Publication date : 03/08/2024

Course : Embedded Linux, BSP and uBoot

Practical course - 5d - 35h00 - Ref. BLE
Price : 3040 € E.T.

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 The cross development tools

- 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 and Scratchbox

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.
- Configuration, compilation and installation in a QEMU sandbox for testing.
- Development of a standalone program using uBoot as BIOS.
- uBoot BSP. Adding a new SOC and a new board in the uBoot BSP tree.

Hands-on work

Add a new command to uBoot and test uBoot inside QEMU, generate a new BSP for uBoot and develop a simple stand alone program using uBoot as BIOS.

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 and kernel modules development. Development cycles.
- Kernel development tools, quilt, GDB, GIT, LTT. Configuration tool Kbuild.
- The Linux boot process.
- Devices drivers. The Linux driver framework and standard drivers.
- The Linux BSP. Adding a new board to Linux.
- Specific embedded systems drivers MTD drivers, CAN, SPI and I2C drivers.

Hands-on work

Modify the kernel tree to add a new driver to the kernel tree and generate a patch formatted for the LKML. Develop a character driver outside of the kernel tree.

4 Root File system

- Creation of a rootfs. A tiny root file system, back to UNIX fundamentals and the init program.
- Manage users on an embedded system with busybox.
- Dynamic libraries or static programs. Choosing a root file system architecture.
- Building a rootfs as CPIO or as EXT2 file system.
- Creating JFFS2, UBIFS or YAFFS file systems.

Hands-on work

Create rootfs from scratch using busybox and test it on a real ARM target.Use buildroot to add new applications.Add your own application developed using SCRATCHBOX.Test the buildroot generated rootfs.

5 Limits of Linux Embedded

- Industrial realtime application.
- Power management.
- Embedded interfaces.
- Complete embedded framework.
- Debugging. Using QEMU to debug and embedded system.

Hands-on work

You will modify the Linux boot-logo using standard Linux graphical tools. Test a hard realtime solution. Debug an application on the ARM target.

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 : 1 June, 1 June, 12 Oct., 12 Oct.

PARIS LA DÉFENSE
2026 : 1 June, 12 Oct.