CS60038: Assignment 3

Custom Linux distribution for embedded systems

Submission Deadline: October 20, 2024 EOD

Submission Instructions

1. You need to submit the assignment through CSE Moodle: `https://moodlecse.iitkgp.ac.in/`. The course joining key is: **AOSD@Stud24**.
2. Only one member from each group should submit the assignment solution as a single zip file.
3. Mention the name and roll numbers of the group members in your submission.

Objective

The objective of this assignment is to gain hands-on experience in building a custom Linux distribution for embedded devices. By completing this task, students will familiarize themselves with the process of configuring, building, compiling, installing, and booting Linux on an embedded platform. This exercise aims to provide practical insight into managing resource-constrained environments commonly found in embedded systems.

Configuring and Building Linux Kernel, Filesystem, and Bootloader

Overview

Building a custom Linux distribution for embedded systems is crucial, as full-fledged Linux distributions are often too resource-heavy for such devices. To meet the specific needs of embedded systems, lightweight and custom-tailored Linux environments are required. Two popular tools for creating embedded Linux systems are **Buildroot** and **Yocto**:

- **Buildroot** offers a simpler and quicker setup process, making it suitable for smaller projects and quicker builds.
- **Yocto** provides extensive flexibility and customization options, suitable for larger and more complex projects.

In this assignment, we will use Buildroot due to its simplicity and ease of use, making it an ideal tool for educational purposes and introductory projects.

Task Description

In this assignment, you will build a custom embedded Linux distribution for the **Raspberry Pi 3**. The following steps are required to complete the task:

1. Download the Buildroot tarball from `http://buildroot.org/download.html`.
2. Configure Buildroot to create a custom configuration file specifically for the Raspberry Pi 3.
3. Compile the Linux kernel, filesystem, and bootloader to generate a bootable image for an SD card.

Buildroot Configuration

You need to configure the following settings using the Buildroot configuration interface (`make menuconfig`):

- Display your names in the system banner (located in `System configuration`).
- Enable the `nano` text editor for convenience.
- Set a `root` password for system security.
- Enable SSH server capabilities.
- Enable network utilities by selecting `Net-tools`

Submission Guidelines

Students are required to submit the following files:

- The final Buildroot configuration file (`.config`).
- A README file that explains the steps you followed to compile the kernel, including any commands and configuration options used.