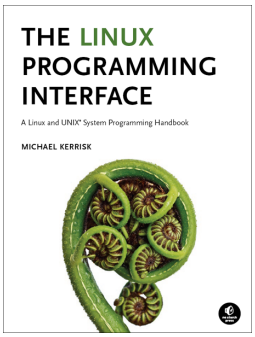
man7.org
Training and Consulting

Linux Control Groups (Cgroups)

Course code: M7D-CGROUPS02

This course provides a thorough introduction to Linux control groups (cgroups), one of the components used in a range of modern applications, including container frameworks, sandboxing technologies, and *systemd*. Detailed presentations coupled with carefully designed practical exercises provide participants with an understanding of cgroups and the knowledge to build and troubleshoot applications that use cgroups.



Audience and prerequisites

The primary audience comprises designers, programmers, and systems administrators who are building, administering, or troubleshooting applications that employ cgroups.

Participants should know how to log in to a Linux or UNIX system and be familiar with common shell commands. No particular programming experience is required.

Course materials

- A course book (written by the trainer) that includes all course slides and exercises
- A source code tarball containing example programs written by the trainer to accompany the presentation

Course duration and format

One day, with around 30-40% of the course time devoted to practical sessions.

Course inquiries and bookings

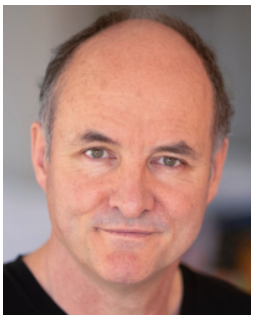
For inquiries about courses and consulting, you can contact us in the following ways:

- Email: training@man7.org
- Phone: +49 (89) 2488 6180 (German landline)

Prices, dates, and further details

For course prices, upcoming course dates, and further information about the course, please visit the course web page, `http://man7.org/training/cgroups/`.

About the trainer



Michael Kerrisk has a unique set of qualifications and experience that ensure that course participants receive training of a very high standard:

- He has been programming on UNIX systems since 1987.
- He has more than two decades of experience as a teacher and trainer, and first began teaching UNIX system programming courses in 1989.
- He is the author of *The Linux Programming Interface*, a 1550-page book acclaimed as the definitive work on Linux system programming.
- He has been actively involved in Linux development, working with kernel developers on testing, review, and design of new Linux kernel–user-space APIs.
- Since 2000, he has been the involved in the Linux *man-pages* project, which provides the manual pages documenting Linux system calls and C library APIs, and was the project maintainer from 2004 to 2021.

Linux Control Groups: course contents in detail

Topics marked with an asterisk (*) may be covered, if time permits.

1. **Course Introduction**
2. **Cgroups: Introduction**
   - Preamble
   - What are control groups?
   - An example: the `pids` controller
   - Creating, destroying, and populating a cgroup
3. **Cgroups: Further Details**
   - Enabling and disabling controllers
   - Freezer control
   - The `pids` controller in more detail
   - Overview of the cgroups controllers
4. **Cgroups: `cpu` and `memory` Controllers**
   - The `cpu` controller
   - The `memory` controller
   - Pressure stall information
5. **Cgroups: Other Controllers**
6. **Cgroups: Advanced Features**
   - Cgroup namespaces
   - Release notification (`cgroup.events` file)
   - Delegation
7. **Cgroups: Thread Mode (*)**
   - Overview of thread mode
   - Creating and using a threaded subtree
   - Further details
8. **Cgroups Version 1 (*)**
   - Cgroups v1: hierarchies and controllers
   - Cgroups v1: populating a cgroup
   - Cgroups v1: release notification
   - Cgroups v1: delegation
   - Problems with cgroups v1; rationale for v2