Benefits of Intel Xeon E5 Processor Family for Engineering Simulation

Wim Slagter, PhD
Lead Product Manager
ANSYS Drives:

Simulation Driven Product Development™
We enable product innovators to digitally simulate performance across all physics of complete systems and in their real-world environments.
ANSYS, Inc.

**Focused**
Engineering simulation is all we do.
Leading product technologies in all physics areas
Largest development team focused on simulation

**Capable**
2,000 employees
60 locations, 40 countries

**Trusted**
96 of top 100 *FORTUNE* 500 industrials
ISO 9001 and NQA-1 certified

**Proven**
Recognized as one of the world’s most innovative and fastest-growing companies*

**Independent**
Long-term financial stability
CAD agnostic

*BusinessWeek, FORTUNE*
Trends in Engineering
Driving HPC Innovations

Increase product performance and integrity in less time
• Consider more design variants
• Find the ‘optimal’ design
• Ensure performance across a range of conditions

➢ HPC is a key enable to assure greater product integrity through robust design

Increased product complexity!
• Assess larger, more detailed models
• Consider more complex physics
• From single component to system innovations

➢ HPC is a key enabler to gain higher-fidelity insight
Trends in Engineering
Driving HPC Innovations

Do more with existing engineering and design teams

• Scale-up of HPC to support more simulation workloads
• Centralized HPC infrastructure (or cloud) with effective remote access
• Managing collaboration and explosive growth of engineering data

➢ HPC is a key enabler to amplify engineering productivity
1: Product Integrity via Robust Design
Enabling HPC Technology

HPC infrastructure is a key enabler of customer success.

Increasing understanding, innovation, ROI

- Robust Design
- Enterprise HPC
- Cloud Computing
- Resource Management
- Scalable File Handling

HPC Clusters
Study Job Schedulers
Licensing

Solutions
- High-End Workstations
- High-End Solvers
- Entry Level Clusters

Enterprise
Cloud

Standalone Workstations and Servers

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In the area of CFD they include:
- Network-aware partitioning
- Hybrid parallelism for best performance on multi-core chips within clusters
- Parallel I/O
- 1st GPU capability for “specialty physics”

In the area of FEA they include:
- Parallelized equation ordering in sparse solver
- Parallelized preconditioning step in iterative solver
- Multiple GP-GPU support for all DMP solvers

In the area of EMA they include:
- Domain Decomposition Method, incl. support of finite antenna arrays
- Spectral Decomposition distributes frequency sweep points across networked processors
3: “Amplifying” Engineering
Fully Automated Workflow in ANSYS Workbench

Challenge
• Simulate 50 shape variants of the Volvo XC60 with high-fidelity CFD simulations using a computational mesh of 50 million cells in a total elapsed time of 50 hours (after initial case setup)

Solution
• ANSYS Workbench platform
  – To drive shape parameters (RBF Morph)
  – To create DOE and perform Goal Driven Optimization
• ANSYS Fluent and ANSYS HPC
• Intel Xeon based cluster

Benefits
• Automatic with least human effort
• Ability to explore a large design space
• Accurate because of high-fidelity CFD
• Shorten vehicle development process
  48% improvement
HPC Innovation Through Partnership

ANSYS maintains close technical collaboration with the leaders in HPC incl. Intel

This mutual commitment ensures that customers get the most possible value from their overall HPC investment

Optimized performance on multicore processors from Intel, with R&D focused on Intel’s Many Integrated Core (MIC)

• ANSYS 14.0 shows over 60% performance boost for the latest Intel® Xeon® E5-2600 processor (Sandy Bridge) family compared to previous Intel (Westmere) generation
  – For ANSYS Mechanical 14.0, performance gains have been realized through the adoption of the latest AVX compiler instructions and math kernel libraries
Achieving Faster, Higher-Fidelity Simulation Results - with Intel Xeon E5-2600 processor family

**ANSYS Fluent 14**
Relative Performance
Higher is better

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**ANSYS CFX 14**
Relative Performance
Higher is better

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**ANSYS Mechanical 14**
Relative Performance
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Summary

• Major trends in engineering are driving the need for HPC innovation
• ANSYS is a HPC technology leader committed to deliver optimized software performance on the latest Intel processor technologies
• ANSYS users can realize significant gains in speed, fidelity and productivity with the new Intel Xeon E5-2600 processor family

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THANK YOU!