

Kokkos Training Welcome

NERSC

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Kokkos Training

- C++-based programming model for writing performance portable applications
- Part of the NERSC/OLCF/ALCF Performance Portability Series
 - <https://www.nersc.gov/performance-portability-series-2023-2024/>

Session	Date
Advanced SYCL Techniques and Best Practices	May 30, 2023
HIP Training Series	August - October 2023
OpenMP Offload 2023 training, Part 1: Basics of Offload	September 29, 2023
OpenMP Offload 2023 training, Part 2: Optimization and Data Movement	October 6, 2023
Raja	October 10, 2023
Performance Portability for Next-Generation Heterogeneous Systems	February 26, 2024
AMReX	March 14, 2024
Kokkos	April 25-26, 2024
OpenMP Training Series	May - October, 2024
Other solutions	TBD

SYCL: TBD
HPX: TBD

A few Upcoming Trainings

- [Kokkos 4.3 Release Briefing, April 29](#)
- [ALCF AI Testbed Training Workshops, May - June](#)
 - 2 more sessions, registration due May 1
- [OpenMP Training Series, May 6 - October 28](#)
 - Also part of the NERSC/OLCF/ALCF Performance Portability Series
 - Monthly training sessions. First session starts May 6
- [Debugging Challenging Memory and GPU Problems with TotalView, May 13](#)
- [NERSC GPU Hackathon, August 13-22](#)
 - Application deadline May 8

Some Logistics

- Users are muted upon joining Zoom due to large number of attendees
- Please change your name in Zoom session as “first_name last_name (nersc_user_name)”, such as “Helen He (yunhe)”
 - Click “Participants”, then “More” next to your name to rename.
- You can click the CC button to toggle captions and view full transcript
- Slides will be uploaded soon. Recording to be available in a few days
 - <https://www.nersc.gov/portability-series-kokkos-apr2024/>
- Please ask your questions in GDoc (preferred over Zoom chat)
 - <https://tinyurl.com/99k548je>
- Please help us improve by answering the survey
 - <https://tinyurl.com/57e3c6vy>
- Slack channel for Q&A after this training

Agenda (Day 1)

New Users (Main Zoom room)

- Kokkos Introduction and simple parallel patterns
 - [Rahul Gayatri \(NERSC\)](#)
- Kokkos Data abstractions + Execution and Memory Spaces
 - [Bruno Turcksin \(OLCF\)](#)

Advanced Users (Breakout 1)

- Hierarchical Parallelism
 - [DongHun Lee \(Sandia National Lab\)](#)
- Scratch Memory
 - [Conrad Clevenger \(Sandia National Lab\)](#)
- Reductions
 - [Daniel Arndt \(OLCF\)](#)

Agenda (Day 2)

New Users (Main Zoom room)

- Multi-dimensional Range parallelism
 - Rahul Gayatri (NERSC)
- Hierarchical Parallelism
 - Bruno Turcksin (OLCF)

Advanced Users (Breakout 1)

- Kokkos Tools
 - Vivek Kale (Sandia National Lab)
 - John Mellor-Crummey (Rice Univ)
 - Kevin Huck (Univ of Oregon)
 - Sameer Shende (Univ of Oregon)
 - Daniel Arndt (OLCF)

Kokkos Materials

- Primary GitHub repo <https://github.com/kokkos>
- Documentation: <https://kokkos.github.io/kokkos-core-wiki>
- [Kokkos Lecture Series](#)
- [Hands-on exercises](#)
- Join the Kokkos slack <https://kokkosteam.slack.com>
 - **#doe-portability-training** channel

Access to Perlmutter and Use Kokkos Module

- NERSC users have been added to ntrain9 project
- Non-users were sent the instruction to get a training account
 - Account valid through May 2
- Login to Perlmutter: ssh username@perlmutter.nersc.gov
- Kokkos modules:
 - % module use /global/common/software/nersc/pe/modulefiles/latest
 - % module load kokkos-cpu/4.3.00 (CPU module)
 - % module load kokkos-gpu/4.3.00 (GPU module)
- Running Jobs examples:
 - <https://docs.nersc.gov/jobs/>

Compute Node Reservations

- GPU node reservation: 10 am -1 pm Pacific, Fri Apr 26
 - To use 1 GPU only (sample flags for sbatch or salloc):
 - `-A ntrain9 --reservation=kokkos -C gpu -N 1 -c 32 -G 1 -t 30:00 -q shared`
 - To use multiple nodes (sample flags for sbatch or salloc):
 - `-A ntrain9 --reservation=kokkos -C gpu -N 2 -t 30:00 -q regular`
- Outside of reservation, use:
 - To use 1 GPU only (sample flags for sbatch or salloc):
 - `-A <project> -C gpu -N 1 -c 32 -G 1 -t 30:00 -q shared`
 - To use multiple nodes (sample flags for sbatch or salloc):
 - `-A <project> -C gpu -N 2 -t 30:00 -q regular` (or `-q interactive` for `salloc`)