IWOCL 2024
The 12th International Workshop on OpenCL and SYCL

SYCL State of the Union IWOCL’24
Tom Deakin, SYCL Working Group Chair
University of Bristol, UK

APRIL 8–11, 2024 | CHICAGO, USA | IWOCL.ORG
SYCL State of the Union
IWOCL’24
CC-BY
April 2024
SYCL so far

- **OpenCL 1.2**: C++11 Single source programming
- **OpenCL 2.1**: SPIR-V in Core
- **OpenCL 2.2**:
- **OpenCL 3.0**:

- **SYCL 1.2**: C++11 Single source programming
- **SYCL 1.2.1**: C++11 Single source programming
- **SYCL 2020**: C++17 Single source programming
  - Lots of features for HPC
  - Many backend options
- **SYCL Next**...

- **C++11**
- **C++14**
- **C++17**
- **C++20**
- **C++23**

- **2011**
- **2015**
- **2017**
- **2020**
- **202X**
SYCL Implementations in Development

SYCL, OpenCL and SPIR-V, as open industry standards, enable flexible integration and deployment of multiple acceleration technologies.

SYCL enables Khronos to influence ISO C++ to (eventually) support heterogeneous compute.

DPC++
Uses LLVM/Clang
Part of oneAPI

AdaptiveCpp
(formerly hipSYCL)
Multiple Backends

WIP to upstream SYCL support in LLVM

Any CPU
Intel CPUs
Intel GPUs
Intel FPGAs

NVIDIA GPUs
AMD GPUs

Level Zero
Intel GPUs
AMD GPUs

OpenMP
Any CPU

OpenCL
Intel CPUs
AMD GPUs
Intel GPUs

SPIR-V
NVIDIA CUDA
Level Zero
Intel GPUs
AMD GPUs
Intel GPUs

Logos are the property of their respective owners
This work is licensed under a Creative Commons Attribution 4.0 International License
Intel® oneAPI DPC++/C++ Compiler: Conformant with SYCL 2020 Specification

Unified Shared Memory, Parallel Reductions, Work Group Algorithms, Class Template Argument Deductions, Simplification of Accessors, Expanded Interoperability, and more

Intel is proud to contribute to a revolution anchored in SYCL:

An open ecosystem of
• software developers
• hardware vendors
• compilers and development tools
• APIs and specifications

Intel® oneAPI DPC++/C++ Compiler: with SYCL towards Open Multiarchitecture Computing
SYCL Experimental Development

SYCL, OpenCL and SPIR-V, as open industry standards, enable flexible integration and deployment of multiple acceleration technologies.

SYCL enables Khronos to influence ISO C++ to (eventually) support heterogeneous compute.

Multiple Backends in Development

For more information: http://sycl.tech
SYCL Next

- Strategic path to incrementally release new features as KHR extensions
  - Complete with tests and implementations
- Key priorities are:
  - syntax improvements
  - queue event performance
  - task graphs
  - compile-time properties
  - hierarchical parallelism
- Seeking feedback on priority features from you!

This work is licensed under a Creative Commons Attribution 4.0 International License
SYCL Reference

New resource to support SYCL developers
Inspired by cppreference.com
Short descriptions of SYCL 2020 API
Specification remains the canonical document

https://www.khronos.org/sycl/reference
The SYCL Book (second edition)


- New edition up to date with SYCL 2020, published Oct 4th, 2023
- Source code repository of examples
- (Free) Open Access online, or available in paperback
SYCL Developer Resources

- I need to learn SYCL
  - The book
  - Attend a tutorial
  - SYCL Academy: https://github.com/codeplaysoftware/syclacademy

- I know SYCL, and need more information about an API
  - SYCL Reference https://www.khronos.org/sycl/reference

- I need to know the ins-and-outs of an API
  - SYCL Spec (it’s quite readable!) https://registry.khronos.org/SYCL/

- I still need help!
  - Forums:
    - https://community.khronos.org/c/sycl/
    - https://stackoverflow.com/questions/tagged/sycl
  - SYCL.tech: https://sycl.tech/
  - Khronos Discord: https://www.khr.io/khrdiscord
  - Ask your implementor
Get involved!

Public contributions to Specification and Conformance Tests
https://github.com/KhronosGroup/SYCL-CTS
https://github.com/KhronosGroup/SYCL-Docs

Join as an Invited Expert (no cost, sign Khronos NDA)
https://www.khronos.org/advisors/

Join as a Khronos members
https://www.khronos.org/members/
https://www.khronos.org/registry/SYCL/

Khronos SYCL Forums, Discord/Slack Channels, Stack Overflow, and SYCL.tech

Khronos GitHub
Contribute to SYCL open source specs, CTS, tools and ecosystem

SYCL Advisory Panel

SYCL Working Group