



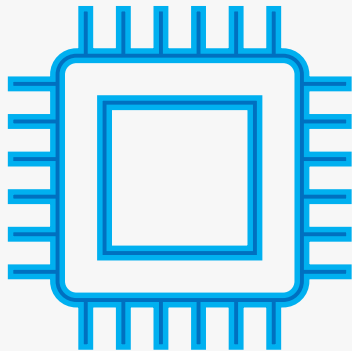
HPC User Forum

September 2021

Andrew Richards

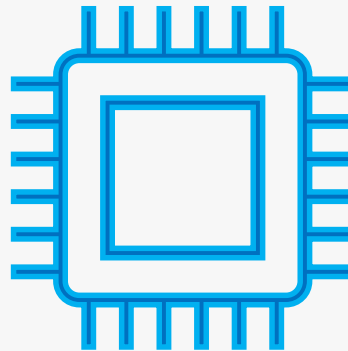
Unleash your Software

Most software
runs here



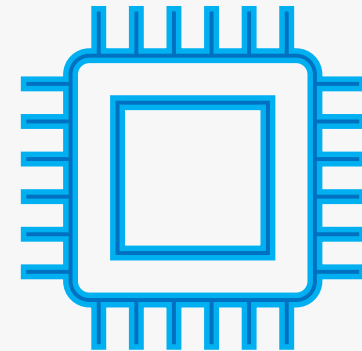
CPU

High performance
software runs here

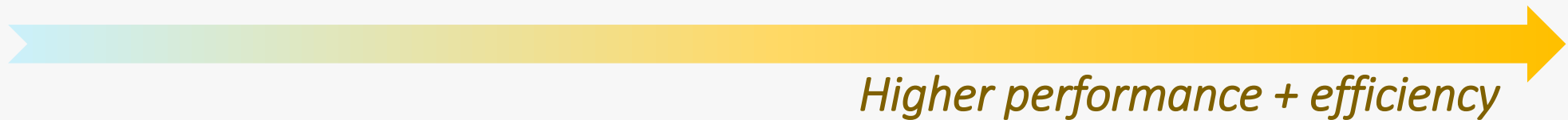


GPU

How do we enable
software to run here?



xPU



Higher performance + efficiency

Case Study: Exascale Supercomputing

Removing Nvidia software lock-in and enabling other US supercomputers with open standards-based software platform with other GPU suppliers



Software ecosystem enabled across all platforms

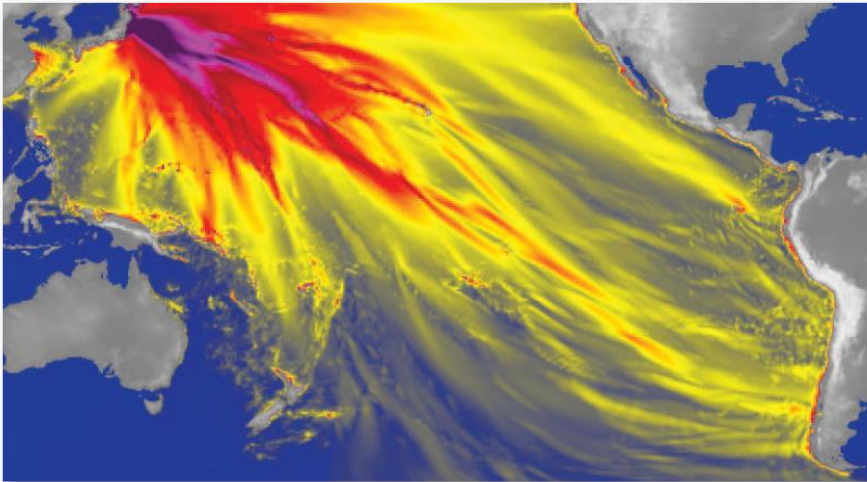


"this work supports the productivity of scientific application developers and users through performance portability of applications between Aurora and Perlmutter."

Case Study: Port CUDA software to SYCL for multi-platform execution

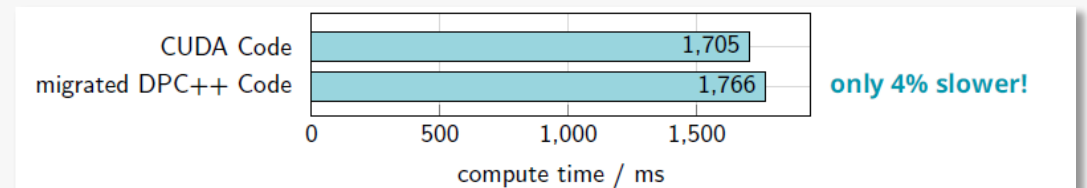
Even on NVIDIA GPU, SYCL code achieves 96% of CUDA's performance

- with Codeplay developed open-source compiler



Source Code Porting

- CUDA for NVIDIA GPUs → SYCL (DPC++)
 - auto-converted with Intel's Compatibility Tool
- SYCL runs on many solutions:
 - NVIDIA GPU + Intel GPU + Intel CPU + Intel FPGA + new SYCL supported processors



Codeplay Product Offering



	Acoran for GPUs	Acoran for Differentiated Compute	Acoran for Processor Developer
Product			
Users	• Supercomputing • Commercial HPC (Intel/AMD/Nvidia)	• Commercial HPC with new processors • Automotive, Data Centers	• Design your own processor optimized for real-world HPC/AI software
Deliverables	DPC++ (SYCL open source) Ecosystem (libs/frameworks)	ComputeCpp (SYCL closed source) Ecosystem (libs/frameworks)	ComputeAorta (closed source)

How can you participate?

- Port your software to SYCL/oneAPI:
 - You get the performance of proprietary GPU programming models, but without the lock-in to one vendor
- Design your own chip around real-world software
 - You can now build a custom chip, optimized for real-world AI and HPC software
 - SYCL gives you huge hardware flexibility: no need for cache coherency, or even caches at all! You can have highly flexible memory architectures
 - SYCL lets you can auto-tune the software to your architectures
- Join the SYCL and oneAPI groups
 - These industry standards let you propose your own favourite features

