Publication date : 03/15/2024

Course : Embedded and real-time Linux

Practical course - 4d - 28h00 - Ref. LXT
Price : 2550 € E.T.

4,4 / 5

BEST

Practical details

Hands-on work

Every step of the training session is immediately applied as a case study on an embedded ARM board with a touch screen to test graphical developments.

Course schedule

1 Open-source cross development tools

- Architecture overview. Overview of an embedded system and of the Linux kernel architecture.
- Cross development tool chain, gcc cross compiler, C libraries, glibc and uClibc, GNU debugger, GNU ELF tools.
- Embedded development tools, QEMU, BUILDROOT, BUSYBOX.

Hands-on work

Installation and practice of Buildroot to build a cross compilation toolchain.

2 The universal Boot loader: uBoot

- uBoot project overview. A walk through the source code. Supported architectures.
- Basic functionalities. The uImage format for booting uBoot Images.
- Practice on a ARM-9 device with uBoot. Configuration, compilation and installation in a qemu sandbox for testing.
- The uBoot configuration options. uBoot commands and environment.
- Integration of new uBoot commands. Development of a standalone program using uBoot as BIOS.

Hands-on work

You will add a new command to uBoot and test uBoot inside QEMU.

PARTICIPANTS

PREREQUISITES

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

3 Linux kernel

- Licenses implications on kernel and kernel modules development.
- Kernel development tools, quilt, GDB, GIT, LTT. Kernel configuration tool Kbuild.
- Kernel configuration and compilation. Module development and compilation.
- The Linux boot process. The schedulers, preemption and scheduling.
- The Linux driver framework and standard drivers.
- VFS Essentials callbacks, implementing a quick and dirty driver with open, read and write callbacks.

Hands-on work

How to modify the kernel tree to add a new driver to the kernel tree. Generate a patch formatted for the LKML. Develop a character driver outside of the kernel tree.

4 Root File system

- Bottom-up approach for the root file system creation.
- Adding users management with busybox.
- Application integration.
- Copying the root file system on a memory technology device.

Hands-on work

Create rootfs from scratch using busybox and test it on a real ARM target. Use buildroot to build new generic applications. Add your own application.

5 Linux and Real-Time

- History and kernel evolution.
- Linux-RT a realtime evolution.
- Nano kernels and interrupt virtualisation.
- Xenomai applications development.
- Real-time Hypervisors.

Hands-on work

Installation of Xenomai, development of a realtime application with Posix and Native Interface. Benchmark comparing Linux standard applications and Xenomai applications under heavy load.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

Dates and locations

REMOTE CLASS

2026 : 7 Apr., 14 Apr., 16 June, 16 June, 18 Aug., 18 Aug., 15 Sep., 13 Oct., 20 Oct., 8 Dec., 8 Dec.

PARIS LA DÉFENSE

2026 : 14 Apr., 16 June, 18 Aug., 20 Oct., 8 Dec.