aiXcelerate 2017

Paul Kapinos

RWTH AACHEN UNIVERSITY

CLAIX – how2use

- **CLAIX is tightly integrated into the RWTH Cluster**
  - → same software, same batch system(, same front ends, …)
  - → new CPUs, new fabric
    - → old binaries will run
    - → but recompiling/linking all of your software highly recommended
  - → you need a project for starting batch jobs on CLAIX
    - → you get a test project for the lab session
    - → with a project of RWTH or THES class, OR
    - → without a project your jobs will run on old (Bull) hardware

CLAIX – Access

- **CLAIX front ends:**
  - → login.hpc.itc.rwth-aachen.de
  - → login2.hpc.itc.rwth-aachen.de
    - → note the new domain
  - → CPU: Intel(R) Xeon(R) CPU E5-2695 v4 @ 2.10GHz
    - → AVX, AVX2: binaries built here could fail on old (Bull) hardware
- **All other (old) common front ends will do, too!**
  - → note dedicated front ends e.g. for data transfers
  - → older CPUs, no AVX2, binaries built here could be slow on CLAIX
  - → Intel compiler: use –axcode, e.g. see $FLAGS_FAST

CLAIX – Software

- **CLAIX uses the same software stack as (old) Bull cluster**
- **old binaries will run, but could be inefficient**
- **compatibility details:**
- **Open MPI in versions older than openmpi/1.10.4 (current default) won't utilize Intel OmniPath network at full grade**
- **(old) binaries optimized for old CPUs (e.g. -xHost, -fast) won't use new CPUs at full grade (no AVX2…)**

CLAIX – Software

- **CLAIX uses the same software stack as Bull cluster**
- **old binaries will run, but could be inefficient**
- **recompiling/linking all of your software highly recommended: use**
  - → default compiler (Intel), better: intel/18.0
  - → default Open MPI (1.10.4), better: Intel MPI, and
  - → -xHost on [login\login2] front end for optimize for CLAIX CPUs
    - → won't run on old CPU's,
  - → $FLAGS_FAST (-xSSE4.2 -axCORE-AVX2,AVX)
    - → will run fine everywhere (also on old hardware)

CLAIX – Software

- **CLAIX uses the same software stack as Bull cluster**
  - → >4 compilers, >2 MPIs, dozens of versions

- **use modules! e.g. for Intel MPI:**

```
$ module switch openmpi intelmpi
```

- **use envvars we set for you! $FC $CC $CXX $MPIFC $....**

```
$ $MPIFC -g $FLAGS_FAST  mpihelloworld.f90
$ $MPIEXEC $FLAGS_MPI_BATCH  a.out
```

- **consult documentation**
  - → http://www.itc.rwth-aachen.de/primer
  - → https://doc.itc.rwth-aachen.de/display/CC/

CLAIX – Batch

- **CLAIX uses the same software stack as Bull cluster**

- **submit and control you jobs from any front end**
  - → you need a project for starting batch jobs on CLAIX
  - → without a cleared project your jobs will run on old (Bull) hardware
  - → with a cleared project you cannot start jobs on old (Bull) hardware

- **which projects will use CLAIX?**
  - → JARA, BUND, NOVA, PREP projects
  - → any other project cleared for CLAIX, e.g. for using Pascal GPUs
  - → test project for aixCelerate lab session: **hpclab**

CLAIX – Batch Job Example

```
#!/usr/bin/env zsh
#BSUB -J terminal
#BSUB -W 120
#BSUB -M 1850
#BSUB -S 1300
#BSUB -XF
#BSUB -app vtune
#BSUB -P hpclab
#BSUB -U aixcel_2017

#BSUB -R knl
xterm
```

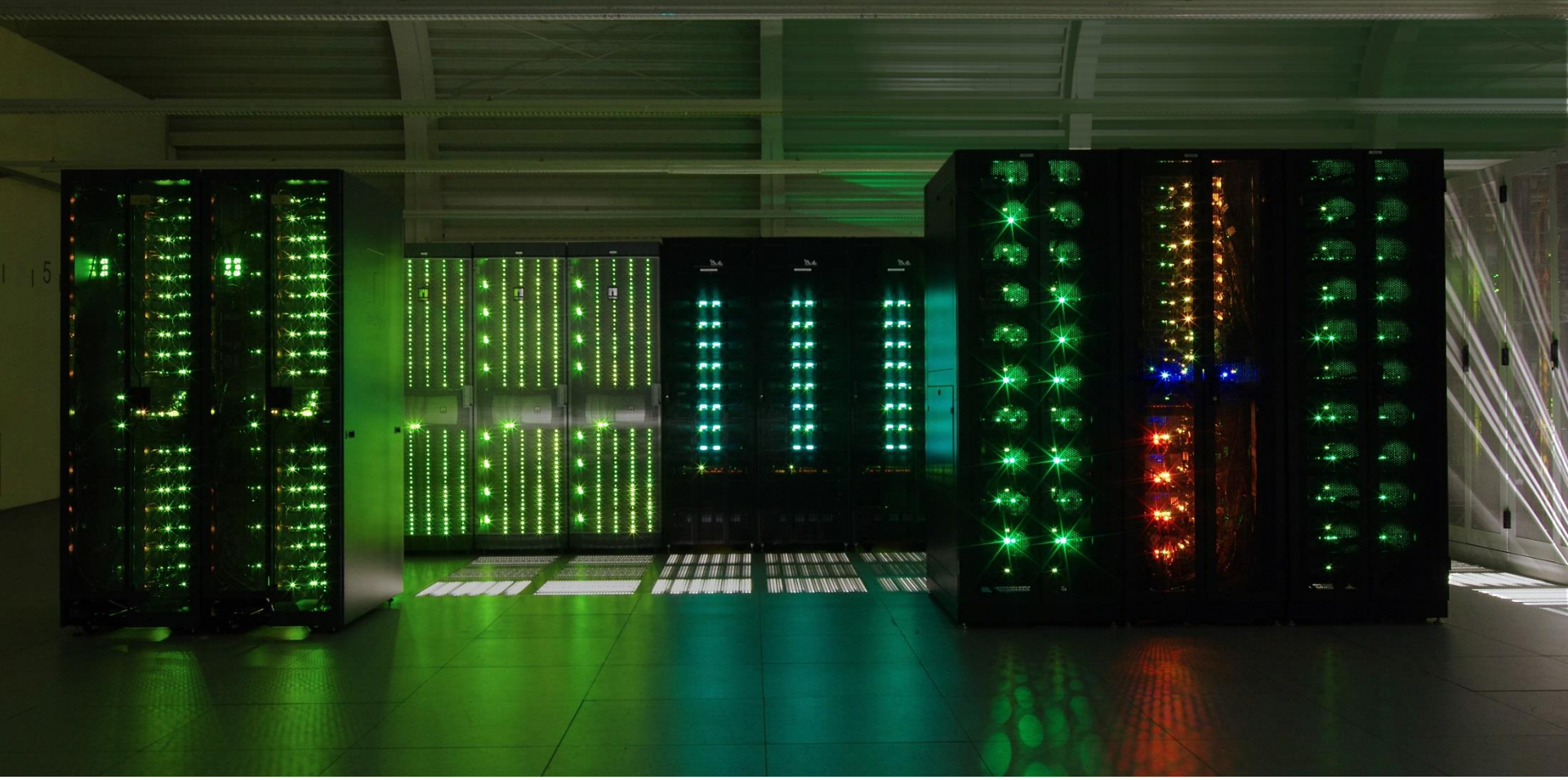
- <- shebang (#!) – you need this for modules!
- <- name of your batch job
- <- time you need (in minutes)
- <- Request memory you need for your job (in MB)
- <- Request stack space (in MB)
- <- Request an (exclusive) job with X11-Forwarding
- <- Request HwC support for VTune/Amplifier
- <- use 'hpclab' project to run on CLAIX
- <- use 'aixCelerate' advanced reservation (optional, on aixCelerate labs only!)
- <- order KNL node type
- <- start an application (a terminal)

VTune and MPI

- **Use Intel MPI**
- **do not use it on front ends**

  → on front ends, MPI ranks are offloaded to back ends (old Hw)

```
#!/usr/bin/env zsh
#BSUB -W 120 -M 1850 -S 1300
#BSUB -app vtune
#BSUB -P hpclab -U aixcel_2017
#BSUB -R knl
#BSUB -a intelmpi
#BSUB -n 4 -R "span[ptile=2]"
module switch openmpi intelmpi;  module load intelvtune
$MPIEXEC $FLAGS_MPI_BATCH \
  amplxe-cl -collect hotspots -r result_dir a.out
```



Thank for your attention.

Paul Kapinos <kapinos@itc.rwth-aachen.de>

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