Embitude
Let's have fun with Embedded

Online Training on Linux SPI Drivers

Course Description

The Linux SPI Driver Module provides a deep insight into the Embedded Linux Driver in hardware platform specific context. The course starts with basic low level device driver and helps develop the understanding of accessing hardware specific registers in Linux driver. Further to this, it helps to apply the important concepts such as Platform Drivers and DTB. And finally the low level driver is integrated with Linux SPI framework, thereby helps in developing the complete understanding of various SPI components such as SPI Master, SPI Client device & driver. In addition, the course covers the important concept of Direct Memory Access (DMA) using the Linux DMA Engine.

Course Objective

The Linux SPI Driver Module attempts to serve multiple objectives:

- To enable participants develop the low level driver from scratch by accessing the hw specific registers
- To enable participants develop the solid understanding of device driver Building Blocks as Device Tree Tlob (DTB), Platform Driver and Direct Memory Access (DMA)
- To enable pariticipants to understand the Linux SPI Framework
- To develop the in-depth understanding of complete end to end flow from the user space to the low level driver.

Target Group

Professionals/Students looking to Deep Dive into Linux Devcie Drivers

Pre-Requisite

Solid Knowledge of C Programming & Good Understanding of Linux Character Drivers with Kernel Internals

Methology

Every theoretical topic is accompanied by corresponding hands-on/assignment to get the deep understanding of the topic.

Assessment

Assignment Based

Learning Outcomes
- Comfortability with writing a Low Level Driver from Scratch
- Indepth understanding of Key Concepts such as Device Model, Platform Drivers & Device Tree Binary (DTB)
- Comfortability with Linux SPI Framework
- Confortability with Linux DMA Engine

Session 1: BBB Set up & Character Driver Framework For SPI Driver
- Readying BBB for SPI Drivers
- Setting up the host environment
- Patching & Building the kernel
- Overview of SPI Protocol
- Character Driver Framework for Low Level SPI Driver

Exercises/Assignments
- Configure & build the kernel
- BBB Setup & booting up the board
- Develop the character driver framework for low level SPI driver

Session 2: Low Level SPI Driver
- Understanding the AM335x specific SPI registers
- Understanding the flow for transferring the single byte

Exercises/Assignments
- Write a low level SPI driver with loopback

Session 3: Linux Device Model-1 & Assignment Review
- Need for Linux Device Model
- Role of Platform Drivers

Exercises/Assignments
- Enhance the low level driver to use the platform bus

Session 4: Linux Device Model - 2
- Need for Device Tree Binary (DTB)
- Adding the device specific nodes in the device tree blob (DTB)

Exercises/Assignments
- Enhance the driver to use the DTB

Session 5: Linux SPI Framework
- SPI framework components
- Registering SPI Client & Master driver
- Understanding the SPI Client probing mechanism
- Adding device specific nodes in the device tree

Exercises/Assignments
- Writing a Dummy SPI Client and Dummy Master

Session 6: Integrating low level driver with framework & Assignment Review
- Integrating platform specific controller driver

- Integrating the Client Driver

Exercises/Assignments
- Making suitable enteries in DTB for SPI Master & Client driver
- Testing the driver

Session 7: SPI Driver with Linux DMA Engine
- Understanding the Linux DMA Engine
- Enhancing SPI driver to use DMA

Exercises/Assignments
- Enhance the driver to add the support for DMA

Session 8: Assignment Review & Wrap Up
- Q & A
- Next Steps