ScaleMP™

Powering high-end x86 systems

vSMP Foundation™ Solutions Overview

End User Presentation

v.2008.05.23

Agenda

BRIEF TECHNOLOGY INTRODUCTION

PRODUCTS

VALUE PROPOSITION

About vSMP Foundation

vSMP Foundation enables the creation of industry-standard, high-end x86-based SMP systems, by aggregating multiple off-the-shelf x86 server boards into one virtual x86 system

Why Aggregate?

END-USER VALUE PROPOSITION

- Provide x86 **Large Memory** resource
  - Enable larger workloads that cannot be run otherwise
  - Alternative to costly and proprietary RISC systems
- **Shared Memory** coupled with high-core-count
  - Allow threaded applications to benefit from shared-memory systems
- **Ease of Use**
  - One system to manage: fewer, larger nodes means less cluster management overhead
    - Single Operating System
    - Avoid Cluster File Systems
    - Hide the complexities of InfiniBand
  - SMP operational more, at cluster pricing, built with x86

vSMP Foundation™

HOW IT WORKS?

Multiple off-the-shelf x86 boards, with processors and memory

Processors speed/amount or memory amount doesn't have to be same across all boards

+

InfiniBand HCAs, cables and switch

+

vSMP Foundation™ Devices

The flash-devices plug into the boards and used as bootable device. vSMP Foundation is booted to present an aggregate coherent view to the OS

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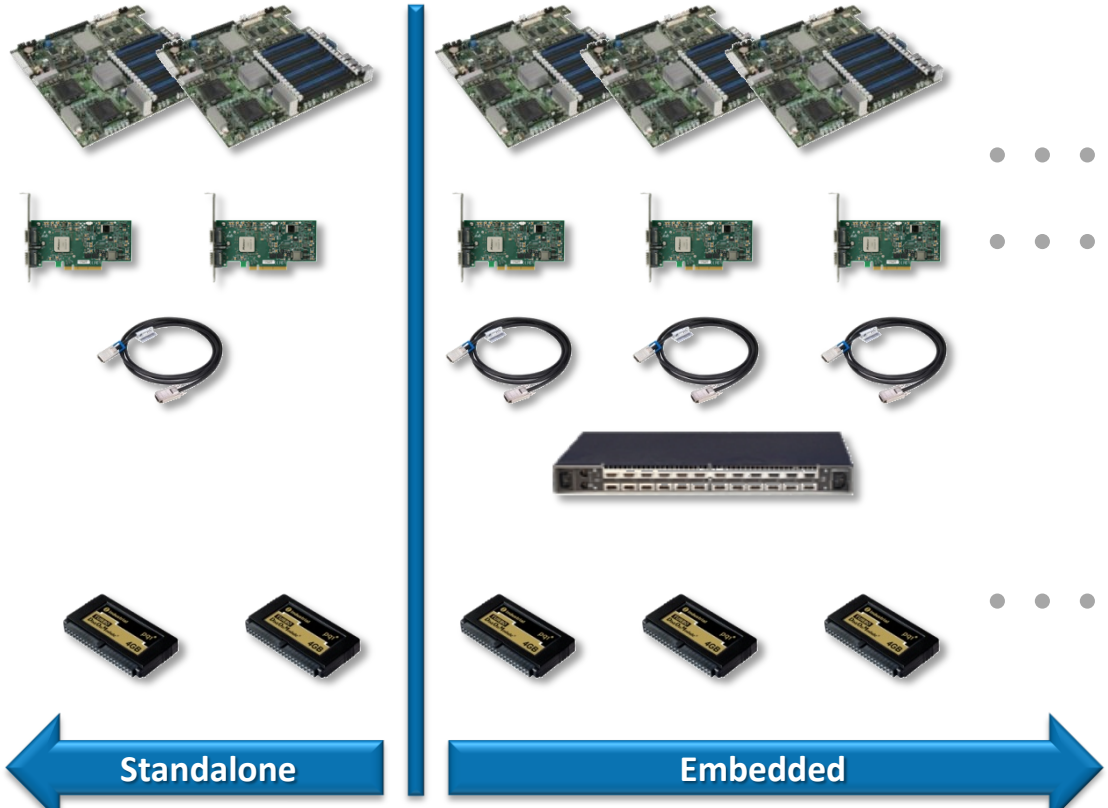
High-end x86 system, based on standard x86 components



vSMPowered™
scalable systems by ScaleMP

vSMP Foundation™

BEHIND THE SCENES

One System

- Software interception engine creates a uniform execution environment
- vSMP Foundation creates the relevant BIOS environment to present the OS (and the SW stack above it) as single coherent system

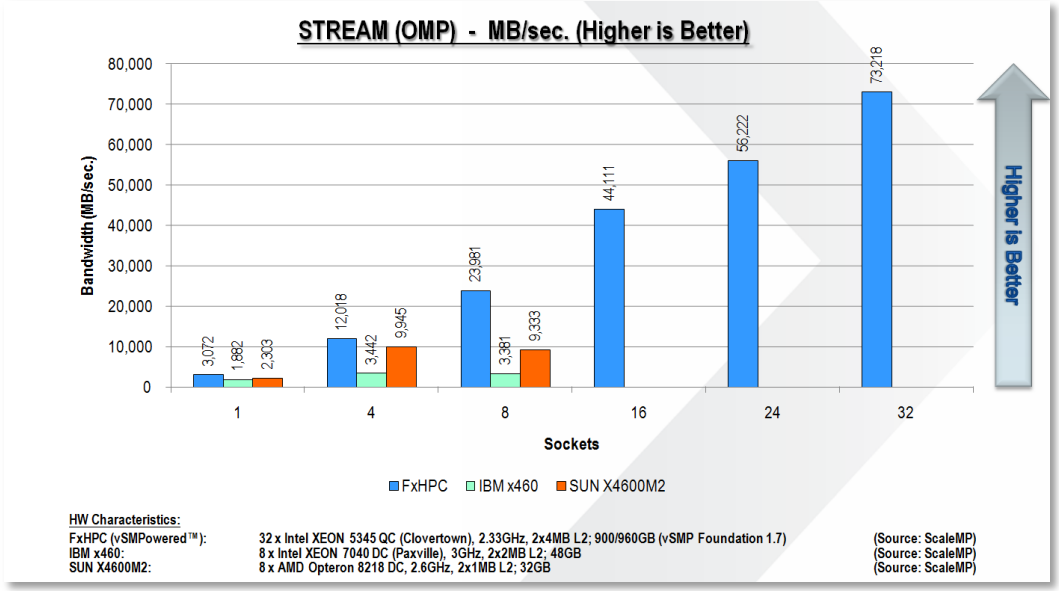
Coherent Memory

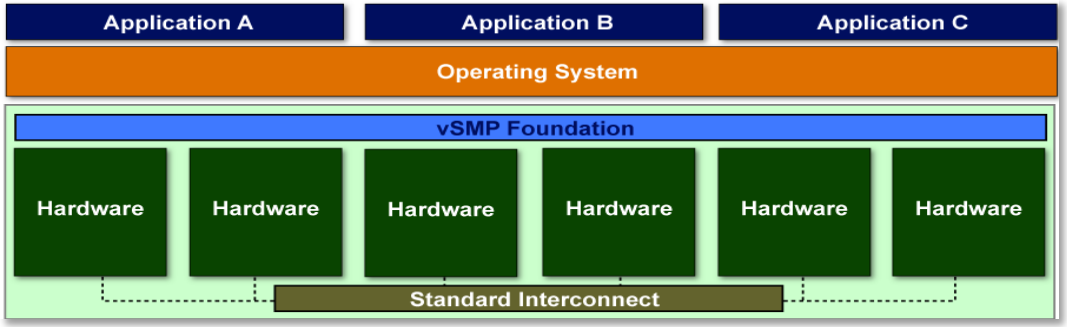
- vSMP Foundation maintains cache coherency between boards
- Multiple concurrent memory coherency mechanisms, on a per-block basis, based on real-time memory activity access pattern
- Leverage board local-memory for caching

Shared I/O

- vSMP exposes all available I/O resources to the OS in a unified PCI hierarchy
- No need for cluster file systems

Highest x86 SMP memory bandwidth!





vSMP Foundation™

FLEXIBLE HIGH-END X86 SYSTEM, MEETING END-USER REQUIREMENTS

CONFIGURATION VERSATILITY

Compute intensive configuration

Up to 1 TFLOPS

- Up to 32 processors / 128 cores / 16 boards
- Up to 1 TB RAM / 16 boards (4 GB DIMMs)
- Multiple I/O expansion options

Memory intensive configuration

Up to 1TB shared memory on 16 boards, using 4GB DIMMs

- Fast proc. for compute; Slow proc. for memory/I/O only boards
- Uneven memory amounts per board
- Multiple I/O expansion options

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vSMP Foundation™ Products

vSMP Foundation™ Standalone

- **Entry-level:** 4 sockets (DC-QC) and up to 128GB RAM
- Introduced in early 2008
- Targets power users or small departments to leverage price performance advantage of the 4-socket market
- Software only solution, integrated by VARs
- Target market: HPC (Engineering, Life Sciences, Numerical Simulations, Research…)

vSMP Foundation™ Embedded

- **High-end:** 4 to 32 sockets (DC-QC) and up to 1TB RAM
- Introduced mid 2006, customers worldwide
- Targeted to department level HPC requiring 8 or more sockets, with room to grow economically as requirements increase
- Systems provided by major systems vendors
- Target market: HPC (Engineering, Life Sciences, Numerical Simulations, Research…)

vSMP Foundation Embedded

EXAMPLE: VXTECH FUSION1200 SYSTEM

FUSION1200

UP TO128 CORES/1TB RAM SMP AT CLUSTER PRICING!

- FUSION1200 Channel Partners:
  - SGI and Dell (Europe),
  - Regional Resellers in Russia, Germany and Japan

- Processors:
  - Up to 12 processors per chassis
  - Up to 32 processors per system
  - Intel Dual-Core and Quad-Core
- Memory:
  - Up to 384GB per chassis
  - Up to 1024GB per system
- Internal Storage
  - Up to 6 SATA drives per chassis
  - Up to 16TB per system

SAMPLE CUSTOMERS

- Total S.A. France
- BMW Sauber F1 Switzerland
- Dunlop Tyres Japan
- Honeywell Inter., Inc. USA
- Northrop Grumman Corp. USA
- Lockheed Martin USA
- Cornell University USA
- Yale University USA
- University College London UK

SGI Accounts | Dell Accounts | Regional Resellers Accounts

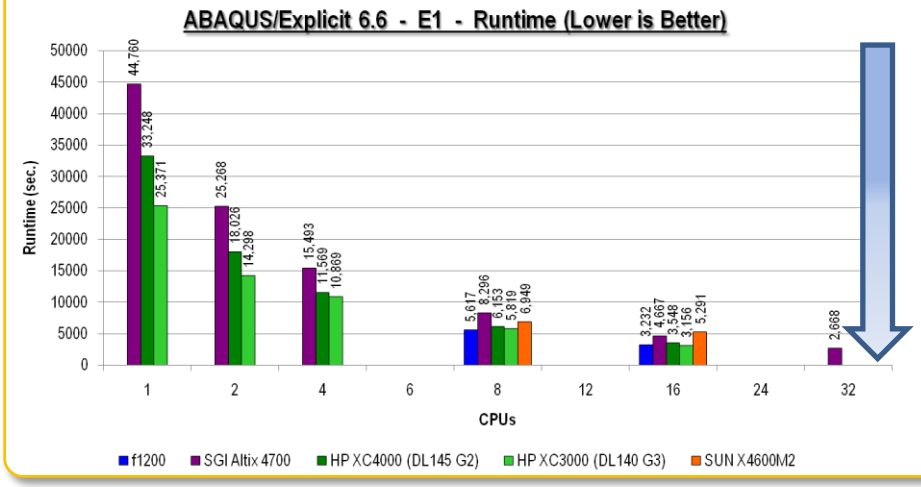
VXTECH

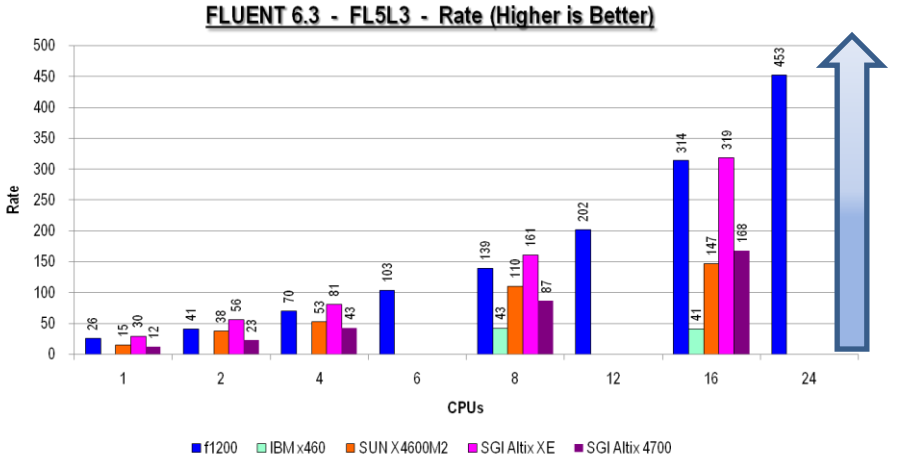
Speed | Performance | Passion for Innovation

Stellar Performance

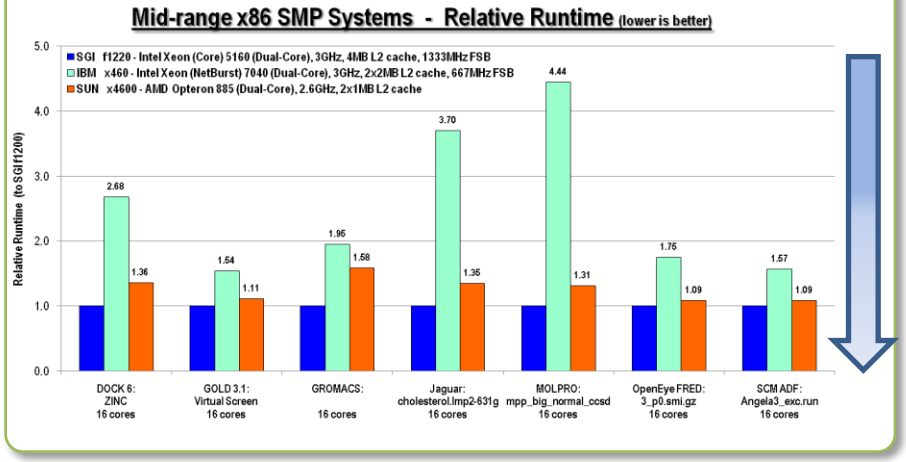
APPLICATION PERFORMANCE EXAMPLES

Engineering

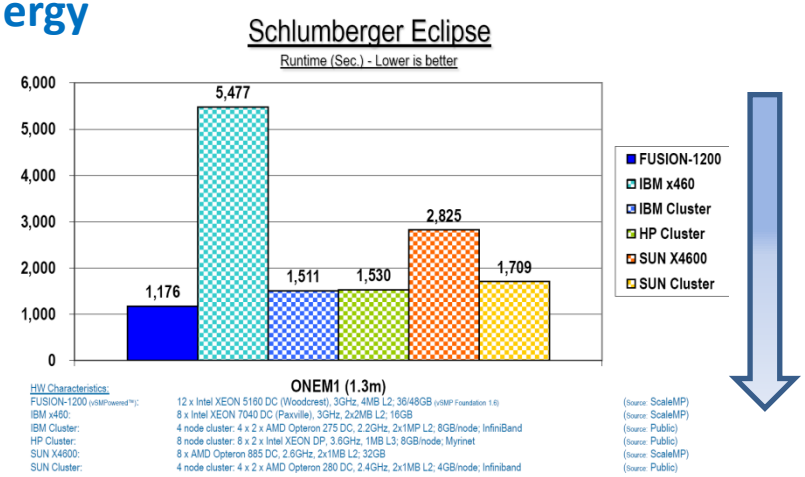




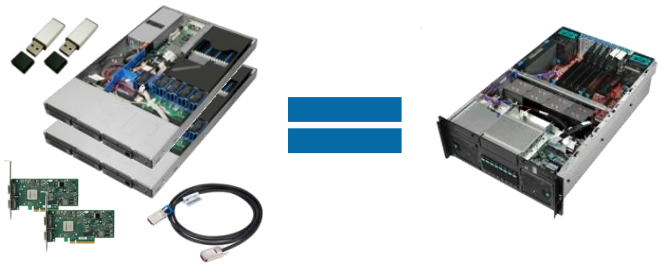
Life Sciences



Energy



vSMP Foundation™ Standalone



- **Leverage ScaleMP's proven technology to the entry-level HPC market**
- **The first 4-socket* SMP starting under $10,000!**
- Create a 4-processor SMP computer by linking two 2-processor systems
  - Up to 16 cores and 128 GB RAM
  - High-performance, high density
  - Lower power consumption, lower TCO

Quantified Benefits

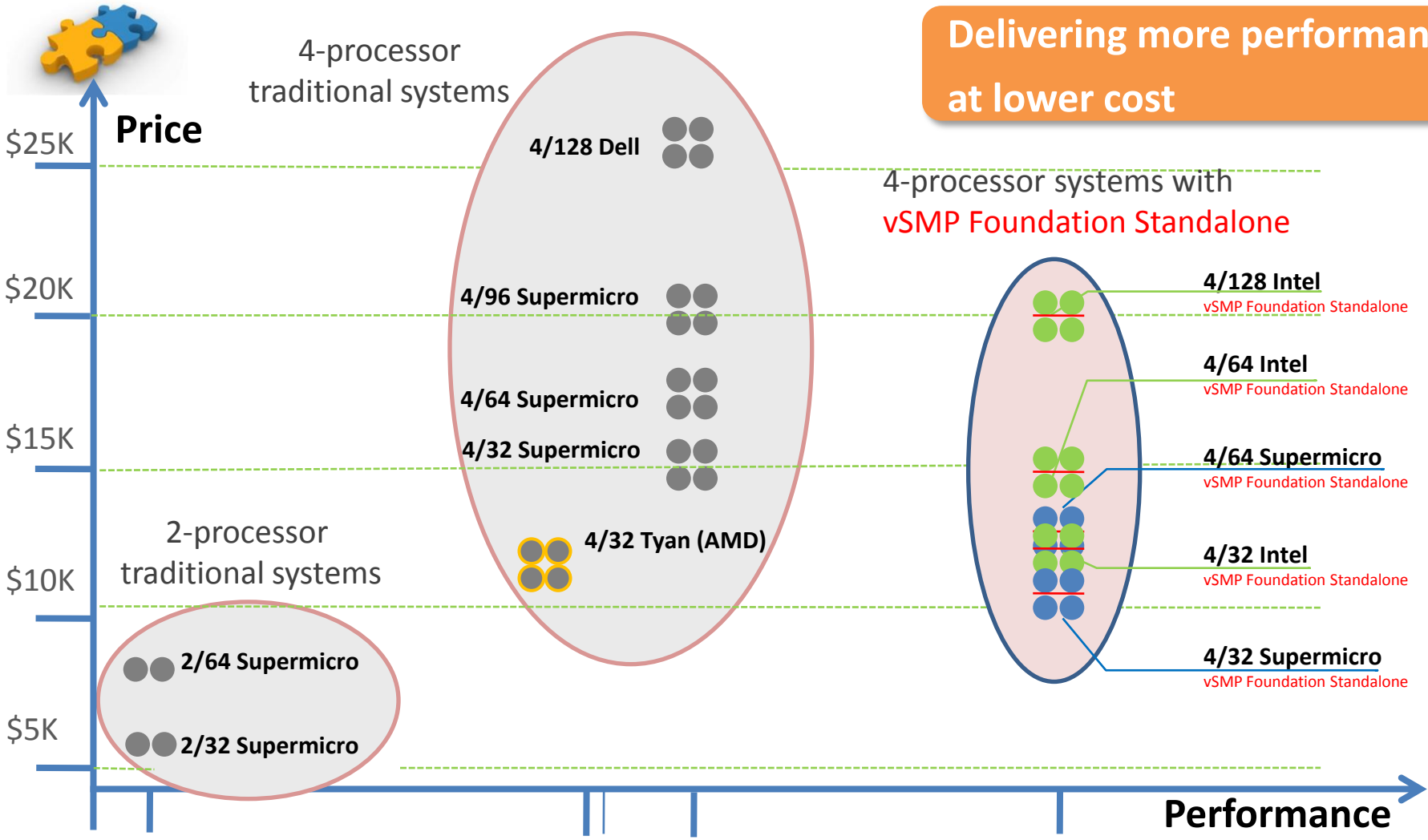
- 50% rack-space savings
- 24% power saving
- 73% better price/performance:
  - 26% more performance
  - 27% less cost

SPEC CPU2006

* 32GB RAM configuration

vSMP Foundation Standalone

PRICE / PERFORMANCE POSITIONING



Note: Performance based on SPECint_rate2006 and SPECfp_rate2006

x86 4-socket systems at a glance

SUPPORTED CONFIGURATIONS

		Supported Configurations			
					
Form Factor					
Solution	2-socket SMP Intel	**4-socket SMP vSMP Foundation Standalone Supermicro**	**4-socket SMP vSMP Foundation Standalone Intel**	4-socket SMP Intel	4-socket SMP Tier-1 Branded
Model	SR1560SF	**6015TW-INFV(B)**	**2 x SR1560SF**	S7000FC4UR	Vendor specific
Rack-Space	1U	**1U**	**2U (2 x 1U)**	4U	4U
Max processor speed (GHz)	Dual-Core: 3.4 Quad-Core: 3.2	**Dual-Core: 2.93** **Quad-Core: 2.93**	**Dual-Core: 3.4** **Quad-Core: 3.2**	Dual-Core: 2.93 Quad-Core: 2.93	Dual-Core: 2.93 Quad-Core: 2.93
Front-side bus	1 x 1600MHz	**2 x 1600MHz**	**2 x 1600MHz**	1 x 1066MHz	1 x 1066MHz
Processor power consumption (3.0 GHz QC)	80W	**80W**	**80W**	130W	130W
Chassis power consumption	600W	**980W**	**2 x 600W = 1200W**	1570W	1570W
Estimated end-user price (3.0 QC 32GB RAM)	$3,500	**$9,500**	**$10,000**	$14,000	$19,000 - $22,000

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vSMP Foundation

PRODUCTS

vSMP Foundation Standalone

- First 4-socket x86 system under $10K with better performance
- 4 sockets (16) cores and 128GB RAM
- Personal supercomputer and workgroup system
- As low as $7,000
  with 8GB RAM and 2.66GHz Processors

vSMP Foundation Embedded

- Affordable scalable x86 SMP systems for high performance computing
- From 8 to 32 sockets (128 cores) and 1TB RAM
- Departmental high performance system
- Starting at $45,000

SCALABILITY

Value Proposition

KEY REASONS FOR CUSTOMERS TO SELECT VSMP FOUNDATION

Application requirements

- Applications that use large memory footprint (even with one processor)
- Applications that need multiple processors and shared memory

vSMPowered™ systems deliver:

- Best price/performance
- For customer looking for x86, the only solution that delivers large memory and high-socket count

Operational requirements

- Simplify the complexities involved with running clusters
- Use same computing resource for multiple application classes ("mixed environments"): single-processor, multi-processor, shared-memory

vSMPowered™ systems deliver:

- Lowest TCO!
- The most flexible platform – top performance for all application classes

SMP at cluster pricing !

Example 1

LARGE MEMORY REQUIREMENT

PROBLEMS

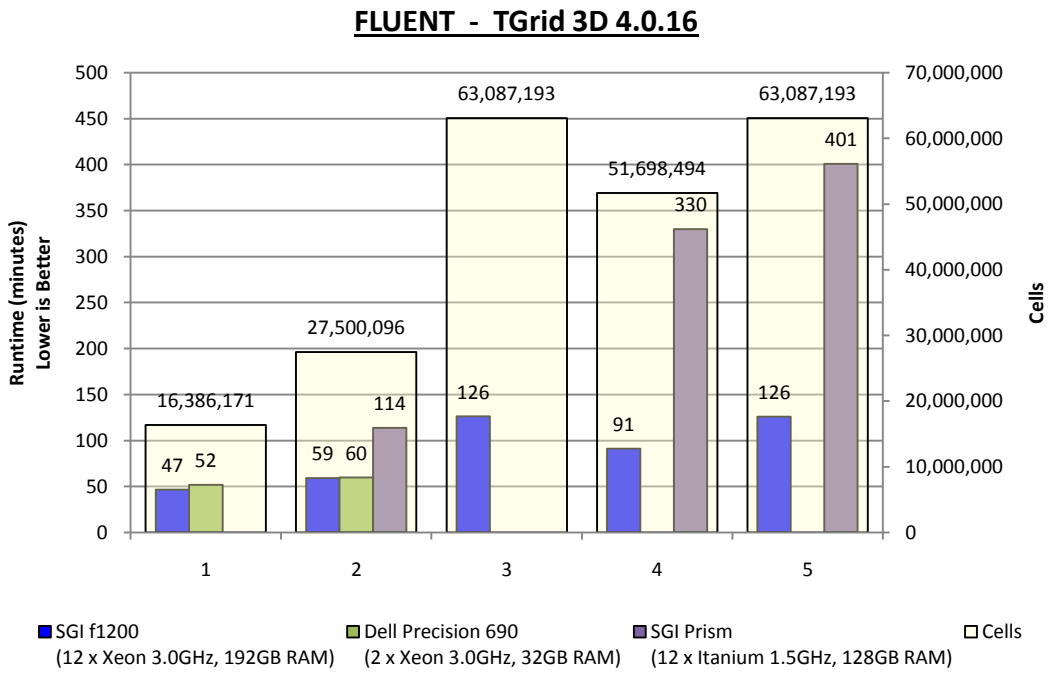
- Mesh generation which requires large memory
- Run solvers run on same system or larger cluster system

APPLICATIONS

- FLUENT
- In-house developed code

END USERS

- Formula1 team (example on the right)
- USA National Lab meshing problem



Example 2

DEPARTMENTAL RESOURCE SHARING

PROBLEMS

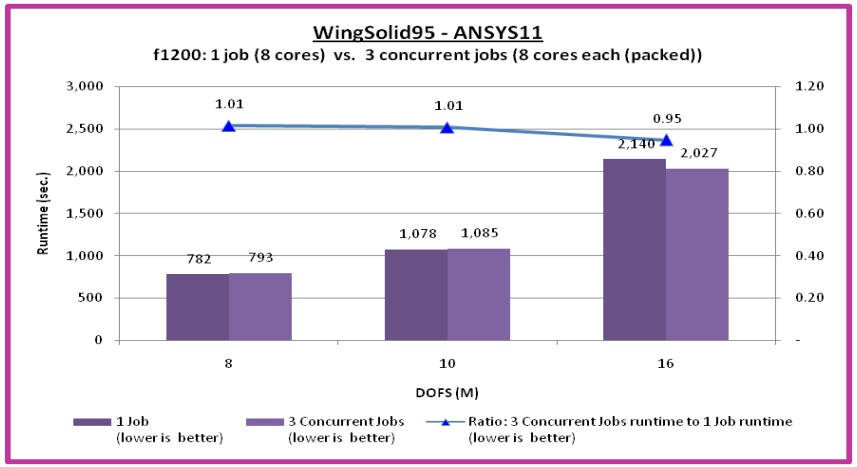
- Server consolidation in throughput environment
- Users running multiple simulations simultaneously or one large job

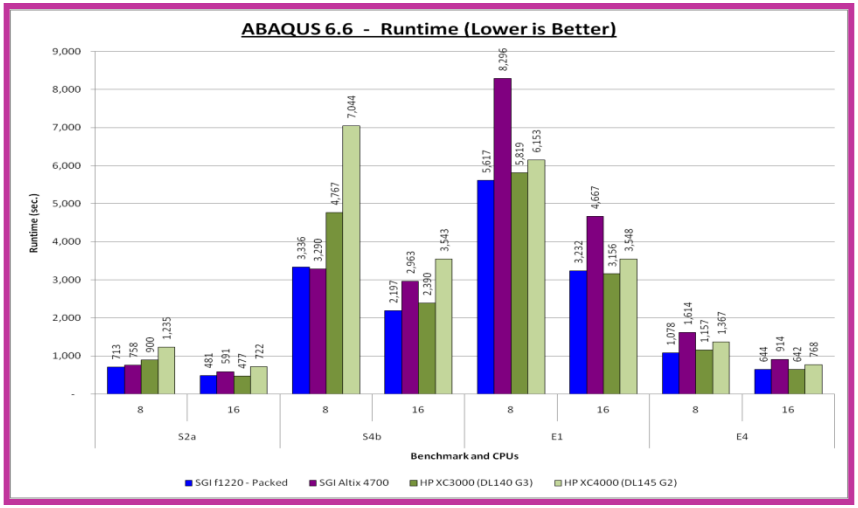
APPLICATIONS

- ANSYS
- ABAQUS

END USERS

- ANSYS Engineering Services Company
- Educational Institution
- US Defense Contractor (classified)





Example 3

FLEXIBLE PLATFORM

PROBLEMS

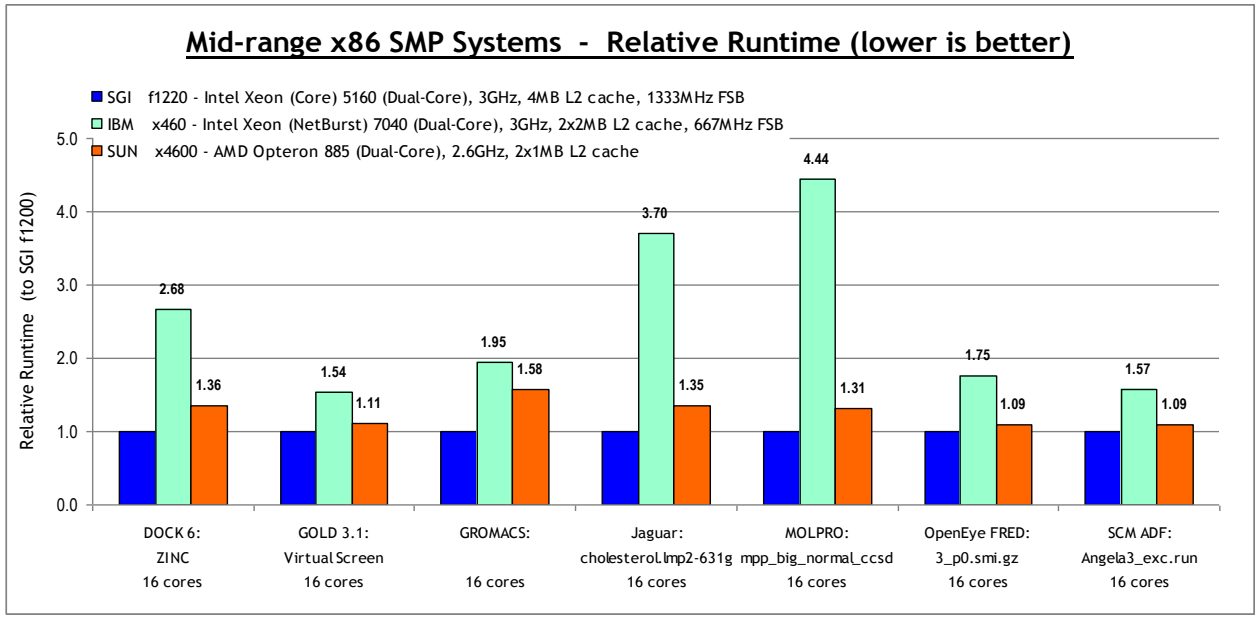
- Support multiple users in research environment with different applications needs
- Unpredictable usage patterns
- Support large memory jobs

APPLICATIONS

- Gaussian
- NAMD
- OpenEye FRED
- OpenEye OMEGA
- SCM ADF
- HMMER
- In-house codes
- Legacy code

END USERS

- US Pharmaceutical Company
- Educational Institution



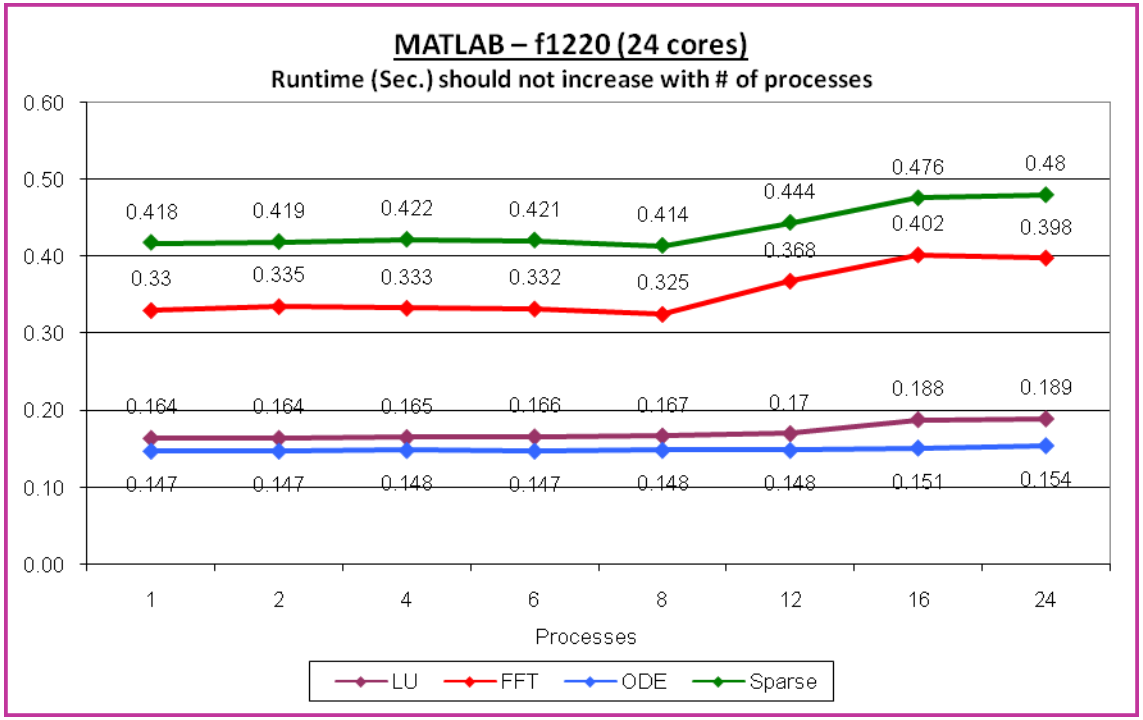
Example 4

EASE OF USE

PROBLEMS
- Single systems administrator on staff
- Support multiple users in research environment with different applications needs

APPLICATIONS
- MATLAB
- R

END USERS
- US Defense Contractor
- Canadian higher education institution



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