

OpenACC Workshop @ University Oldenburg

March 28th/29th, 2017

HPC Facilities @ University Oldenburg

- shared HPC cluster CARL/EDDY
 - close to 600 compute nodes
 - 4 login and 2 administration nodes
 - Infiniband FDR interconnect for parallel computing
 - 10/1GE network
 - parallel file system (GPFS) with 900TB capacity
 - NFS mounted central storage

 - Linux (RHEL) as OS
 - many scientific applications and libraries available
 - Job Scheduler (SLURM)

[https://wiki.hpcuser.uni-oldenburg.de/index.php?title=HPC Facilities of the University of Oldenburg 2016](https://wiki.hpcuser.uni-oldenburg.de/index.php?title=HPC_Facilities_of_the_University_of_Oldenburg_2016)

Overview New Hardware

- **CARL**
 - multi-purpose cluster as a basic computing resource
 - funded by the University/MWK and the DFG under grant number INST 184/157-1 FUGG (Forschungsgroßgerät nach Art. 91b GG)
- **EDDY**
 - CFD cluster for wind energy research
 - funded by the BMWi under grant number 0324005
- **used as a shared HPC cluster**
 - common infrastructure is shared (e.g. file systems, network)
 - shared administration

http://wiki.hpcuser.uni-oldenburg.de/index.php?title=Acknowledging_the_HPC_facilities_2016

Summary CARL & EDDY

| Feature | CARL | EDDY | Total |
|-----------------|-------------|-------------|---------------|
| Nodes | 327 | 244 | 571 |
| Cores | 7.640 | 5.856 | 13.496 |
| RAM | 77 TB | 21 TB | 98 TB |
| GPFS | 450 TB | 450 TB | 900 TB |
| local disks | 360 TB | - | 360 TB |
| Rpeak (nominal) | 271 Tflop/s | 201 Tflop/s | 482 Tflop/s |
| Rpeak (AVX2) | 221 Tflop/s | 164 Tflop/s | 385 Tflop/s |
| Rmax | | | 457.2 Tflop/s |

Rank 363 in Top500

<https://www.top500.org/system/178942>

Compute Nodes CARL

- 128/158x MPC-LOM/STD
 - multiple nodes per chassis
 - 2x Intel 2650 V4
 - 12 cores @ 2,2 GHz
 - 128/256 GB RAM (8x16/32)
 - 1 TB HDD
- 9x MPC-GPU
 - as MPC-STD
 - NVIDIA Tesla GPU P100 PCIe



Racks in Server Room



Login to the HPC Cluster

<http://wiki.hpcuser.uni-oldenburg.de/index.php?title=Login>

- Linux
 - use ssh as before with **carl** or **eddy** as login nodes
`ssh -X abcd1234@carl.hpc.uni-oldenburg.de`
- Windows
 - use MobaXterm (recommended) or PuTTY
- login host names
 - `hpc100[1-4].hpc.uni-oldenburg.de`
 - can be used instead of **carl** or **eddy** (for login to specific node)
 - no difference between **carl** and **eddy** as login
- from outside of the campus network use VPN connection
 - see instructions at <http://www.itdienste.uni-oldenburg.de/21240.html>

Modules and SLURM

- modules to compile and run code using OpenACC

```
module load PGI CUDA-Toolkit
```

- to compile code with OpenACC

```
pgcc -acc -ta=tesla:cc60 -o executable code.c
```

- to execute code on the GPU nodes

```
srun -p mpcg.p -gres=gpu:1 ./executable
```

- Alternatively use partition cfdg.p

- May take a moment if everyone does it the same time