Yu-Siou Lin

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Master's student in Data Science with a deep focus on low-level systems programming. Demonstrated expertise in OS kernel development, bare-metal programming on ARM platforms, and performance optimization of Linux kernel modules. Seeking a challenging firmware or systems software engineering role.

Projects

Bare Metal Operating System on RaspberryPi 3b+ GitHub

Skills: C, ARM Assembly, Bare Metal, OS Kernel Development

- **Objective:** To **master fundamental operating systems concepts** by designing, building, and deploying a functional monolithic kernel from scratch, focusing on memory management and process scheduling.
- **Key Achievements:**
  - Engineered a complete **memory management subsystem**, featuring **buddy system page allocator** and **slab allocators**, which successfully managed efficient dynamic memory allocation for kernel objects with `less fragmentation`.
  - Implemented a comprehensive interrupt handling mechanism, including IRQs for **hardware timers** and **UART**, enabling **asynchronous I/O** and **concurrent I/O device handling**.
  - Implemented a robust **virtual memory system** with **demand paging** and **copy-on-write**, reducing the memory footprint and time of forked processes.
  - Developed a `preemptive`, `priority-based` **round-robin scheduler** that managed multiple **concurrent** user-level tasks and handled **POSIX signals**.
- **Outcome:** Successfully **deployed the OS on Raspberry Pi 3B+ hardware**, achieving a stable runtime environment capable of **loading and executing user-space programs**, with a custom shell interface.

Linux Kernel Module: Fibonacci Driver using Big Integer Arithmetic GitHub HackMD

Skills: C, Linux Kernel Programming, ARMv8-A, perf_events

- **Objective:** To **understand Linux kernel module operations** by developing a high-throughput Fibonacci driver capable of correctly calculating large numbers beyond standard integer limits, and to **investigate kernel performance overhead** through systematic benchmarking.
- **Key Achievements:**
  - Implemented a **Fast Doubling algorithm** with a **custom arbitrary-precision big-integer** library, accelerating computation by **4x up** compared to standard iterative methods.
  - **Reduced performance measurement noise** through strategic kernel parameter tuning (`isolcpus`, `nohz_full`), enabling more accurate analysis of CPU cycles.
  - Integrated the **Performance Monitoring Unit (PMU)** via **perf_events** for high-precision CPU cycle counting, after initial analysis showed the `Armv8-A generic timer` lacked sufficient resolution for fine-grained measurements.
  - Diagnosed and quantified a **300% latency increase** in **kmalloc** operations caused by **cold-cache penalties**, providing insights into kernel memory allocation behavior.
- **Outcome:** The project resulted in a driver capable of efficiently computing up to at least the **100,000th Fibonacci number**. A comprehensive **technical analysis** detailing the optimization process was published on HackMD.

Education

2023 - 2025 Master's degree at **National Yang-Ming Chiao-Tung University**
Institute of Data Science and Engineering (Medical Image Processing Lab, MIPLab)

2017 - 2021 Bachelor's degree at **National Yang-Ming Chiao-Tung University**
Department of Transportation and Logistics Management

Activities

- **Teaching Assistant (Algorithms [CSIC30072], NYCU):**
  - Assisted the professor with overall course management and instruction for undergraduate students.
  - **Managed course materials**, including preparing and uploading lecture videos, slides and homework assignments.
  - **Graded homework and examinations**, providing timely and constructive feedback to students.
  - Provided academic support by **answering student inquiries**, clarifying algorithmic concepts, and holding regular office hours.
- **Operational Support (MIPLab, NYCU):**
  - Assumed responsibility for **managing lab finances**, ensuring smooth operational support for the entire lab.
  - Coordinated with professors on budget planning and allocation.
  - Liaised with vendors for procurement and managed purchasing processes.
  - Worked with the university's cashier division to process reimbursements and ensure financial compliance.
- **Dance Troupe Member & Camp Counselor (Pop Dance Club, NYCU):**
  - **Performed in the annual showcase**, demonstrating teamwork through intensive rehearsals.
  - Served as a **Camp Counselor**, guiding and supporting new members to foster an inclusive and welcoming team environment.
- **Volunteer Instructor & Mentor (Cultural Service Team, NYCU)**
  - Designed and delivered **educational workshops** on for over 100 elementary school students during cultural service camps.
  - Mentored and guided students in team-based activities.

Awards and Honors

- **Honor Student:** 1st Semester of 2022 Academic Year

Skills

Programming: C (Advanced), Python (Advanced), C++ (Basic), Lua (Basic), LaTeX

OS & Architectures: Linux, MacOS, ARMv8-A, AMD64

Framework & Package: PyTorch, OpenCV, Scikit-learn, C++ STL, POSIX Threads, OpenMP, CUDA

Tools: Git, GNU Make, GNU Plot, CMake, QEMU, GDB, Perf, Neovim, Tmux

Language: Chinese (Native), English (Fluent)