Welcome to Using HPE Cray Programming Environment to Port and Optimize Applications to GPUs Training

Helen He
NERSC Training
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Speaker Introduction

- Legendary **John Levesque**, HPE
- 57 years of experience in HPC
  - Director of Center of Excellence at OLCF, LANL (Cray)
    - Titan, top 1 in 2012; Jaguar, top 1 in 2009
  - Director of Advanced Computing Tech Center (IBM)
- Expert in application tuning and compiler analysis of scientific applications
- Book author
  - Programming for hybrid Multi/Manycore MPP systems (2017)
  - A Guidebook to Fortran on Supercomputers (2014, 1989)
  - High Performance Computing: Programming and Applications (2010)
- Numerous presentations and tutorials at conferences and at DOE labs
- To retire at the end of 2023. Congratulations !!!

Some Logistics (1)

- Muted upon joining Zoom due to large number of attendees
- Please change your name in Zoom session as “first_name last_name”
  - Click “Participants”, then “More” next to your name to rename
- Live “Captions” and “View Full Transcripts” are enabled
- Q&A: use Google Doc (preferred) instead of Zoom chat
  - https://tinyurl.com/24sbn752
- Slides/videos will be uploaded to the event web page
- Please help us with answering the survey after the training
  - https://tinyurl.com/ybv5bt5u

Some Logistics (2)

- Users are added to the ntrain9 project for hands-on
  - Training accounts are valid through Dec 14
- Perlmutter GPU nodes are reserved during the training
  - 8:30 am - 12:30 pm, Dec 7
    - #SBATCH --reservation=cpe_dec7 -A ntrain9 -N 1 -C gpu -c 32 -G 1 -q shared
  - Outside of above reservation
    - #SBATCH -A <project> -N 1 -C gpu -c 32 -G 1 -q shared
    - #SBATCH -A <project> -N 1 -C gpu -q debug (use entire GPU node)

Some Logistics (3)

- Hands on materials
  - % ssh perlmutter.nersc.gov
  - % cd $SCRATCH
  - % cp -r /global/cfs/cdirs/training/2023/CPE_Dec2023 . (notice the last dot)
  - % cd CPE_Dec2023

    refer to README there
  - % cd tutorials_apps/himeno
  - % source setup
  - % compit
  - % sbatch runit.dec7

Using HPE CPE and Tools on Perlmutter

- Setup environment
  - module load PrgEnv-cray
  - module load perftools (or perftools-lite, perftools-lite-loops, perftools-lite-gpu,...)
- Sample compilation
  - ftn -h list=a mycode.f -o mycode.exe
  - rm mycode.exe+pat
  - pat_build -u -g mpi mycode.exe (this will create mycode.exe+pat)
- Run the mycode.exe+pat to get performance data
    - srun .. mycode.exe+pat (in a batch script)
- Using Reveal
  - Generate program library
    - ftn -hpl=mycode.pl mycode.f -o mycode.exe
  - Launch reveal
    - reveal mycode.pl <perftools_data_directory>

Some Useful Links

- Perlmutter documentation
  - https://docs.nersc.gov/systems/perlmutter/
- NX documentation
  - To expedite remote X-forwarding, useful for GUI
  - https://docs.nersc.gov/connect/nx/
- Using Perftools and Reveal
  - https://docs.nersc.gov/tools/performance/craypat/
  - https://docs.nersc.gov/tools/performance/reveal/
- NERSC Training Events
  - https://www.nersc.gov/users/training/events/
  - https://www.nersc.gov/users/training/past-training-events/

Thank you!