Introduction to embedded Linux

Embedded Linux has grown to one of the most preferred operating systems for embedded system designs and numerous companies have adapted it for their products. It is an open-source, rich featured and robust operating system for embedded systems.

However, getting started with an embedded Linux based embedded design can be a challenging and time consuming task for those who have not previously developed in embedded Linux. Secondly it is difficult to grasp all the advantages and features of embedded Linux and get an overview about hardware requirements for custom designed embedded Linux systems.

This workshop is designed for developers with embedded C experience who would like to get an insight into the development based on embedded Linux from a practical point of view. An introduction is given about what is needed to develop and run an embedded Linux system on a 32-bit processor. The basic concept of the Linux kernel and its main components will be introduced as well as embedded Linux application and kernel module (driver) development.

A critical issue in embedded systems design is the energy efficiency and the power management, therefore the power management framework of the Linux kernel will be introduced as well as power debugging techniques for software optimization targeting the energy efficiency of developed code and the Linux kernel processes itself. Real power consumption will be measured and correlated to software execution to make code and the custom kernel run more energy efficient.

Each course attendee will be given a development kit based on an ARM processor; additionally each attendee will get an energy probe for power debugging. 50% of the course is practical hands-on exercises which are designed generic so that they can be used as a platform for custom embedded Linux projects. Development hardware kits will be provided which can be taken home after the course.

Benefits
On the course you will receive:

➜ An insight into embedded Linux and key kernel components

➜ Setup and use of a cross platform development system

➜ Knowledge about application development based on embedded Linux

➜ Knowledge about peripheral interfacing through kernel modules (drivers)

➜ Knowledge about power management and code correlated power debugging

➜ Hands-on experience with embedded Linux development

Contact

▮ Assistant professor Lars Duggen
tlf. 6550 1640, mail: duggen@mci.sdu.dk

▮ Consultant Mathias M. Jensen
tlf. 6550 1073, mail: matj@sdu.dk

Learn more on www.sdu.dk/sdue

SYDDANSKUNIVERSITET**.DK**

Program

Day 1 Lecture
➜ Introduction to embedded Linux (Kernel concept and architecture, Virtual memory and memory manager, Hardware abstraction layer, Scheduler, File Systems, I/O subsystem, Device driver (kernel module) concepts, User- versus kernel space, Kernel configuration)
➜ Hardware requirements to run an embedded Linux kernel (Processor architecture, Memory management, Storage, Periphery)
➜ Linux start-up sequence and Boot loader (Busybox integration)

Hands-on session
➜ Introduction to the development kit
➜ Setup of a cross platform development and tool chain
➜ Interfacing of an I2C sensor in user-space

Day 2 Lecture
➜ Linux device drivers
➜ Time, Interrupts and Concurrency
➜ Kernel debugging techniques

Hands-on session
➜ Development of a device driver for DC motor control

Day 3 Lecture
➜ Power management in the Linux kernel
➜ Kernel Energy efficiency and power probing techniques
➜ In-system power consumption probing to determine power efficiency of code

Hands-on session
➜ Implementation of a power consumption probing framework for the given hardware and embedded Linux kernel

Robert Brehm is project leader and R&D Engineer for embedded control systems at the Mads Clausen Institute, University of Southern Denmark.

Audience
The course content is addressed to skilled professionals working in different industrial sectors related to embedded systems. It is intended for those who would like to become familiar with the tools and techniques used in developing based on an embedded Linux system.

Basic embedded programming (preferable C) skills corresponding to a bachelor, civil engineer, professions bachelor or similar are expected

Time and place
21.-23. January 2015
The course is held at University of Southern Denmark, Sønderborg campus

Price
9.000 kr. excl. VAT
The price includes tuition, materials (Embedded Linux development kit) and meals during the course days. The price does not include accommodation.

Registration
Deadline 12. December 2014
On our website: www.sdu.dk/sdue

SYDDANSKUNIVERSITET**.DK**