scalability and availability over traditional SAN or NAS.

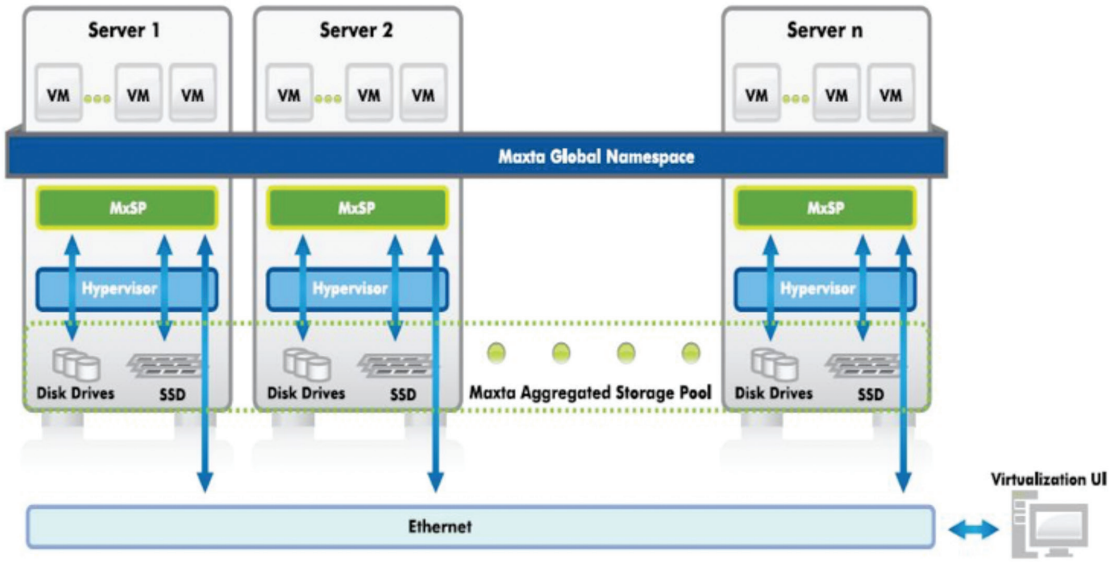
Maxta Storage Platform

The Maxta Storage Platform (MxSP) is a hypervisor-agnostic, highly resilient storage platform for the virtual data center. It fully integrates with server virtualization at all levels from user interface to data management, while supporting all possible deployments of virtual data centers, including private, public and hybrid clouds. Through its software-only solution, MxSP turns standard servers into a converged compute and storage solution, leveraging server-side flash and disk drives to optimize performance and capacity. MxSP's distributed architecture enables shared storage and delivers enterprise-class data services such as snapshots, clones, thin provisioning, compression, de-duplication, and replication, as well as full scale-out without performance degradation. This results in a dramatically simplified deployment and can result in significant cost savings.

Maxta's innovative, peer to peer architecture aggregates storage resources from multiple servers, incorporating a global namespace, while creating a shared storage pool. An instance of MxSP software is installed on each of the servers that are part of the virtualization cluster. The storage resources are a combination of magnetic disk drives and solid state drives (SSDs) for metadata and read/write-caching. All the servers running MxSP software have access to the aggregated storage pool.

MxSP intelligently maps VMs to storage resources, optimizing data layout for virtual workloads. MxSP dramatically improves performance and eliminates the need for IT administrators to make rational tradeoffs between performance and cost.

Maxta Storage platform is architected to leverage the innovation and enhancements to the Intel® processor (faster and higher number cores), memory (DDR4) and SSD (NVMe) technology.



Intel Ingredients in the Reference Architecture

Intel® Server board S2600WT-based System

Intel® Server board S2600WT family of products are designed to support the performance and features of dual Intel® Xeon® processors E5-2600 v3, Intel® TXT Technology, Intel® Xeon Phi™ coprocessors and Intel® Solid State Drives. Systems include preconfigured 1 and 2U rack models, or disaggregate chassis and boards for greater flexibility. For more details, please refer to http://ark.intel.com/products/82156/Intel-Server-Board-S2600WTT?q=2600WTT.

Intel® Xeon® Processor E5 2600 v3 Product Family

The new Intel® Xeon® processor E5-2600 v3 product family helps IT address the growing demands placed on infrastructure, from supporting business growth to enabling new services faster, delivering new applications in the enterprise, technical computing, communications, storage, and cloud. This new generation of processors enables powerful, agile data centers by supporting a software-defined infrastructure (SDI) to address the imminent need of greater flexibility with higher levels of automation and orchestration. In addition, the Intel Xeon processor E5-2600 v3 product family delivers significant benefits in performance, power efficiency, virtualization, and security. Combining these benefits with a low total cost of ownership and Intel's acclaimed product quality, the Intel Xeon processor E5-2600 v3 product family is a compelling solution for any organization. For more details, please refer to http://www.intel.com/content/www/us/en/processors/xeon/xeon-processor-e5-family.html?wapkw=Xeon%20E5&wapkwg=featured

Intel® Ethernet Converged Network Adapter X540

The Intel® Ethernet Converged Network Adapter X540 enables Intel's leadership to drive 10 Gigabit Ethernet into the broader server market. This adapter hosts Intel® Ethernet Controller X540, which is used by many OEMs as a single chip solution for LAN on Motherboard (LOM) to deliver 10 Gigabit Ethernet (10 GbE) on the latest server platform. For more details, please refer to http://www.intel.com/content/www/us/en/network-adapters/10-gigabit-network-adapters/ethernet-x540-datasheet.html.

Intel P3700 Data Center SSDs

Intel SSDs DC family for PCIe, provides fast, unwavering data streams directly to Intel® Xeon® processors making server data transfers extremely efficient. Additionally, the new Non-Volatile Memory Express (NVMe) storage interface standard is engineered for current and future Non-Volatile Memory (NVM) technologies. NVMe overcomes SAS/SATA SSD performance limitations by optimizing hardware and software to take full advantage of the SSD's capabilities. Intel® Xeon ® processors efficiently transfer data in fewer clock cycles with the NVMe optimized software stack compared to the legacy Advanced Host Controller Interface (AHCI) stack, reducing latency and overhead. Direct CPU connections also eliminate Host-Bus-Adapter (HBA) cards, further reducing latency and CapEx. By combining SSD NAND management techniques and NAND silicon enhancements, High Endurance Technology (HET) enables the DC P3700 Series to achieve 10 drive writes per day over a 5 year drive life. For more details, please refer to http://www.intel.com/content/www/us/en/solid-state-drives/data-center-family.html.

Intel developed NVMe driver for ESXi 5.5

The Intel developed NVMe driver compatible with ESXi 5.5 was used in this reference architecture. Intel is actively working to certify Intel® PCIe SSDs and Intel® NVMe driver with ESXi 5.5 and future releases. Once certified, Intel SSD DC P3700 Series and others will be listed on the VMware Compatibility Guide and NVMe driver will be publicly available.

Reference Architecture

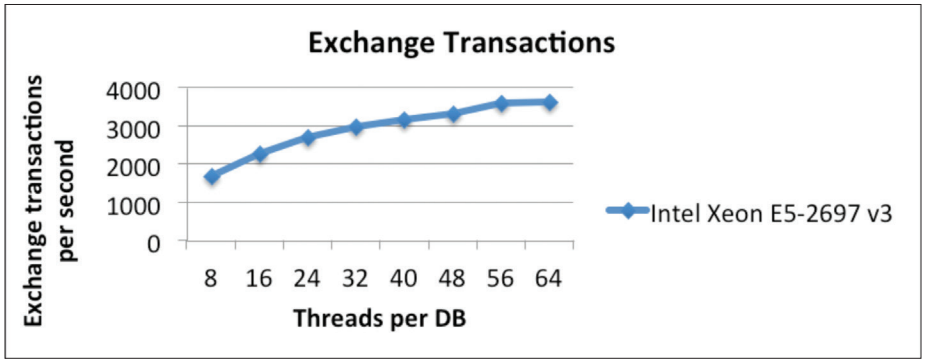
The reference architecture highlights how the Maxta Storage Platform can take advantage of the performance enhancements on Intel platforms. The performance measurements were based on Microsoft Exchange workload simulation leveraging the industry standard JetStress* utility.

Performance Analysis

Jetstress simulates the Exchange database and logs disk input/output (I/O) load. Jetstress performance tests run over 24 hour period demonstrated that the reference platform supported 3642 Microsoft Exchange I/O transactions per second. The number of Exchange I/O transactions determine the total number of users (Mailboxes) that can be deployed on a system. Exchange transactions are calculated based on the user profile which identifies the number of emails they send and receive in any given day. For our performance testing we assumed that users will send and receive around 200 messages per day. Additional parameters that were also factored in determining the transactions were background tasks such as backup jobs, database indexing etc. Leveraging the Intel PCIe SSDs also reduced the application latency compared to the SATA based SSDs in the prior generation system.

Figure 1 identifies the number of Exchange transactions and the corresponding number of users that can be deployed on the system. The X-axis determines the number of threads that were used to generate the workload. In this example 64 threads were used to generate the workload that resulted in 3642 transactions. The Y-axis determines the number of transactions achieved.

System Configuration	New Generation
Hardware Configuration	
CPU	Intel® Xeon® Processor E5-2697 v3 (35M, 2.6GHz, 9.60 GT/s Intel® QPI, SR1XF)
Memory per node	64 GB DDR4
SSD per node	2 Intel® Data Center PCIe SSDs (NVMe) P3700 • Used for Metadata, Read/Write-back Caching • 400 GB (10% of HDD capacity) • SSD used for read caching, write-back caching and metadata caching
Disk drives per node	4x1 TB 7.2K RPM HDD
Network configuration	Intel® Ethernet Controller X540 (Twinville) Dual-Port On-board
Software Configuration	
VMware vSphere	ESXi 5.5 U2
NVMe Driver	Intel developed driver
Maxta Storage Platform	2.4.1



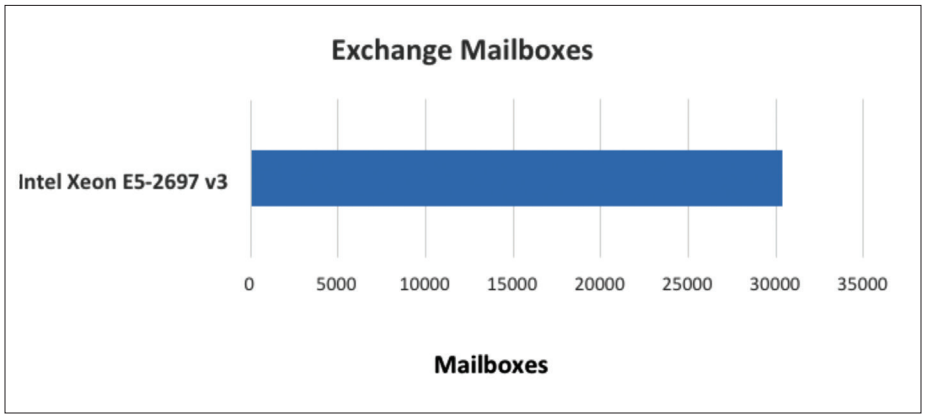
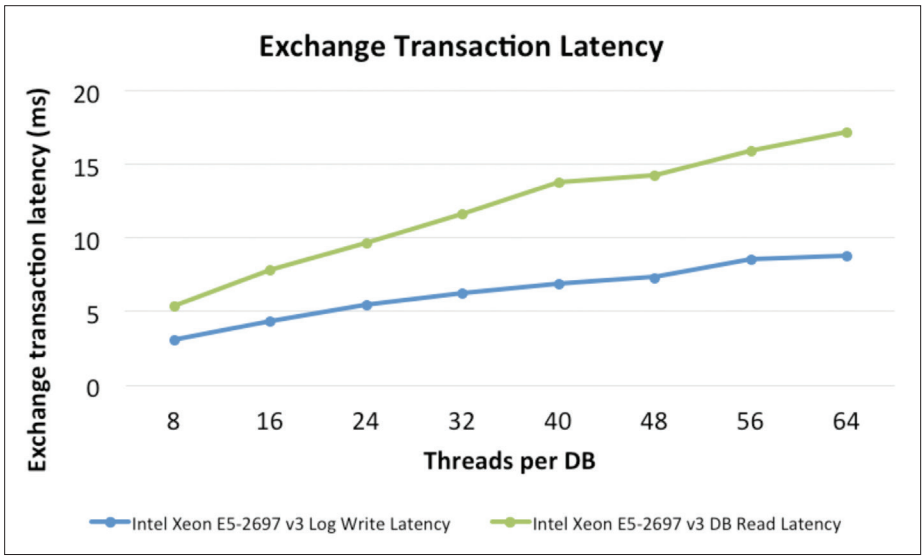


Figure 1: Number of Exchange Transactions and Number of Exchange Mailboxes

Figure 2 identifies the Exchange transaction latency. Latency is an important factor while measuring the performance. Latency determines the amount of time it takes for a transaction to be serviced. The higher the latency, the longer the time it took for the transaction to be serviced. In other words latency determines the end-user experience. The X-axis determines the number of threads that were used to generate the workload. In this example, 64 threads were used to generate the workload. The Y-axis determines the average Exchange transaction latency achieved.

By combining the 2 graphs, administrators will be able to determine the number of Exchange users that they should deploy for a given latency. For example at 24 threads per database the average latency for write is around 5ms and for read is around 10ms. At this level of latency administrators can deploy around 10,000 users on the system.

Figure 2: Exchange transaction latency



System Configuration: 64GB RAM, 4X1TB 7.2RPM SATA, 1X1.6TB and 1X400GB Intel P3700 PCIe SSD

Conclusion

This reference architecture showcases the promise of a hyper-converged software defined solution for the virtual datacenter, on a pre-defined and performance verified set of hardware and software for virtualized applications. The reference architecture enables customers to make intelligent hardware choices when deploying Microsoft Exchange. The Maxta Storage Platform addresses the storage management issues, provides the ability to scale compute and storage on demand, and combines best-in-class technology for compute, storage and networking components. It is a simple and cost effective solution for deployment of Microsoft Exchange without compromising features or performance to customers.

Disclaimers

Δ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor
families. See www.intel.com/products/processor_number for details.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

A "Mission Critical Application" is any application in which failure of the Intel Product could result, directly or indirectly, in personal injury or death. SHOULD YOU PURCHASE OR USE INTEL'S PRODUCTS FOR ANY SUCH MISSION CRITICAL APPLICATION, YOU SHALL INDEMNIFY AND HOLD INTEL AND ITS SUBSIDIARIES, SUBCONTRACTORS AND AFFILIATES, AND THE DIRECTORS, OFFICERS, AND EMPLOYEES OF EACH, HARMLESS AGAINST ALL CLAIMS COSTS, DAMAGES, AND EXPENSES AND REASONABLE ATTORNEYS' FEES ARISING OUT OF, DIRECTLY OR INDIRECTLY, ANY CLAIM OF PRODUCT LIABILITY, PERSONAL INJURY, OR DEATH ARISING IN ANY WAY OUT OF SUCH MISSION CRITICAL APPLICATION, WHETHER OR NOT INTEL OR ITS SUBCONTRACTOR WAS NEGLIGENT IN THE DESIGN, MANUFACTURE, OR WARNING OF THE INTEL PRODUCT OR ANY OF ITS PARTS.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The
information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order. Copies of documents which

have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or by visiting Intel's Web site at www.intel.com.

*Other names and brands may be claimed as the property of others.

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.

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Visit: http://www.intel.com/products/processor_number for more information.