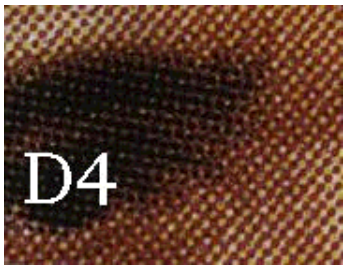

Course

Linux Kernel Internals

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A view below the surface

Nowadays, many companies use Linux-based servers. As the use of Linux for mission critical applications increases, the need for specialised Linux-knowledge will grow proportionally.

In this course the internal concepts of the Linux kernel will be covered. The focus of the course is on the architecture and the functionality of the kernel code, not on a detailed examination of the sourcecode (which changes continuously). Various kernel mechanisms are reviewed which contribute to the right perspective about the design of the Linux kernel. Besides, the internal kernel administration is discussed along with the possibilities to investigate and analyze serious system malfunctioning with help of kernel debugger tools. Also the internal structure of filesystems on disk will be explained.

You can download a sample from this course.

Audience

- Experienced Linux system administrators who need a deeper understanding of the consequences of their daily system management activities and the possibilities to analyze problem situations.
- Experienced application programmers who want to know how the kernel manages system calls in order to be able to write their programs more efficiently.

Objectives This course covers the internal concepts of the Linux kernel without the details of the sourcecode. It enables you to manage your daily system activities in a more efficient way and to track the reasons of complicated problems. For this purpose additional debugging tools will be provided during the course.

Prerequisites For this course detailed knowledge about and experience with Linux/UNIX system administration, or experience as a Linux/UNIX system programmer, is required.
Knowledge of the C programming language is *not* required.

Topics The course is based on Linux version `2.4`. In case of hardware dependencies, the focus is on Intel based systems.

The following topics will be covered:

- Introduction to the kernel: Overview of the kernel source tree. Layers

within the kernel.

- File subsystem: Layout of the `ext2` and `ext3` filesystems. Filesystem switch in the kernel (VFS). Pseudo-filesystem `/proc`. Disk cache implementation. In-core administration of open files. In-core mount list. Handling of pipes.
- Process subsystem: Process management via system calls `fork()` and `exec()`. The boot mechanism. State transitions of processes. Process groups and sessions. Processes and multithreading via the system call `clone()`. Process scheduling and priorities.
- Interrupts and traps: Handling clock and device interrupts. Handling CPU-traps.
- Signals: Source of signals. Handling signals upon receipt.
- Memory management: Layout of the physical memory. Virtual memory concept. Swap devices. The paging mechanism.
- General structure of device drivers: Loadable modules. Characteristics of disk- and tty-drivers.
- Sockets: the framework of networking in the kernel.
- Kernel analysis: Investigation of kernel-administration with the program `atkins`.

The theorical lectures are varied with practical exercises. These exercises will focus on the usage of various tools to analyze problem situations.

Topics not covered include:

- System installation and administration.
- Device driver programming.

Course materials You will receive the book "Understanding the Linux kernel" by Bovet & Cesati. Apart from that, exercises, solutions and copies of the overhead foils are provided.

Certificate You will receive a certificate of attendance shortly after the course.

Duration and price The course will take five days. The price is € 1.330,00 (excl. VAT) for courses in 2003.

Schedule

Date	Location
5-6-7-8-9 May 2003	Nijmegen