



Tools, Standards and Books, oh my! Compilers, libraries and VTune™, oh my!

James Reinders and Thanh Phung, Intel
July 8, 2014; IXPUG; Austin, TX



Thank you
for being a part of this
Intel® Xeon Phi™ Users
Group.

Neo-Heterogeneous

Computing

The “promise” of heterogeneous systems
but with a homogeneous programming environment.

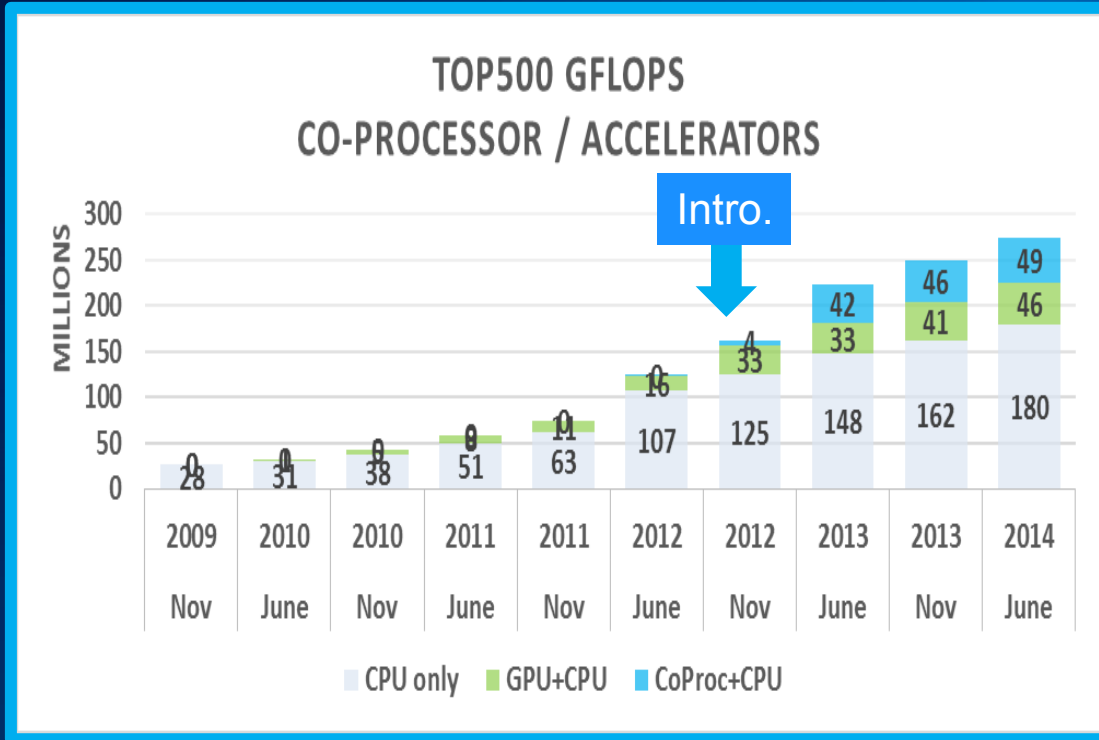
It’s a lot more to us than a cute marketing phrase.

It started as a technical concept, and remains one for us *all*.



It's the Programming Model, Stupid.

June 2014 Top 500 List



#1 system
(third time)

Neo-heterogeneous

(Intel® Xeon® Processors +
Intel® Xeon Phi™ Coprocessor)

Common
Programming
Model



Investing forward

- Knights Landing
- Programming Standards and their growth/evolution
- Intel Parallel Computing Centers (IPCCs)
- Education: course work

Knights Landing

(Next Generation Intel® Xeon Phi™ Products)

Continued programming model advantage
Add Intel® AVX-512 instructions
gcc work well underway

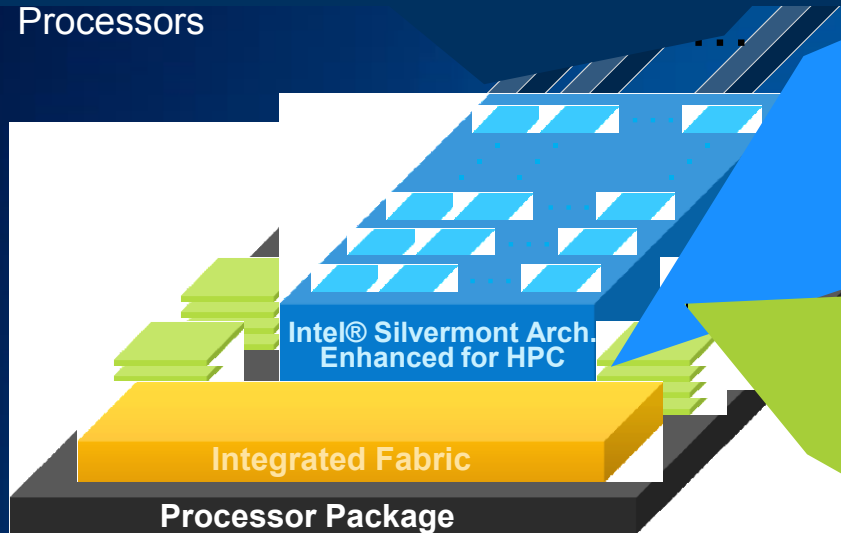
Platform Memory: DDR4 Bandwidth and Capacity Comparable to Intel® Xeon® Processors

Compute: Energy-efficient IA cores

- *Microarchitecture enhanced for HPC*
- **3X Single Thread Performance** vs Knights Corner
- *Intel Xeon Processor Binary Compatible*

On-Package Memory:

- up to **16GB** at launch
 - **1/3X** the Space
 - **5X** Bandwidth vs DDR4
 - **5X** Power Efficiency
- Jointly Developed with Micron Technology**



Conceptual—Not Actual Package Layout

 **3+ TFLOPS**
In One Package
Parallel Performance & Density

 **2nd half '15**
1st commercial systems



Investing forward

- Knights Landing
- Programming Standards and their growth/evolution
- Intel Parallel Computing C **Latest Intel tools in beta (2015)**
- Education: course work **OpenMP* 4.0 support**
Explicit Vectorization
(see my SGIUG talk – lotsofcores.com)
A talk about the need for explicit vectorization, given at SGIUG on April 30, 2014

Investing forward

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- Programming Standards and their growth/evolution
- Intel Parallel Computing Centers (IPCCs)
- Education: course work

AMBER WRF VISIT VASP UTBENCH SU2 SG++ SeisSol, GADGET, SG++ ROTOR SIM R Quantum Espresso Optimized integral OPENMP/ MPI Openflow NWChem

AVBP (Large Eddy)

Announcing new mailing list: <http://tinyurl.com/IPCCmaillist>
 New IPCCs being added (rolling basis)
 Watch for University of Oregon developed 4/500 level curriculum

NEMO5

MPAS

Blast

Mardyn

BUDE

MACPO

CAM-5

Ls1

CASTEP

Harmonie

Castep

GTC

CESM

GS2

CFSv2

Gromacs

CIRCAC

GPAW

Intel® Parallel Computing Centers

The image displays a collection of logos for Intel Parallel Computing Centers (IPCCs) from various international institutions. The logos include:

- ETH Zürich
- TACC (Texas Advanced Computing Center)
- University of Bristol
- University of Edinburgh
- University of Oklahoma
- Purdue University
- University of Wisconsin-Madison
- University of Colorado Boulder
- Stanford University
- Berkeley Lab
- Penn State
- Georgia Tech
- 東京大学 (The University of Tokyo)
- LSU (Louisiana State University) Center for Computation & Technology
- NCAR (National Center for Atmospheric Research)
- epcc (European Parallel Computing Center)
- COPPE 50 UFRJ
- ZIB (Zentrum für Informations- und Bioinformatik)
- ICHEC (Irish Centre for High-End Computing)
- CDAC (Centre for Development of Advanced Computing)
- ICG (Institut für Computational Graphics)
- IRIT (Institut de Recherche en Informatique et Automatique)
- CISS (Center for Information Systems Security)
- University of Toronto
- University of Tübingen
- University of Göttingen
- University of Vienna
- University of Turin
- University of Turin (CINECA)
- University of Turin (GINECA)
- University of Turin (BUDE)
- University of Turin (CAM-5)
- University of Turin (CASTEP)
- University of Turin (Castep)
- University of Turin (CESM)
- University of Turin (CFSv2)
- University of Turin (CIRCAC)
- University of Turin (DL-MESO)
- University of Turin (DL-Poly)
- University of Turin (ECHAM6)
- University of Turin (Elmer)
- University of Turin (FrontFlow/Blue Code)
- University of Turin (GADGET)
- University of Turin (GAMESS-US)

ClPhi (COSMOS)

COSA Cosmos codes DL-MESO DL-Poly ECHAM6 Elmer FrontFlow/Blue Code GADGET GAMESS-US

*Other brands and names are the property of their respective owners.



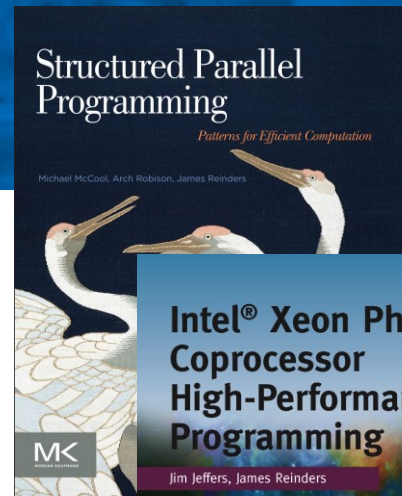
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Structured Parallel Programming, 2012

Intel® Xeon Phi™ Coprocessor High-Performance Programming, 2013

Multithreading for Visual Effects, 2014 (June)



User driven – contribution based books on parallel programming – “inspired by the highly scalable Intel®

Xeon Phi™ Coprocessor”

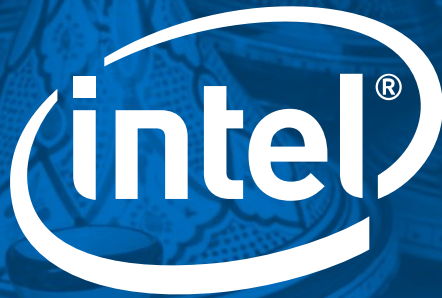
High Performance Parallelism Pearls – Successful Approaches for Multicore and Many-core Programming

<http://lotsofcores.com/gems>

Status:

- Volume 1 – **DEFINITELY HAPPENING**
being written/edited, target availability end of 2014
- Volume 2 – **PLANNED** (*assume volume 1 is a “hit”*)
submissions being accepted (writing due end of 2014), publish in 2015
submit your proposal now: <http://lotsofcores.com/gems>

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Software



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