LXKer1

Understanding the Linux Kernel

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LXKer1 - Version: 1

5 days Course

Description:

The course describes in details the structure of the Linux kernel and the various mechanisms it contains. A deep understanding of the kernel components helps solving complicate problems, improving system performance and securing the system.

Intended audience:

System managers and programmers who want to deepen their knowledge of Linux OS, or a first step for those who intend to become kernel programmers.

Prerequisites:

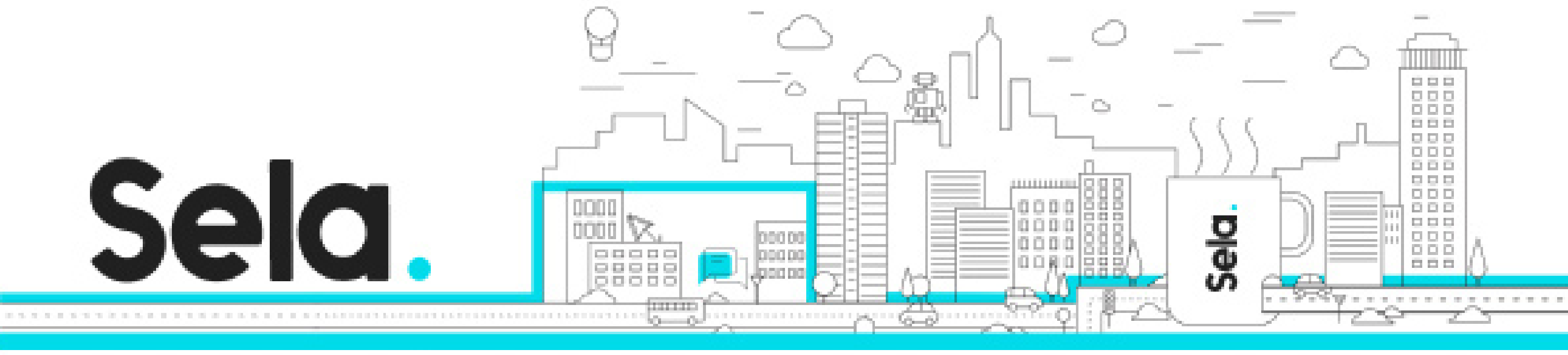
A knowledge of Linux usage and system management.
Basic knowledge of C programing language.

Objectives:

Topics:

Linux OS Overview

- Operating system components
- Operation modes



- Linux kernel structure
- Errors in kernel mode
- User interface to the kernel
- Kernel parameters
- System calls
- Timekeeping
- Compiling the kernel

Linux memory management

- The virtual address space
- Mapping and translating virtual addresses
- Paging
- Physical memory allocation
- I/O buffer cache
- Linux memory usage
- Some tunable parameters
- Out Of Memory mechanism

Linux Process Management

- Processes and threads representation
- Process creation
- Kernel threads
- Process states
- Signals
- Process scheduling

Linux I/O

- Accessing devices
- I/O types
- Direct Memory Access (DMA)
- Host adapters
- Linux device types
- Device drivers
- Device files
- I/O system calls
- I/O scheduling

The Boot Process

- Boot loader stages
- The kernel initialization
- Process ID 1 (init)

Linux on ARM

- What is ARM
- ARM Linux vs x86 Linux
- Device-tree
- Embedded Linux

Crash Dump

- Dump-capture kernel
- kexec
- kdump
- Core collector
- The kdump process

- Forced crash
- The crash utility

Virtualization

- Containers support on Linux
- Docker
- Virtual Machines on Linux

Writing a device driver

- Building a kernel module
- Compiling the module
- Register a module as a device driver
- Adding operations to the driver
- An interrupt handler