

# HPC code modernization with Intel<sup>®</sup> development tools

Bayncore, Ltd.

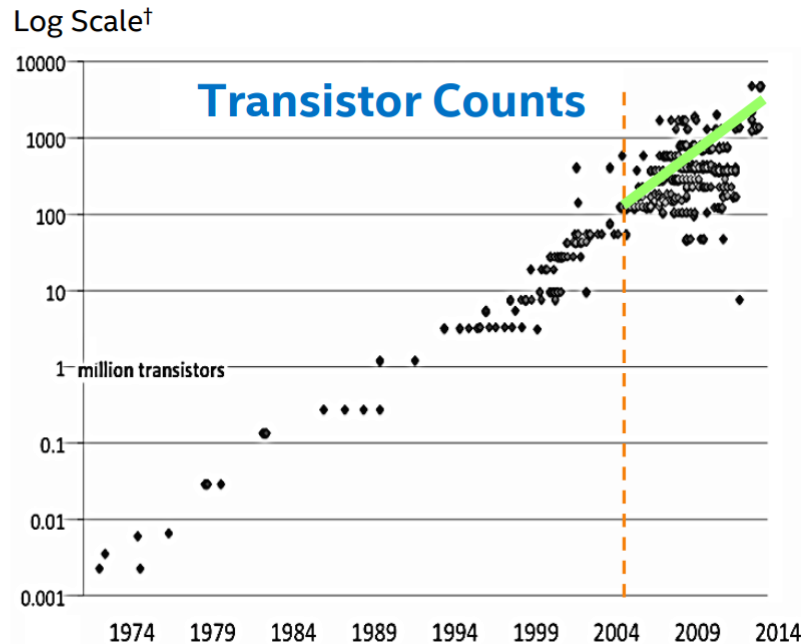
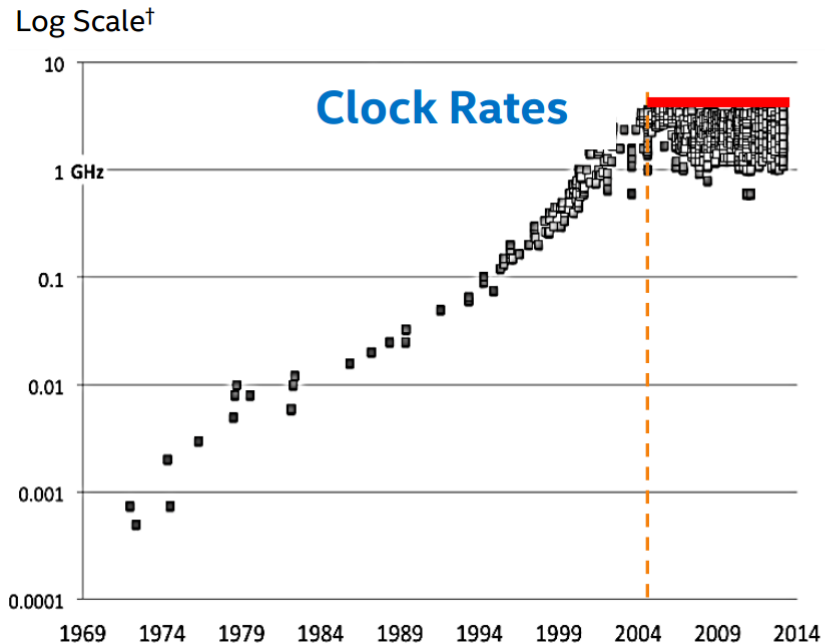
Intel HPC Software Workshop Series 2016

HPC Code Modernization for Intel<sup>®</sup> Xeon and Xeon Phi™

February 17<sup>th</sup> 2016, Barcelona



# Microprocessor trends

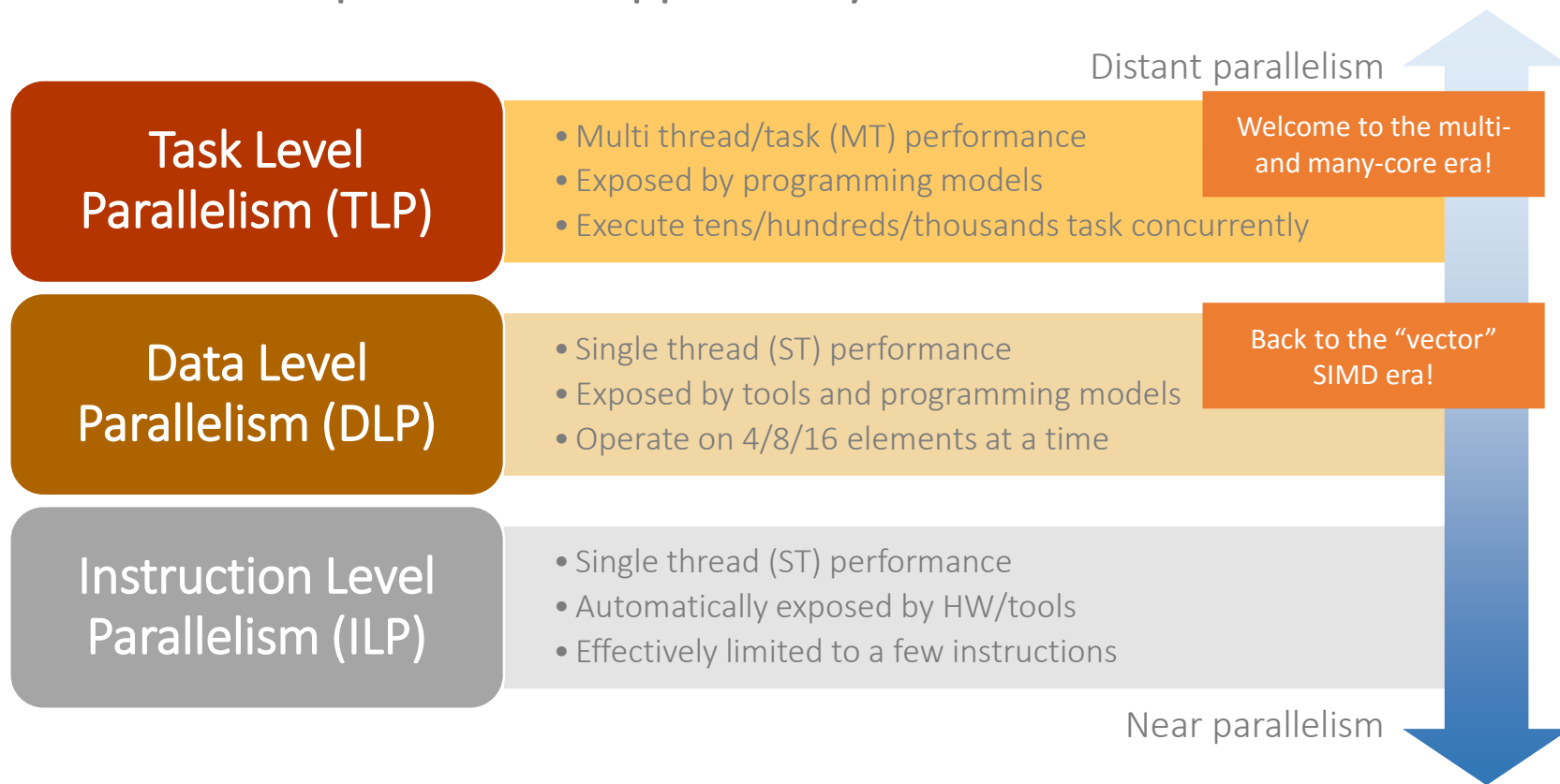


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“Free lunch” is over: how to use so many transistors?

# Exploiting the parallel universe

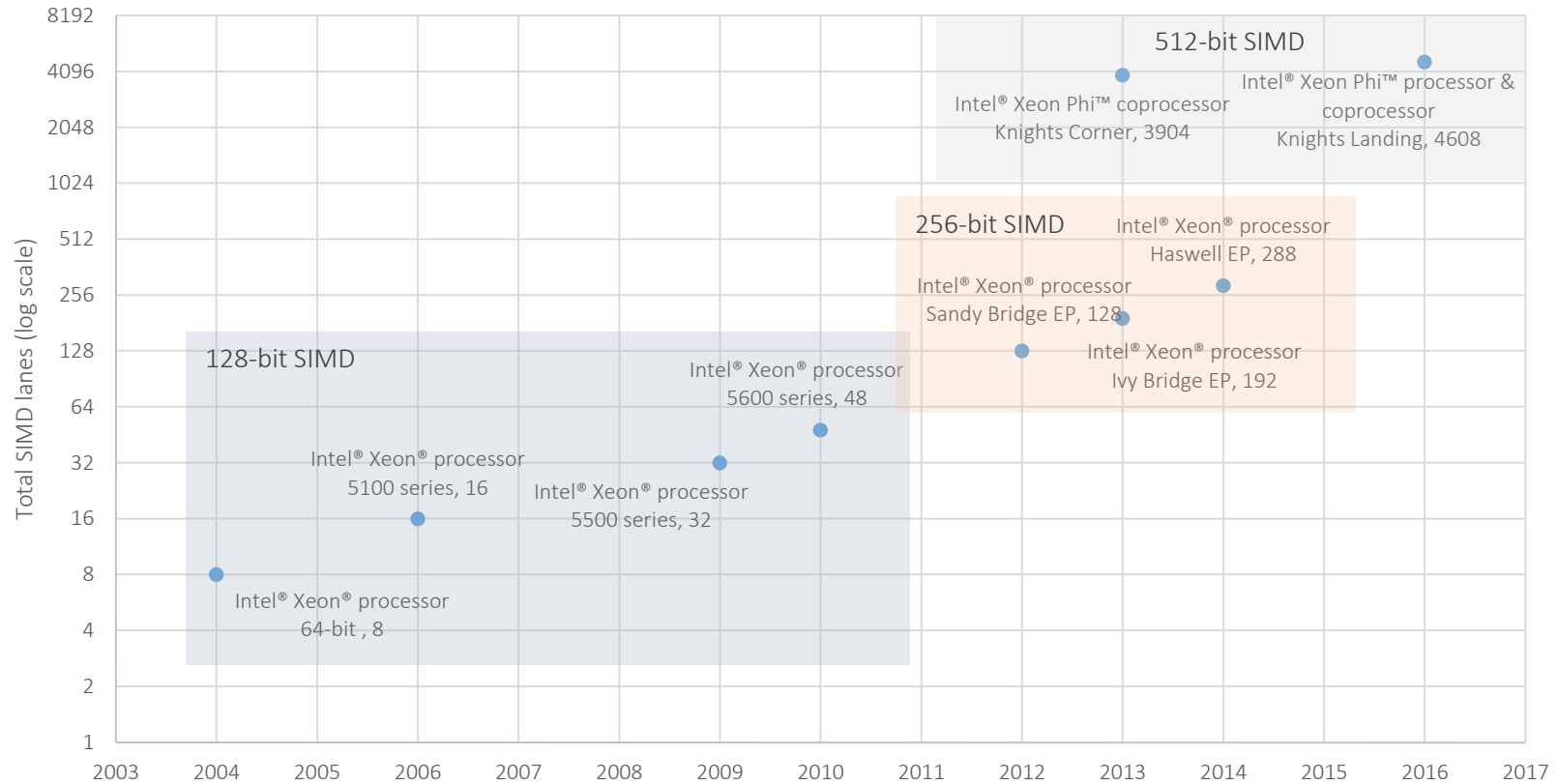
Three levels of parallelism supported by Intel hardware



Programmers responsibility to expose DLP/TLP

# Changing hardware impacts software


More cores, more threads, wider vectors



# Intel® Software Development Products

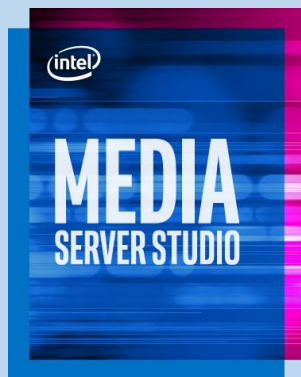
Technical,  
Enterprise, HPC

```
#pragma omp parallel for
for (i = 0; i < N; i++) {
    pixel[i] =
    red_filter(pixel[i]);
}
```




Performance,  
scalability and  
reliability

Media



Video streaming  
performance

Gaming



Graphics  
Performance  
Analyzers



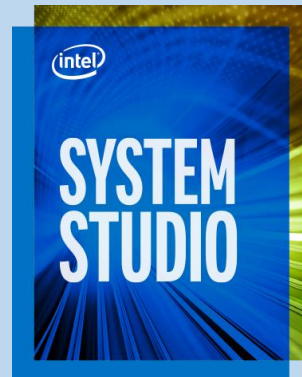
Media SDK



OpenCL SDK

Develop, analyze, and  
optimize your games

Embedded



Fast, efficient embedded  
and mobile  
devices/systems

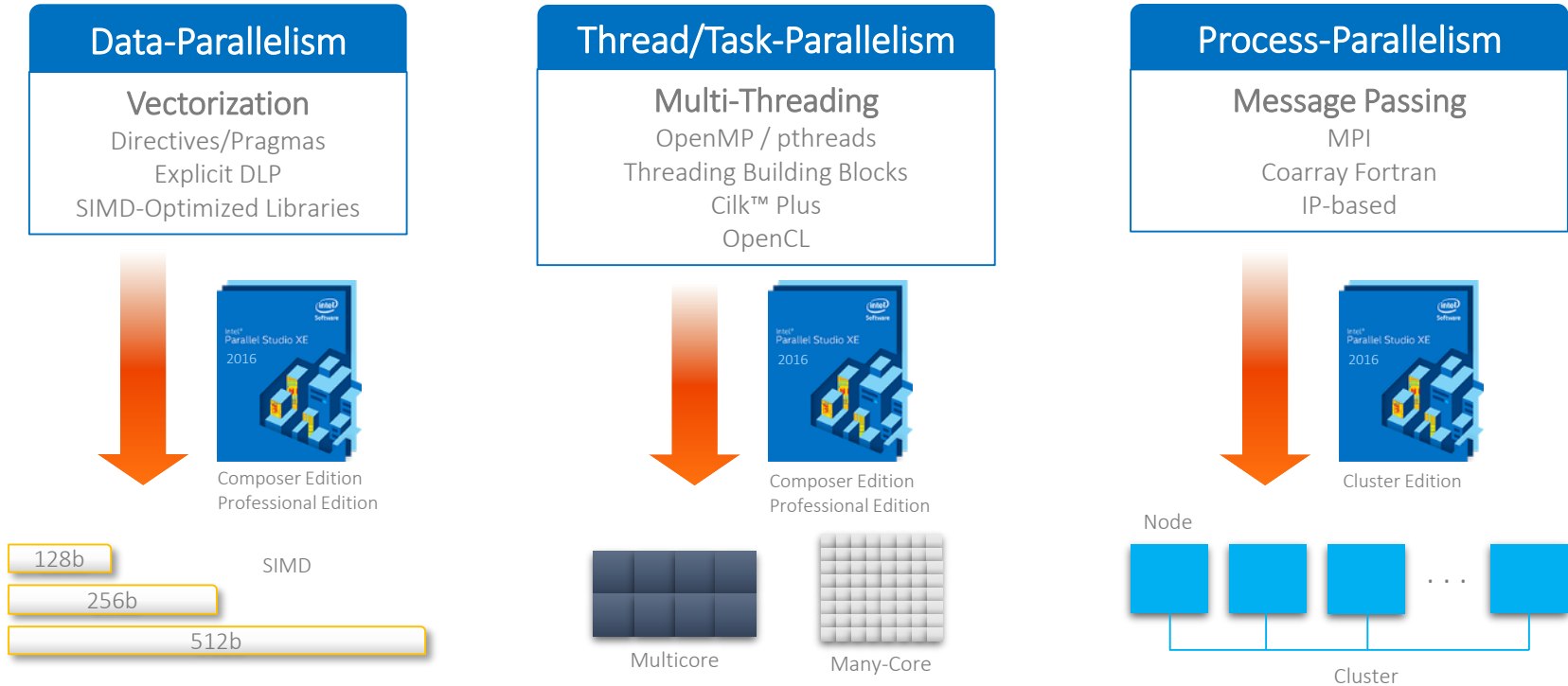
Web Multi-Platform



Deploy apps on  
multiple platforms  
using one codebase

# Portable and scalable parallel programming

Simplified by Intel® Parallel Studio XE 2016



Single software architecture valid for all Intel hardware targets

# Agenda (Day 1)

Time	Topic
09:00 – 10:00	Intel technology platform for HPC and processor update
10:00 – 11:00	Meet Intel® Parallel Studio XE 2016
11:00 – 11:15	Coffee break
11:15 – 12:30	Optimize and perform with Intel® MPI
12:30 – 13:00	Maximizing performance and scalability using performance libraries
13:00 – 14:00	Lunch
14:00 – 14:30	Coding high performance big data analytics with DAAL
14:30 – 15:30	Best practices for SIMD vectorization
15:30 – 15:45	Coffee Break
15:45 – 17:15	Tutorial – Real world examples for SIMD vectorization
17:15 – 17:45	Q&A

# Agenda (Day 2)

Time	Topic
09:00 – 10:00	Case study – Performance optimization of Black-Scholes calculation
10:00 – 11:00	Case study – Improving performance of numerical weather prediction codes
11:00 – 11:15	Coffee break
11:15 – 12:45	Case study – Code modernization of Polyhedron benchmark suite
12:45 – 13:45	Lunch
13:45 – 14:30	Case study – Pairwise sequence alignment with the Smith-Waterman algorithm
14:30 – 15:15	Case study – Dynamic load balancing of the N-body problem
15:15 – 15:30	Coffee Break
15:30 – 17:00	Case study – Code optimization in a 3D diffusion model
17:00 – 17:30	Q&A