Driving Industrial Innovation
On the Path to Exascale:
From Vision to Reality

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Technical Computing Continues Its Rapid Growth

To Compete, You Must Compute

Governments & Research
Fundamental Discovery to Gain Fundamental Insights

Commercial/Industrial
Business Transformation

New Users – New Uses
Big Data Analytics Enabling Data Driven Science

Better Products
Faster Time to Market
Reduced R&D

Genomics
Clinical Information
From Diagnosis to personalized treatments quickly

My goal is simple. It is complete understanding of the universe, why it is as it is and why it exists at all.
Stephen Hawking

HPC: Transforming the world of data and information into KNOWLEDGE

Source: IDC: Worldwide Technical Computing Server 2013–2017 Forecast; Other brands, names, and images are the property of their respective owners.
“For Audi to stay on the forefront of automotive design, we required a new way to visualize our designs. Working with Intel and Autodesk, we have been able, for the first time, to adopt Real Time Predictive Rendering to interactively see our car design concepts with high fidelity visualization. This helps us reduce the costs of development by eliminating expensive prototype turns.”

-- Audi
Intel in HPC: In 2009

Processors

Software

Intel® Enterprise Edition for Lustre®
software
Intel in HPC: In 2013+

- **Processors**
- **Coprocessor**
- **Fabrics**
  - Intel® Truescale
  - Intel® Ethernet Products
  - Next Generation Interconnects
- **Software**
  - Intel® Enterprise Edition for Lustre® software

...With Continued Innovation Across All Aspects of HPC
Redefining Compute: *Neo-Heterogeneity* at Scale

IDC HPC End-User MCS Study: Overall Plans for Purchasing Coprocessors

Q: What is your likely accelerator/co-processor purchase plans for your NEXT technical server purchase?

- 78.4% said YES, they plan to purchase coprocessors with their next HPC server
- This is more than double the 29.5% from our 2011 HPC End-User MCS study

Multiple Surveys:
- Increasing Intel Xeon Phi user preference for future buys

Heterogeneity is here to stay...
...but it doesn’t have to be HARD

*Neo- Heterogeneity* = Heterogeneous system with a *single* programming model

*Source: IDC. 78% surveyed plan to purchase a coprocessor or accelerator, Intersect360*

*Source: IDC. Intel® Xeon Phi™ leads all accelerators in user preference for future buys (Intel 32%, nVidia: 26%)*
Announcing Today:
New Intel® Xeon Phi™ Coprocessor Products

7100 Family:
Highest Performance
Most Memory

7120P  7120X

3100 Family:
Performance & Value

3120P  3120A

5100 Family:
High Density Form Factor

5120D

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 purchase, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.

Claim based on calculated theoretical peak double-precision performance capability for a single coprocessor: 16 DP FLOPS/clock/core * 60 cores * 1.053GHz = 1.0108 TeraFlop/s.
Next Intel® Xeon Phi™ Processor: Knights Landing

Designed using Intel’s cutting-edge 14nm process

Not bound by “offloading” bottlenecks

Standalone CPU or PCIe coprocessor

Leadership compute & memory bandwidth

Integrated on-package memory
The Pinnacle of Neo-Heterogeneity Today
Prof. Liao’s Vision

100PF Project Vision
2015

Competency.

Programmability.

Reliability.

Continuity.

50PF Reality
2013

#1 system on top500!

MilkyWay-2

54.9PF Peak Performance

33.86PF Rmax

>32000 Intel® Xeon® Processor

E5-2600 v2 family

>48000 Intel® Xeon Phi™ Coprocessors

*Source: top500.org, NUDT*
Highlights

403 of 500 (81%) of all systems chose Intel

174 of 177 (98%) of new systems chose Intel

Total Rmax of Intel Xeon Phi > total Rmax of GPUs

Intel® Xeon Phi™ coprocessor

- Top 10 systems: #1 and #6 system on list
- #6 system: 5.3 PF TACC Stampede

Intel® Xeon® processor

- 98% of new listings based on Intel
- 1st listing of Intel Xeon E5-2600 V2 processor
- 56% performance increase vs. prior generation

Source: www.top500.org

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Integration Is The Key

Unprecedented Innovations Only Enabled by the Leading Edge Process Technology

System level benefits in cost, power, density, scalability, & performance

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HPC: Transforming Information & Data Driven Science Into Knowledge

This decade we will create and extend computing technology to connect and enrich the lives of every person on earth

On to Exascale: Innovation and partnerships

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