oneAPI Technical Advisory Board Meeting

November 17, 2109

Grand Hyatt Denver Hotel

Agenda

Duration	Topics
5:30pm-6pm	oneAPI introduction
6-7:30pm	Data Parallel C++: What's on top of SYCL and why ○ DPC++ language extensions ○ DPC++ Library ○ Open questions
7:30-8pm	Next Steps. How do we collaborate in the future.

Welcome and Thanks

- A unique opportunity to steer the parallel programming ecosystem

- A problem worth solving
  - Multi-architecture, avoiding lock-in to 1 specific hardware architecture
  - Direct and library-based programming
  - Extending existing models
  - Performant

- Your leadership, input, and feedback is critical

Rules of the Road

- DO NOT share any confidential information or trade secrets with the group
- DO keep the discussion at a High Level
  - Focus on the specific Agenda topics
  - We are asking for feedback on features for the oneAPI specification (e.g. requirements for functionality and performance)
  - We are NOT asking for feedback on any implementation details
- Please submit any implementation feedback in writing on Github in accordance with the Contribution Guidelines at spec.oneapi.com. This will allow Intel to further upstream your feedback to other standards bodies, including The Khronos Group SYCL* specification.

Notices and Disclaimers

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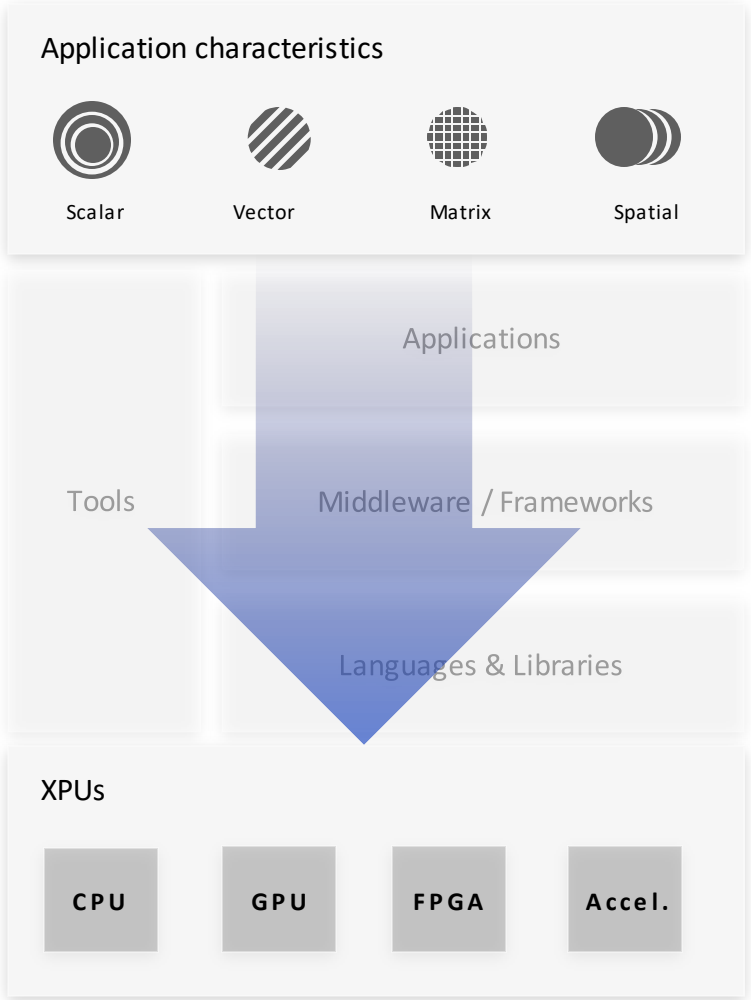
This specification is a continuation of Intel's decades-long history of working with standards groups and industry/academia initiatives such as The Khronos Group*, to create and define specifications in an open and fair process to achieve interoperability and interchangeability. oneAPI is intended to be an open specification and we encourage you to help us make it better. Your feedback is optional, but to enable Intel to incorporate any feedback you may provide to this specification, and to further upstream your feedback to other standards bodies, including The Khronos Group SYCL* specification, please submit your feedback under the terms and conditions below. Any contribution of your feedback to the oneAPI Specification does not prohibit you from also contributing your feedback directly to The Khronos Group or other standard bodies under their respective submission policies.

By opening an issue, providing feedback, or otherwise contributing to the specification, *you agree that Intel will be free to use, disclose, reproduce, modify, license, or otherwise distribute your feedback in its sole discretion without any obligations or restrictions of any kind, including without limitation, intellectual property rights or licensing obligations.* For complete contribution policies and guidelines, see Contribution Guidelines on www.spec.oneapi.com.

PROGRAMMING CHALLENGES FOR MULTIPLE ARCHITECTURES

Variety of compute patterns

Diverse set of data-centric hardware required



No common programming language or APIs

Inconsistent tool support across platforms

Each platform requires unique software investment

What if

- For application developers
  - A single highly productive **language** and a rich set of **libraries** was available **everywhere**
- For HW vendors
  - Tap into **existing SW ecosystem**
  - Define their own “to the metal” language
- For tools researchers
  - Leverage existing **compiler infrastructure** and tooling interfaces

oneAPI

A unified programming model to simplify development across diverse architectures

Common developer experience across architectures

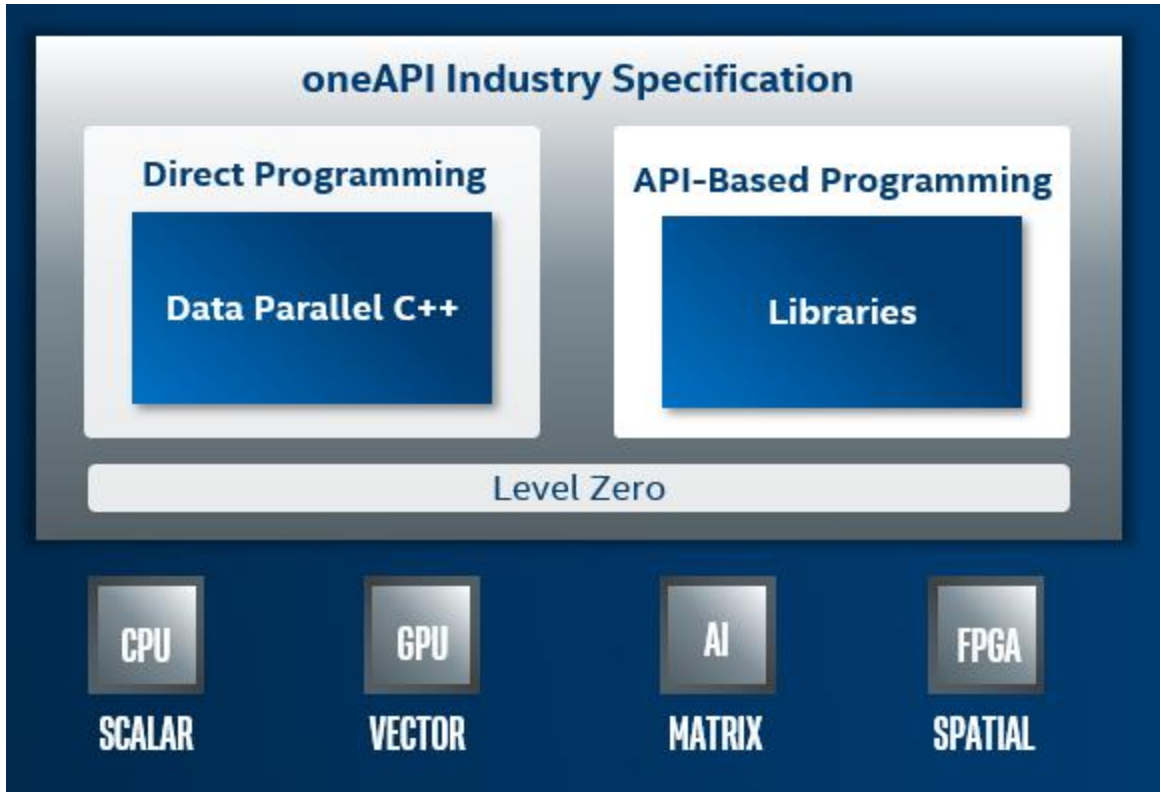
Unified and simplified language and libraries for expressing parallelism

Uncompromised native high-level language performance

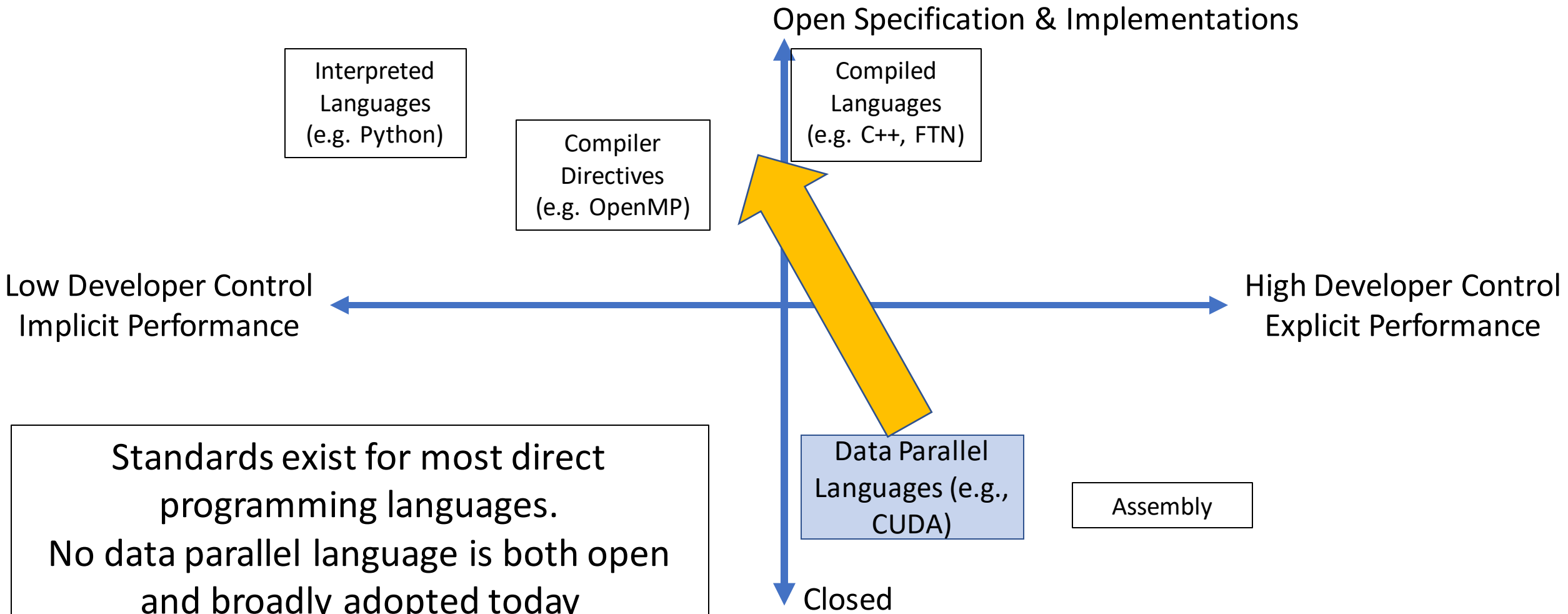
Interoperates with existing languages and libraries

Support for CPU, GPU, AI and FPGA

Based on industry standards and open specifications



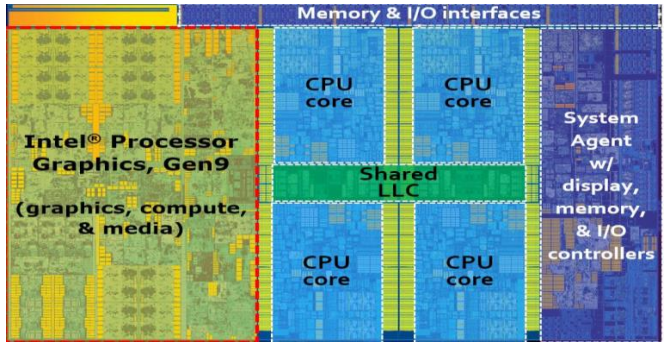
The direct programming problem



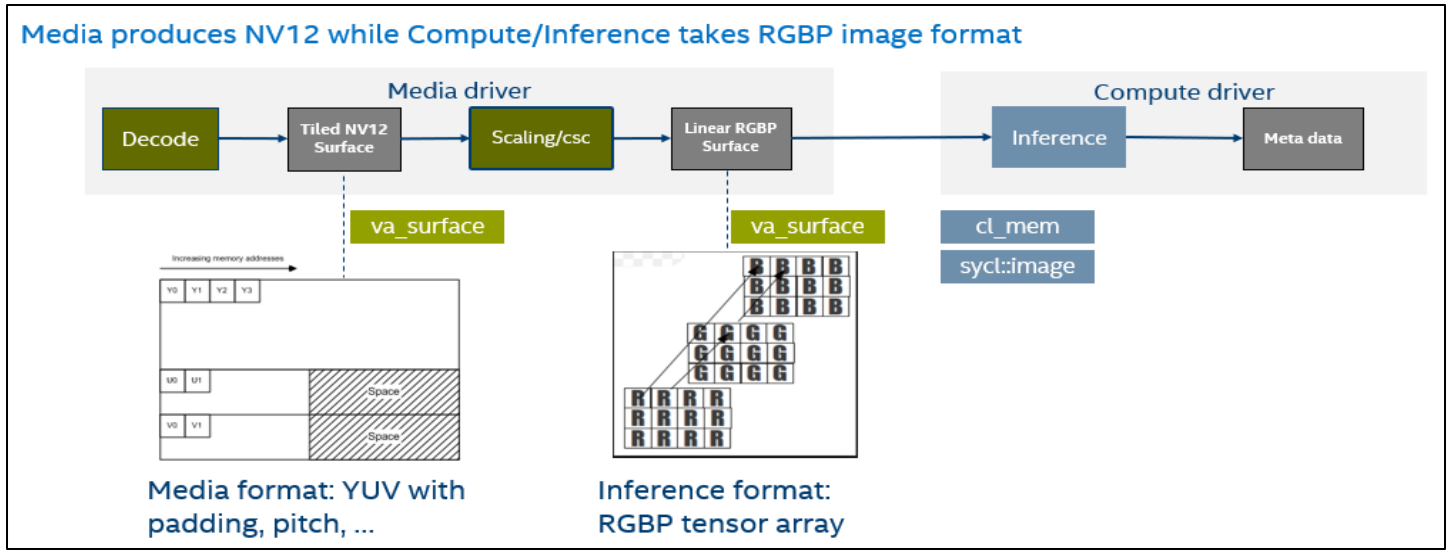
Standards exist for most direct programming languages.
No data parallel language is both open and broadly adopted today

The API programming problem

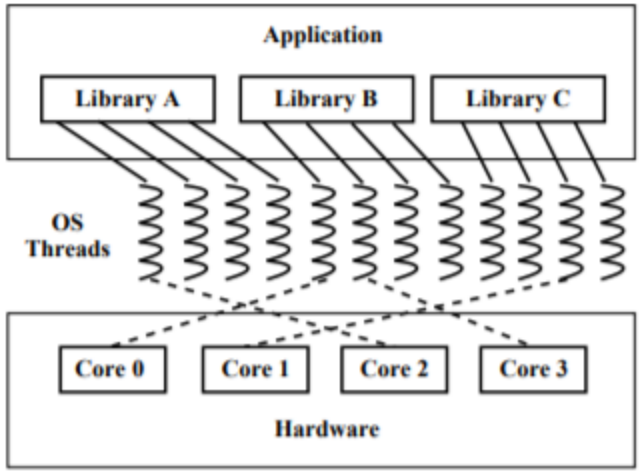
Where to run?



Sharing data?



Sharing resources?



Nine elements of oneAPI

Element Name	Short Name	Open		
		Spec	Tests	Source
oneAPI Data Parallel C++	DPC++	Y	Y	Y
oneAPI DPC++ Library	oneDPL	Y	V1.0	V1.0
oneAPI Deep Neural Network Library	oneDNN	Y	V1.0	Y
oneAPI Collective Communications Library	oneCCL	Y	Y	Y
oneAPI Data Analytics Library	oneDAL	Y	Y	Y
oneAPI Threading Building Blocks	oneTBB	Y	Y	Y
oneAPI Video Processing Library	oneVPL	Y	Y	Y
oneAPI Math Kernel Library	oneMKL	Y	V1.0	TBD
oneAPI Level Zero	Level Zero	Y	β upd.	β upd.

Today we will focus on DPC++ and oneDPL

oneAPI industry initiative

Open Industry Specification

- Specifies Language, APIs, Low level Hardware Interface
- Cooperative relationship with Khronos SYCL standard
- Promotes community and Industry support
- Supports code reuse across architectures and vendors

Technical Advisory Board

Collaborative advancements to specification

Industry Brand

Drives cross-industry adoption

Governance of oneAPI specification

Vision

Model loosely after the MPI Forum
low overhead, no foundation,
open, participation drives voting rights

Work with standards bodies
Khronos, ISO C++, BLAS forum
Preview and test ideas
Goal is sufficient agreement to pass feedback to standards and projects

Focused meetings on different oneAPI components
DPC++, HPC libraries, AI, System interface

For now

TAB is private.
Seeking feedback only

IP

Creative Commons License
Intel feedback clause to facilitate routing to standards

Open to different licensing after 1.0, if necessary