National Yang Ming Chiao Tung University
Computer Architecture & System Lab

Notes of Operating System Capstone Lab Assignments

Outline

- Demo Time/Location
- Rpi 3B+ Rental Rules
- Lab Assignment Submission Guidelines
- Lab Grading Criteria
- Notes for LAB0/LAB1

Demo Time/Location

- Time: 7-9 pm, Thursday
- Location: EC 222

Rpi 3B+ Rental Rules

- A student will obtain
  - one Raspberry Pi 3B+
  - one UART cable
  - one SD card
  - one Card Reader
- Please take these four utilities from the TAs at EC619
- Please return these four utilities after finishing Lab 8 or drop the course.
- You won’t get your final score until the Raspberry Pi is returned

Rpi 3B+ Rental Rules

- Please note that the Raspberry Pi 3B+ is susceptible to damage due to power issues.
- Before connecting power, please review the pin layout
- Avoid using power transformers/power supplies

Lab Assignment Submission Guidelines

- You must demonstrate your work to the TAs
- Fork the repository at github.com/oscapstone/osc2024
- Commit your source code to a branch named after your student ID
- Create a Pull Request before the demonstration

Lab Grading Criteria

The lab website lists the score for each task.

- **100%: Excellent**

  Your solution functions correctly on the Raspberry Pi, and you can articulate your code well and address TA inquiries proficiently.

- **90%: Good with room for improvement**

  While your solution performs well in QEMU, it encounters issues on the Raspberry Pi.

Lab Grading Criteria

The lab website lists the score for each task.

- **70%: Requires additional effort**

  You haven't completed all the task requirements.

- **50%: Unclear**

  You seem unsure about your approach or what you've implemented.

Lab 0 - cross compiler

- Determine the programming language in Labs
  - You're free to choose any language to accomplish the task, whether it's C, C++, or Rust. If you're uncertain, it's recommended to use C

Lab 0 - cross compiler

- If you lack proficiency in C programming or are unfamiliar with using pointers, this course might pose challenges for you
- The simplest method for installing a cross-compiler is to download it from https://developer.arm.com/downloads/-/gnu-a

Lab 0 - qemu

- Search for instructions on how to install **qemu-system-aarch64** on your operating system
- QEMU can emulate a Raspberry Pi, eliminating the need for repetitive reboots and kernel setups
- QEMU can serve as a GDB server, aiding in debugging by providing instruction-by-instruction analysis

Lab 0 - debuger

- The debugger GDB can be sourced from the cross-compiler toolchain or gdb-multiarch

- While GDB plugins like **gdb-peda** and **gef** are recommended, they are not mandatory

Lab 1 - basic setup & mini uart

- In lab1, you can refer to the following two repositories:
  a. https://github.com/s-matyukevich/raspberry-pi-os
  b. https://github.com/bztsrc/raspi3-tutorial

The two repositories can be found on the external resources page of the lab website

Some small suggestions

- Ensure that the UART pin is correctly configured
- Make sure your code is well-structured and readable, which will make debugging easier
- Every function should handle all possible cases to prevent crashes in future labs.

Deadline of Lab Assignment

Lab	Deadline
Lab 0/1	3/15
Lab 2	3/28
Lab 3	4/11
Lab 4	4/25
Lab 5	5/9
Lab 6	5/23
Lab 7	6/6
Lab 8	6/20

Q&A