Hewlett Packard Enterprise

Practical sessions

Comprehensive General LUMI Course

October 28–31, 2024

Materials Locations

- Slides will be uploaded soon after talks
  `/project/project_465001362/Slides/HPE`
  `Files *.pdf`

- Exercise notes and files (should include PDFs or Readme.md with instructions)
  `/project/project_465001362/Exercises/HPE`

- Copy exercise files into your `$HOME` directory
  - If needed, unpack the exercise tar files with
    `tar xf <file>.tar`
    `tar xf <file>.tar.gz`

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

Setup

- Reservations are setup for use during the training (on LUMI-C and LUMI-G)
  - Use the following flags in the SLURM commands:

```
-A project_465001362 --reservation=lumic_ams
                     (or --reservation=lumig_ams)
```

- To run the examples either use above options with sbatch/srun/salloc or you can also set SLURM environment variables, e.g.

```
export SLURM_ACCOUNT=project_465001362
export SLURM_RESERVATION=lumig_ams
```

  (to be repeated for variables with prefix `SLURM_`, `SBATCH_`, `SALLOC_`)

- For convenience, we provide a script to setup your environment (copy from `/project/project_465001362/Exercises/HPE`):
  - `source lumi_c.sh # LUMI-C`
  - `source lumi_g.sh # LUMI-G`

  ➔ It will change the prompt accordingly, remember to run `exit` before you switch environment

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

Exercises – Day 1 Introduction

- Exercise notes and files (should include PDFs or Readme.md with instructions)
  `/project/project_465001362/Exercises/HPE/day1`

- Directory: `ProgrammingModels`
  - Session 1:
    Run on the system and get familiar with the SLURM commands
  - Session 2:
    Try different compilers and flags

- Directory: `libsci_acc`
  - Session 3:
    Test with LibSci_ACC, check the different interfaces and environment variables

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

Exercises – Day 2 Introduction

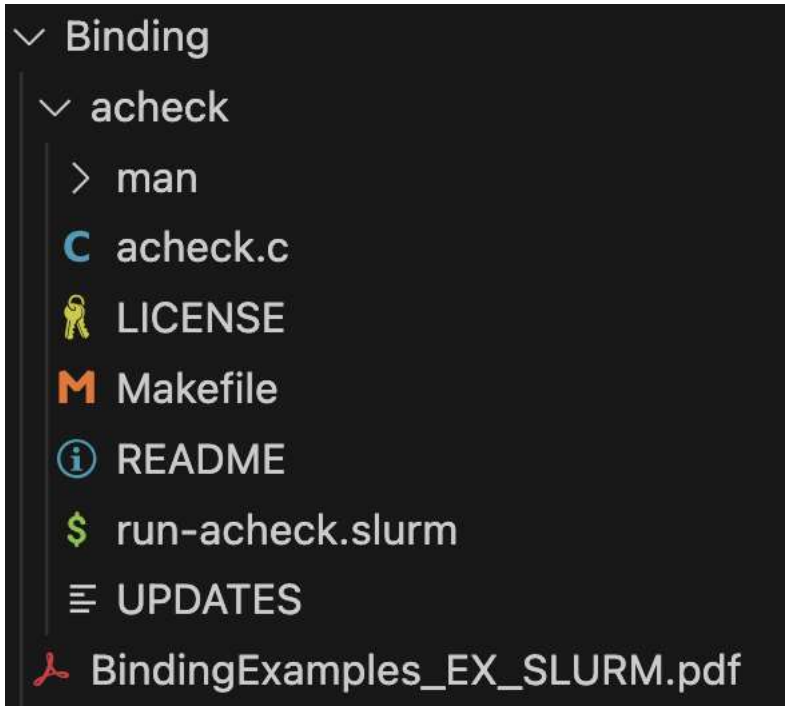
- Exercise notes and files (should include PDFs or Readme.md with instructions)
  `/project/project_465001362/Exercises/HPE/day2`

- Directories: `Binding, gpu_perf_binding`
  - Session 5:
    Try different binding options for CPU execution (look at slides and use envars to change order and display the order) and for GPU execution (gpu_perf_binding, see next slide)

- Directories: `debugging` (within directories)
  - Session 6:
    Try the debugging tools in debugging sub-directory

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

CPU binding : HPE/day2/Binding/



Get the right environment:

- `source ../../lumi_c.sh`

Compile acheck :

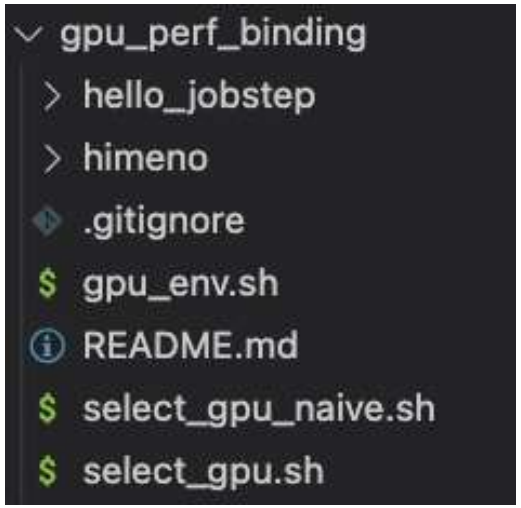
- cd acheck && make
  - Default modules produces *acheck-cray*

Look at the sbatch example

- `cat run-acheck.slurm`
  - test different bindings
- `sbatch run-acheck.slurm`

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

GPU binding : HPE/day2/gpu_perf_binding/



Get the right environment:

- `source ../../lumi_g.sh`
- `source gpu_env.sh`

Compile the two applications:

- cd hello_jobstep && make
- cd himeno && make

Start with hello_job_step example

- `cd hello_jobstep`
- `sbatch job.slurm`
  - test different bindings
  - `gpu_bind variables...`

Launchl Himeno from the root directory

- `cd himeno`
- `sbatch job.slurm`
  - test different bindings

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

Exercises – Day 3 Introduction

- Exercise notes and files (should include PDFs or Readme.md with instructions)
  `/project/project_465001362/Exercises/HPE/day3`

- Directories: `perftools-lite, perftools-lite-gpu`
  - Session 7:
    Follow the Readme.md description and get familiar with the perftoos-lite commands and outputs
    – subdirectory perftools-lite needs lumi_c.sh to be sourced
    – subdirectory perftools-lite-gpu needs lumi_g.sh to be sourced

- Directories: `perftools` (within directories)
  - Session 8:
    Follow the Readme.md description (per each directory) and get familiar with the perftools commands and outputs
    – subdirectories perftools, perftools-api, perftools-hwpc, perftools-python, and perftools-apa need lumi_c.sh to be sourced
    – subdirectories perftools-for-hip and perftools-for-omp-offload need lumi_g.sh to be sourced

- Directories: `ProgrammingModels`
  Session 9:
  Test the Pi example with MPI or MPI/OpenMP on 4 nodes and 4 tasks
  Show where the ranks/threads are running by using the appropriate MPICH environment variable
  Use environment variables to change this order (rank-reordering)

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

Exercises – Day 4 Introduction

- Exercise notes and files (should include PDFs or Readme.md with instructions)
  `/project/project_465001362/Exercises/HPE/day4`

- Directory: `node_performance`
  - Session 12:

    Try different compiler optimization levels and see the impact on performance

- Directory: `VH1-io`
  - Session 13:

    For I/O experiment with striping for the example.

    ALTERNATIVELY look again at MPI with apprentice
    If you did not do this yesterday, set `PAT_RT_SUMMARY=0`

    – You get trace data per rank when you do this (huge file)

    Set only 2 cycles in the input file (indat)

    Use app2 on .ap2 file to see new displays (see help)

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP

© 2024 HEWLETT PACKARD ENTERPRISE DEVELOPMENT LP