



The **Proficiency Training High Performance Computing** is given by the **Competence Center for High Performance Computing in Hessen**. It consists of short courses which offer researchers and students in academia an introduction to respective topics promoting efficient and successful work in the context of HPC.

ProTHPC takes place multiple times a year at the HKHLR member universities of Hessen (Darmstadt, Frankfurt, Gießen, Kassel, Marburg).

The topics are aligned to the skill tree of the **HPC certification forum**:
<https://www.hpc-certification.org/>

The courses of the program are modules that can be booked separately:

First Day

- **Linux and Shell Scripting – Quick Access to HPC Systems**
- **Batch Job Scheduling**

Second Day

- **Linux Software Build Process**
- **Version Control with GIT**

Third Day

- **Debugging with TotalView**

All courses consist of lectures, some are supplemented with practical exercises. Please bring your own laptop.

ProTHPC is free of charge. Participants organize their own refreshments during breaks.

Please register via <https://www.hkhlr.de/en/events>



Hessisches Kompetenzzentrum
für Hochleistungsrechnen



ProTHPC

Proficiency Training High Performance Computing

March 16-18, 2020

Universität Kassel
IT Servicezentrum

Location:

Universität Kassel, IT Servicezentrum
Mönchebergstrasse 11

Nearest stations:

Holländischer Platz/Universität (Tram 1, 5, RT1, RT4)
Katzensprung (Tram 3, 6, 7)



10:00-13:30

Linux and Shell Scripting – Quick Access to HPC Systems

Level: basic - intermediate

HPC Skill Tree: USE1-B

This course is an introduction to the Linux command line interface, as found on most HPC systems. It covers the basics of the command line as well as the fundamentals of shell scripting and prepares their use for the automation and organization of complex workloads in order to enable an easy usage of HPC Systems.

14:30-17:00

Batch Job Scheduling

Level: basic - advanced (Adapted exercises offer opportunities for knowledge enhancement at all levels. As job scheduling makes use of shell scripting, it is recommended to attend the course introduction into Linux and shell scripting in the morning as well.)

HPC Skill Tree: K4-B

The resources of HPC Systems are managed by a scheduler, therefore the understanding of the scheduling system is critical to appropriately use HPC systems. This course gives an introduction to the concept of batch job scheduling and its usage to achieve maximum resource utilization. The concepts are illustrated using the Slurm scheduler.



10:00-13:00

Linux Software Build Process

Level: intermediate - advanced

HPC Skill Tree: USE3-B

We introduce the basics of building software in the Linux command line environment, which is common on HPC systems. You will learn how to build your own applications with the Linux make system. The basic use of compilers (compiler flags, optimization, linking to libraries, using a pre-processor, generating serial and parallel code, ...) will be covered as well the automation of the build process using make-files (setting variables, targets, dependencies, linking, ...). We will discuss basic principles of automated build systems using configure files as found in many open source applications.

14:00-17:00

Version Control with GIT

Level: basic - intermediate

HPC Skill Tree: SD3.2-B

We present the distributed version control system Git, which is well established in the Linux community. Git can be used not only for large projects - such as kernel development - but also for working together on smaller projects or for versioning your own projects

The following topics are covered:

- Explanation of key concepts (snapshots, commits, repositories)
- Prerequisites (install, config, create repository)
- Basic commands (status, add, commit, clone, push, pull, remote)
- Branching (create, rename, delete, switch, update & merge branches)
- Typical workflow concepts for branching
- Dealing with merge conflicts
- Useful add-ons (stash, log, gitignore, worktree)

10:00-17:00

Debugging with TotalView

Level: intermediate - advanced

HPC Skill Tree: SD2.2-B

Debugging is an essential part of software development and application. The advantages of a debugger compared to "printf-debugging" are often underappreciated. TotalView is a powerful tool which helps to find "sophisticated bugs" in parallel jobs quickly, but is also a helpful and timesaving tool for small problems.

TotalView is installed on all Hessian HPC clusters, and is available for all Hessian researchers.

This course will introduce the basics of debugging and in-depth training on the use of the TotalView debugger. TotalView, in contrast to many free debuggers explicitly supports debugging of parallel applications. This course covers the basic steps of session preparation, processing of core dump files and attaching to a hung process using the TotalView debugger. Advanced techniques covered are reverse debugging and parallel debugging.

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