Parallel Programming in Computational Engineering and Science (PPCES)

HPC Training Event 2026

March 16th-20th, 2026 | Aachen

Dr. Christian Terboven, Dr. Marc-André Hermanns,
Dr. Jannis Klinkenberg, Dr. Sandra Wienke

NHR4CES NHR for Computational Engineering Science | HPC.nrw | EDIH Rheinland | WEST AI KI-Servicezentrum | IT Center | RWTH AACHEN UNIVERSITY

Who We Are? – Organizations

- NHR4CES: NHR for Computational Engineering Science
  - NHR = National High Performance Computing: alliance of 9 German universities to provide resources and competencies to scientists at all German universities
  - RWTH + TU Darmstadt = NHR4CES: focus on computational engineering sciences
- IT Center of RWTH Aachen University, HPC team
  - Provides consulting and training services for HPC users
  - Conducts own HPC research and lecturing (Chair for High Performance Computing)
- HPC.nrw: The North Rhine-Westphalian Competence Network for HPC
  - Connection of expertise of the large HPC centers (Tier 2) with the consulting services of smaller centers (Tier 3)
- EDIH Rheinland: European Digital Innovation Hub
  - Advice on Digitalization, Artificial Intelligence and High Performance Computing
  - Focus on small and medium-sized enterprises, Start-ups, Spin-offs and public facilities
- WestAI: AI services from NRW for Germany
  - Consulting services and access to hardware resources on Nvidia H100 for academia as well as small and medium-sized enterprises*

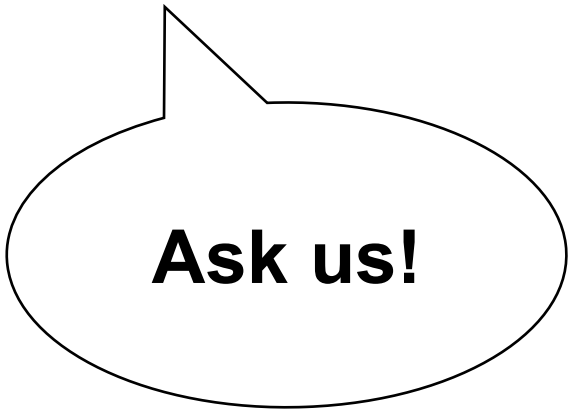
* constraint to research and exploration activities

Who We Are? – People (Speakers, Supporters, HPC Experts)

IT Center of RWTH Aachen University
- Daffa Akmal
- Semih Burak
- Tobias Dollenbacher
- Marc-André Hermanns
- Jannis Klinkenberg
- Jan Kraus
- Philipp Martin
- Lennard Mertens
- Fabian Orland
- Christian Terboven
- Ben Thärigen
- Felix Tomski
- Dominik Viehhauser
- Christian Wassermann
- Sandra Wienke

OpenMP Architecture Review Board
- Ruud van der Pas

Technical University of Denmark (DTU)
- Bernd Dammann



PPCES Overview

- Annual one-week workshop since 2011

- Content
  - Lectures: contents generally applicable
  - Lab exercises: executed on RWTH's HPC cluster "CLAIX"
    - Applying learned concepts in practice (with help from supervisors)
    - Individual discussions possible

- Materials on website: https://blog.rwth-aachen.de/itc-events/en/event/ppces-2026/
  - Additionally: Introduction to HPC (architecture, storage, compute time, slurm,…)

PPCES Overview

OpenMP		MPI		Machine Learning
Mon, March 16th	Tue, March 17th	Wed, March 18th	Thu, March 19th	Fri, March 20th
		Start: 9:00h		
10:10 – 10:40	10:30 – 11:00	10:30 – 11:00	10:30 – 11:00	10:30 – 11:00
12:10 – 13:30	12:30 – 14:00	12:40 – 14:00	12:30 – 14:00	12:30 – 14:00
15:30 – 16:00	15:30 – 16:00	15:30 – 16:00	15:30 – 16:00	15:30 – 16:00
		End: 17:00h		

Legend

lecture/ lab

break

HPC Cluster CLAIX-2023 (Tier-2 + Tier-3)

Theoretical Peak Performance CPUs	2.6 + 1.4 PFlops
Theoretical Peak Performance GPUs	4.4 + 0.7 PFlops
Available resources CPUs	346 + 185 Mio Coreh
Available resources GPUs	27 + 4 Mio Coreh (1 GPU-h == 24 Core-h)
HPC Segment	**412 + 220 HPC nodes** 2-socket Intel Sapphire Rapids (Xeon 8468, 2x48 cores, 2.1 GHz) • 470 nodes with 256 GB • 160 nodes with 512 GB • 2 nodes with 1024 GB
ML Segment	**32 + 5 ML nodes** 2-socket Intel Sapphire Rapids (Xeon 8468, 2x48 cores, 2.1 GHz, 256 GB) **4x NVIDIA H100** 96 GB HBM2e per node
Interactive Segment	One ML node with MIG configuration (e.g., for JupyterHub usage)
Fabric	Infiniband NDR network 2:1 blocking
Storage	29 PB Lustre Storage (HPCWORK) 1.1 PB GPFS (HOME/WORK) BEEOND on SSDs (1.4 TB per node)

Additional WestAI resources:
15 ML nodes

Accessing CLAIX – Hardware

Dedicated hardware (and accounting) for the workshop

ML day only

- 7 CLAIX-2023-ML nodes

	ML/DL
Advanced reservation	`ppces`
Compute time project	`lect174`

Example in batch script file:

```
#SBATCH -reservation=ppces
#SBATCH -account=lect0174
```

Login nodes (full list here)

- `login23-x-1.hpc.itc.rwth-aachen.de` (X-Server, remote desktop sessions, web access possible)
- `login23-x-2.hpc.itc.rwth-aachen.de` (X-Server, remote desktop sessions, web access possible)
- `login23-2.hpc.itc.rwth-Aachen.de`
- `login23-3.hpc.itc.rwth-Aachen.de`

Accessing CLAIX – Accounts

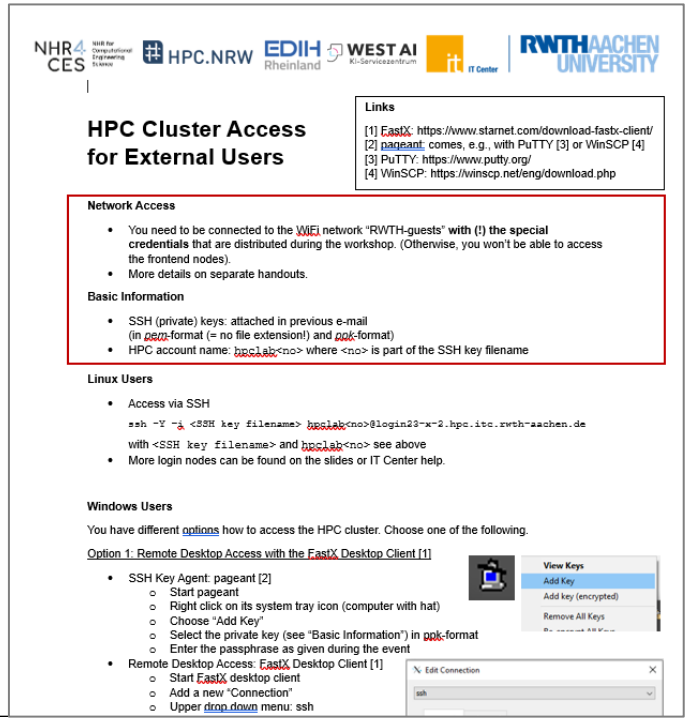
Members of RWTH (or affiliated persons)

- HPC account required: https://regapp.itc.rwth-aachen.de/
  - Two-factor-authentication (2FA) required
- Usage of “free” compute cycles during workshop
- Only ML day: dedicated resources (HPC account must have been submitted during previous survey)

External participants

- Temporary account and SSH key was sent to you by e-mail
  - Account: `hpclab[01-10]`
  - Key: Linux format (pem) or PuTTY/pageant format (ppk)
  - If you didn’t get an e-mail, please contact the IT Center staff during the lab session!
- Password: will be provided during the lab sessions
- Hpclab accounts have all permissions for dedicated hardware
- Network connection: see handout

See **Handout: HPC Cluster Access** for further details



HPC Cluster Access for External Users

Links

[1] FastX: https://www.starnet.com/download-fastx-client/
[2] pageant: comes, e.g., with PuTTY [3] or WinSCP [4]
[3] PuTTY: https://www.putty.org/
[4] WinSCP: https://winscp.net/eng/download.php

Network Access

- You need to be connected to the WiFi network “RWTH-guests” **with (!) the special credentials** that are distributed during the workshop. (Otherwise, you won’t be able to access the frontend nodes).
- More details on separate handouts.

Basic Information

- SSH (private) keys: attached in previous e-mail (in *pem*-format (= no file extension!) and *ppk*-format)
- HPC account name: hpclab<no> where <no> is part of the SSH key filename

Linux Users

- Access via SSH

```
ssh -Y -i <SSH key filename> hpclab<no>@login23-x-2.hpc.itc.rwth-aachen.de
```

with <SSH key filename> and hpclab<no> see above

- More login nodes can be found on the slides or IT Center help.

Windows Users

You have different options how to access the HPC cluster. Choose one of the following.

Option 1: Remote Desktop Access with the FastX Desktop Client [1]

- SSH Key Agent: pageant [2]
  - Start pageant
  - Right click on its system tray icon (computer with hat)
  - Choose “Add Key”
  - Select the private key (see “Basic Information”) in ppk-format
  - Enter the passphrase as given during the event
- Remote Desktop Access: FastX Desktop Client [1]
  - Start FastX desktop client
  - Add a new “Connection”
  - Upper drop down menu: ssh

Evaluation – Feedback Wanted!

PPCES Evaluation Form

(open until April 3rd, 2026)

https://s2survey.net/ppces2026/