CS-428: Embedded Systems Lab
Area: E4 - Computer Architecture and Computer Systems (ECTS: 6)
Semester: Spring 2025
Instructors: Angelos Bilas, Manolis Marazakis

Introduction to Virtualization Technologies: Assignment #1
Due: April 30, 2025

This assignment will guide you through towards creating two virtual machines on a Host machine. The two virtual machines should run using the QEMU machine emulator, for Arm and RISC-V respectively.

The Host machine should be an x86_64 system (eg. a personal desktop or laptop, one of the department's lab systems, or even a virtual machine), running with a Linux distribution of your choice (eg. Ubuntu, Fedora). You will need to demonstrate your VMs to the TA, and be prepared to answer questions about details of their configuration and functionality.

The assignment consist of two parts:

1. [35%] Arm VM setup: Emulation of a Raspberry Pi2b board, using files from a real board.
    a. Download archive from: https://www.csd.uoc.gr/~hy428/vm-labs/teaser-qemu-rpi2b.tar.bz2
    b. The archive includes: device tree, kernel and root filesystem (binary images).
    c. The root filesystem has been configured with the following access credentials: username=pi, password=raspberry
    d. The archive includes a snapshot of the QEMU source tree, and a sample command-line to initiate VM emulation.
2. [65%] RISC-V VM setup:
    a. Follow the instructions at: https://risc-v-machines.readthedocs.io/en/latest/linux/simple/
    b. This step requires setting a cross-compiler (x86_64 → RISC-V), and building the Linux kernel from source.
    c. The root filesystem is constructed by building BusyBox from source.
    d. The root filesystem will reside on a RAM-disk ("initramfs", specified in the Linux kernel's command-line).