Embitude

Let's have fun with Embedded

Online Training on Linux Yocto Project

Course Description

The Yocto Project training Program Intends to provide deep insight into using Yocto with Embedded Linux. The Course starts with Fundamental and from there on, the program deep dives into Bitbake, Layers, Recipes & Class with extensive hands-on Further to this, program provides indepth understanding of BSP Layers in Yocto and adding the support for New Board in Yocto. Finally, the program focuses on Root Filesystem & adding the various Packages.

Course Objective

The Yocto Project attempts to serve multiple objectives:

- To enable participants understand the Bitbake & its Configuration Files
- To enable participants debug any Yocto related issues
- To enable pariticipants Understand the BSP Layer
- To develop the in-depth understanding of Yocto Project

Target Group

Professionals/Students looking to Deep Dive into Yocto Project

Pre-Requisite

Solid Knowledge of C Programming & Good Understanding of Embedded Linux Basics

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 Yocto Core Fundamentals
- Comfortability with all the aspects of Bitbake
- Comfortability with Playing around with Yocto Recipes
- Comfortability with adding the support for

Session 1: Yocto Build System Fundamentals

- Yocto Project Overview and Yocto Project History
- Yocto Project Architecture & Fundamentals
- OpenEmbedded vs Poky Vs Yocto Project
- Bitbake & Configuration Files

Exercises/Assignments

- Setting up the bare bitbake
- Testing bitbake to build the recipe

Session 2 & 3: Bitbake Metadata

- Introduction to recipes and fundamental overview
- Metadata - bbclass, layers & Recipes
- Bitbake Functions & Tasks
- Bitbake variables
- Inheriting the bitbake class
- Extending the recipes with bbappend
- Recipe dependency management
- Task Logs & Running specific tasks
- Debug statements
- Dependency graphs
- Displaying variables and metadata

Exercises/Assignments

- Create a Yocto Layer
- Writing a Simple Bitbake Class
- Write a simple helloworld recipe
- Writing Bitbake Functions & Tasks
- Playing around with Bitbake Variables
- Extending the Recipe with bbappend
- Troubleshooting the build failures and fix it accordingly

Session 4: Yocto Meta Layers

- Introduction to Yocto Layers
- Type of Layers
- Introduction to BSP Layer
- Source Code walk through of BSP Layer for Platform

Exercises/Assignments

- Creating a meta layer and including it in the Yocto Project
- Creating custom BSP layer and Adding a new machine

Session 5: Universal Bootloader (U-Boot)

- Brief introduction about U-Boot
- U-Boot configuration, building & flashing
- Brief introuction about the uboot configuration file and sources

Exercises/Assignments

- Adding a command in the uboot
- Extending the Yocto recipe & applying the custom patches

Session 6: Linux Kernel & Device Drivers

- Brief introduction about the the Linux Kernel
- Kernel Configuration building and updating
- Brief introduction about recipes-kernel in BSP layer
- Appending, Extending the recipe-kernel in BSP layer
- Using the default configuration for kernel building

- Patching, updating the kernel configuration files and sources
- Basics of Linux Device Driver / Kernel Modules

Exercises/Assignments

- Making the kernel configuration changes & testing the same
- Creating the configuration fragments and applying the same
- Making the kernel changes for testing
- Creating & applying the kernel patches with Yocto
- Applying the patches using scc scripts
- Building out of tree kernel module
- Adding the devices drivers in the kernel and applying the patches

Session 7: Linux Root Filesystem

- Need for Root Filesytem
- What is Root Filesystem?
- Adding the Packages in Filesystem
- Customized package selection and configuration
- Root Filesystem post processing
- Init Managers – Sysv Init and Systemd

Exercises/Assignments

- Custom Root Filesystem image creation with selected packages
- Adding, removing the application packages from Root Filesystem
- Writing a recipe to build a source from the git & Adding it to RootFS
- Adding custom SysV service startup on system bootup

Session 8: Yocto SDK & QEMU

- SDK & eSDK
- Brief on Devtool

Exercises/Assignments

- Preparing SDK & eSDK
- Creating a new recipe with Devtool
- Modify existing application with Devtool
- Using Devtool to Modify existing Kernel Module