

Overview

The award-winning vSMP Foundation™ enables the creation of a single virtual system by aggregating multiple industry-standard x86 systems. This add-on software supports the creation of virtual systems ranging from 4 to 32 processors (128 cores) and up to 4 TB of shared memory. It offers more than 70% price/performance advantage, power consumption savings, and rack-space savings over traditional SMP systems.



Limitations of Current Solutions for High Performance Computing (HPC)

SMP Systems

x86 systems with four to eight sockets are used when the processing power, memory or I/O resources of dual-socket x86 systems are insufficient. However, today's four-to-eight socket x86 systems do not provide a 2x performance gain compared to dual-socket x86 systems. In addition, on a per-socket basis, these systems are more expensive, have lower compute density, and consume more power compared to dual-socket systems. Non-x86 SMP proprietary systems are even more expensive on a per-socket basis.

Cluster Deployments

Today's cluster systems are built from enterprise-class blade-server or rack-mounted server systems. They are designed to provide high-density coupled with excellent performance and power efficiency. However, cluster management costs are high: they require managing the Operating System of each system, replicating applications and content, in addition to setting up a cluster file-system. These blade-servers and rack-mounted server are also limited in the memory footprint per system.

vSMP Foundation

vSMP Foundation uses dual-socket blade-server or rack-mounted systems to provide linear performance scaling and best-of-breed density and power consumption at dual-socket system price points. It aggregates multiple systems into one virtual system providing a large memory footprint and a single point of management. Systems size and configurations vary depending on specific blade platforms and enable up to 16 blades-servers, supporting four to 32 processors (128 cores) and up to 4 TB of memory.

Benefits of vSMP Foundation

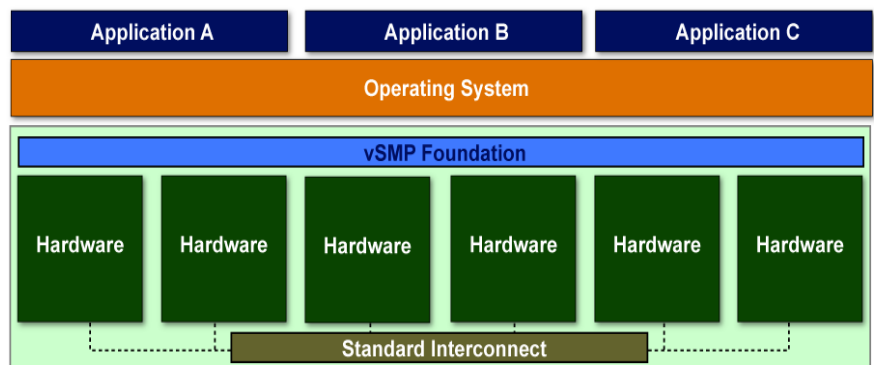
Large memory system

vSMP Foundation-based aggregation provides a cost effective alternative to buying expensive and large proprietary shared-memory systems. It enables an application requiring large amounts memory to leverage the aggregated memory of multiple systems, and reduce the need to use external high-performance storage systems for swap or scratch space. Application runtime can be dramatically reduced by running simulations with in-core-solvers or by using memory instead of swap for large-memory footprint models.

vSMP Foundation provides a cost-effective virtual x86 platform with a large shared memory that minimizes the physical infrastructure requirements and can run both distributed applications as well as applications requiring a large memory footprint at optimal performance on the same physical infrastructure.

Compute intensive, shared memory applications

For workloads that require a high core count coupled with shared memory, users have traditionally acquired proprietary shared-memory systems. vSMP Foundation provides a very cost effective x86 alternative to these expensive and proprietary RISC systems. It combines memory-bandwidth across boards, as opposed to traditional SMP or NUMA architecture where memory bandwidth decreases as the machine scales. This enables solutions based on aggregation technology to show close to linear memory bandwidth scaling, thereby delivering excellent performance for threaded applications.



Ease of use

For workloads that otherwise require a scale-out approach, the primary value provided by vSMP Foundation is ease of use driven by having a single system to manage compared the complexities involved with managing a cluster. A single system removes the need for cluster file systems, cluster interconnect issues, application provisioning and installation and update of multiple operating systems and applications. The use of one operating system instead of one per node, results in significant savings in time and money during installation, as well as ongoing management costs.

Simplified I/O architecture

I/O requirements for a scale-out model can be very complex and costly involving networked storage with accompanying costs related to additional HBA's, and FC switch infrastructure. vSMP Foundation consolidates each individual server's network and storage interfaces. I/O resource consolidation reduces the number of drivers, HBA's, NIC's, cables, and switch ports and all the associated maintenance overhead. The user needs fewer I/O devices to purchase, manage and service with increased availability, resiliency and run time scalability of I/O resources.

Improved Utilization

Even in large cluster deployments in data centers, it makes sense to deploy vSMP Foundation, since fewer larger nodes mean less cluster complexity and better utilization of the infrastructure due to reduced fragmentation of the resources. An example can be found in the financial services industry, where organizations need to run hundreds or thousands of simulations at once. A common deployment model will involve hundreds of servers, where each will execute a few simulations. In this example, each cluster node is running a single application at 80 percent utilization. By using vSMP Foundation to create fewer larger nodes, every four aggregated systems can run another copy of the application, leveraging the underutilized resources and driving an additional 25 percent utilization.

Industry Solutions

Systems powered by vSMP Foundation offer compute, memory and memory bandwidth advantages in a single configuration, optimally running applications on a variety of processors. The solution delivers the industry's highest memory bandwidth for cluster-like performance with MPI applications. Researchers, engineers and scientists use vSMP in a variety of commercial code, in-house developed, legacy and parallel applications using OpenMP, PVM, MPI and other flavors requiring well-balanced systems that are flexible and can run multiple application types.

Manufacturing

Manufacturing environments can leverage the high memory bandwidth and large number of cores provided by vSMP Foundation for explicit structural analysis, impact analysis and computational fluid dynamics applications. They can also take advantage of large shared memory for implicit structural analysis, pre-processing and post-processing.

Energy

Most reservoir and volume interpretation applications require large memory and high memory bandwidth. Seismic processing requires a large number of processors. The vSMP architecture is ideal for such applications.

Numerical simulations

vSMP Foundation allows the flexibility to run numerical simulations using all the memory in the system, multiple processes in parallel sharing the memory, or one or more jobs running in multi-processors mode.

Life sciences

vSMP Foundation offers a flexible, high-performance system for life sciences customers to run a large number of disparate legacy, OpenMP, MPI applications in one system with better performance, by leveraging the large computing resources or by leveraging the memory capacity or bandwidth, or a combination thereof.

Higher education and research

vSMP Foundation allows for dynamic adjustment to the mix of multidisciplinary applications, as well as ever-changing research priorities; from jobs that require a large memory footprint, high number of processors, or small to medium simulations in throughput mode.

Electronic design automation

Utilize the same hardware infrastructure for large shared memory processing during validation phases (prior to tapeout) and running multiple concurrent user jobs on large core count in day-to-day use. Serve many users on a central compute resource, reducing the overall number of managed operating systems installations.

Specifications

Hardware platform

- Min. / Max. boards: 2 / 16
- Min. / Max. memory (GB) per board: 4 / 128
- Min. / Max. processors per board: 1 / 4
- Min. / Max. cores per board: 1 / 16
- Max. system memory: 4 TB
- Max. system processors: 64
- Max. system cores: 128

Supported platforms: <http://www.scalemp.com/spec>

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