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齐鲁理工学院 计算机科学与技术 • 学士（2024 届） 2001-01-25 青岛

对计算机底层、操作系统等有深入的研究。热衷于操作系统技术，编写过 x86、RISC-V 架构的操作系统内核。熟悉 Linux 内核和 GNU/Linux 系统，并对嵌入式软件开发有一定经验。

有充分的计算机底层、裸机开发的经验，能够独立完成操作系统内核级别的设计、开发与调试等。对各类开发环境和工具链有丰富的使用经验，擅长快速学习新技术。实际应用能力突出，能够完成全栈工程师的工作。

热爱开源社区，在GitHub 上开源了多个个人项目，并对一些开源项目做出过贡献。在校期间曾担任计算机协会会长，荣获优秀学生称号，并多次获得校奖学金。

个人技能

程序设计语言 **C** 精通 、**Python** 精通 、**TypeScript** 熟练 、**Rust** 熟练 、**Shell** 熟练
开发工具和框架 **Git、Vue、Django、FreeRTOS**
语言 **英语 (CET4 604 分)** – 习惯使用英文进行技术资料的阅读、编写等。

实习经历

2023.12 – 2023.09 技术支持工程师 @ **统信软件技术有限公司（深圳分公司）**

- 负责 Linux 开源软件的打包及维护工作
- 使用爬虫技术自动化工作流程，并参与部门的技术支持工作。
- 独立研发ShiroDEB工具集，并基于此编写和维护自动构建脚本。
- 参加公司对外主办的技术分享活动，分享技术心得、介绍工作成果（2023-11 武汉 LUG）。
- 使用 Docker 技术及 Github Action 持续集成 ShiroDEB 工作环境，创建构建净室环境。

个人项目

2023.12 – 2023.8 **安规培训报名信息平台及周边设施**

个人外包项目，于实习期业余时间编写维护。本项目实现了一个安规培训报名信息、考试信息管理平台，并支持 Excel 数据表的导入导出功能。目前正在维护期。

- 使用 Django 及 Django REST Framework 作为后端实现
- 使用 Vue3.0、Electron 进行管理系统的开发，使用 Svelte 进行学员报名页的开发
- 基于 ID100 身份证读取器和 Java FX 实现了一个与现行系统交互的考试人脸比对签到软件。
- 使用 Docker 和 Docker-Compose 实现容器化，提高部署效率。

全栈开发 Docker 运维

2023.10 – 2023.7 **基于 NXOS 的 VirtIO 驱动实现**

开源之夏 2023项目，为 NXOS 内核实现 VirtIO 系列驱动。

- 实现了 VirtIO Over PCI Bus 及 VirtIO Over MMIO 通讯方式
- 实现了常见的 VirtIO 设备，例如 Net、Block、Input、Sound 等
- 开发过程中修复了该内核的代码错误
- 开发过程中通过阅读 Linux 及 QEMU 的源码对不满足规范的错误实现进行兼容

C VirtIO QEMU 底层开发 驱动开发

2023.7 – 2023.4 **在线安规培训平台**

个人外包项目。本项目实现了一个在线视频培训平台，具有视频学习、人脸检测、试题测验、留言评论等功能。

- 使用 Django 及 Django REST Framework 作为后端实现
- 使用 Vue3.0 及 Vue-Pure-Admin 框架进行后台管理人员界面的开发
- 分别使用 Vue 及微信小程序开发了具备同样功能的学习者前端使用界面
- 使用 Docker 和 Docker-Compose 完成容器化，提高部署效率

Python Django Django REST Framework Vue 全栈开发 Docker

2022.7 – 2022.5 **基于 RISC-V 架构的操作系统内核**

全国大学生操作系统设计大赛作品，基于 RISC-V 64 架构的操作系统内核，使用宏内核架构。通过调用 SBI 实现内核与硬件平台的交互，具备可移植性和通用性。

- 通过自旋锁及睡眠锁实现了对称多处理的支持
- 实现了基于伙伴算法的页分配器及基于红黑树的 Slab 对象分配器
- 实现了 CoW Fork，优化系统性能
- 实现了扁平设备树文件的支持，并带有可拓展的驱动框架
- 实现了 Execve、dup、pipe 等常用的 POSIX 系统调用，并兼容部分 Linux 系统调用
- 内核支持 QEMU 和 K210，并针对 QEMU 实现了 virtio-mmio 及 virtio-disk 驱动
- 在开发本项目时，同时开发了`RISCV-GDB-Paging`用于调试 RISC-V 架构 SV39/SV48 分页信息的 GDB 脚本，通过 Python 及 Scheme Lisp 实现，该脚本能令调试 QEMU 平台下 RISC-V 架构的分页信息变得简单易懂。

C | CMake | 底层开发 | 内核开发 | RISC-V | GDB | Python

2022.3 – 2021.10 **自助式洗车机嵌入式软件**

校企合作项目。本项目为自助式洗车机解决方案中的嵌入式软件部分，本项目实现了终端电气控制及用户使用界面。

- 本人作为项目管理者负责协调不同方向的开发人员，同时与合作企业进行交流协作
- 本项目采用 STM32F4 系列主控，并基于 HAL 库进行二次开发
- 实现了 LVGL 的基于 DMA2D 的高性能图形操作的移植，并将 LVGL GUI 程序与嵌入式功能解耦，便于调试和编写
- 通过 AT 协议实现了与 LTE 物联网模块和 ESP32 的对接，并基于此与服务器端进行交流
- 实现了通过 USB-FS 及 FATFS 对配置和资源文件的修改
- 本项目采用 FreeRTOS 作为嵌入式系统，并使用多个任务完成不同的功能部分

C | STM32 | LVGL | FreeRTOS | 嵌入式开发

</> 其他个人项目

- **OmochaOS**:
  个人学习用 x86 系统内核，采用微内核架构。实现了 HPET、PCI、APIC、AHCI 等驱动程序，并具备可拓展的系统模块加载框架。
  C | CMake | 内核开发 | 底层开发
- **AiR 空气质量监测器**:
  AiR 空气质量监测器系统。基于 ESP32。项目实现了 MQTT、HTTP API、HTTP 界面等多种网络信息传递方式。同时也能于显示屏上展示各种信息。本项目取得了软件著作权证书。
  C | 嵌入式开发 | FreeRTOS | ESP32
- **OmegaGomoku**:
  本项目为基于 PyTorch 和 DQN 算法的五子棋人工智能。项目总结了一些 DQN 算法的实现，优化了传统 DQN 的奖励计算过程。本项目在 10 万轮的训练中表现出一定水平的智能，与基于 MiniMax 算法的传统搜索算法相比，在两层的搜索深度下最高能达到 95% 的胜率，平均胜率则超过 50%。项目报告：点击查看项目报告
  Python | PyTorch | DQN | 机器学习
- **Rust-shunting_yard**:
  使用 Rust 编写的基于调度场算法的表达式求值工具，具备一定的函数定义能力。
  Rust | Algorithm
- **Rust-headless-chrome(代码贡献)**:
  对广泛应用的 Rust 的 Chrome DevTools 协议实现 API 提交了代码贡献，完善了部分 API 的应用方法，并针对其代码生成工具`auto_generate_cdp`中的错误进行修正。
  Rust | Library | Chrome DevTools
- **ShiroDL**:
  Rust 异步并发小文件下载库，具有良好的通用性和拓展性。同时提供批量下载小文件的命令行程序。
  Rust | Library | 工具开发

奖项证书

- Google Code-in 2017
- 2020“外研社·国才杯”全国英语阅读大赛 山东赛区 三等奖
- 2021 年第 14 届中国大学生计算机设计大赛 山东省级赛 三等奖
- 2021 年第三届全国高校计算机能力挑战赛 程序设计赛C++ 华东区域 优秀奖
- “赛冠杯”第八届山东省大学生电子与信息技术应用大赛 二等奖
- 2022 年第 15 届中国大学生计算机设计大赛 山东省级赛 二等奖
- 2022 年全国大学生计算机系统能力大赛操作系统设计赛内核实现赛道 初赛优胜奖
- 第十三届蓝桥杯全国软件和信息技术专业人才大赛 山东赛区 C/C++ 程序设计 大学 B 组 一等奖
- 第十三届蓝桥杯全国软件和信息技术专业人才大赛 全国总决赛 C/C++ 程序设计 大学 B 组 三等奖
- 中华人民共和国国家版权局 计算机软件著作权登记证书 AiR 空气质量监测器系统

Haoxuan Han

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Qilu Insitute of Technology Computer Science •Bachelor 2001-01-25 Qingdao

Passionate about operating system design and implementation, with experience in developing kernels for x86 and RISC-V architectures. Proficient in Linux kernel and GNU/Linux, as well as embedded software and bare-metal development. Able to design, implement and debug complex software systems independently. Fast learner of new technologies, with outstanding practical application ability and full-stack engineering skills.

Active in the open-source community, having open-sourced various personal projects on GitHub and contributed to some open-source projects.

During school, served as the president of the Computer Association, won the title of outstanding student, and received scholarships multiple times.

Skills

Prog. Lang.	**C** Proficient , **Python** Proficient , **TypeScript** Mastered , **Rust** Mastered , **Shell** Proficient
Tools & Frameworks	**Git**, **Vue**, **Django**, **FreeRTOS**
Language	**English (CET4 604)** — Preferred reading and writing documents in English.

Internship

2023.12 – 2023.09 Technical Support Engineer @ **UnionTech Software Technology Co., Ltd. (Shenzhen Branch)**

- Packaging and maintenance of Linux open-source software.
- Wrote scripts for workflow automation and spider program. Participated in the department's technical support work.
- Independently developed the ShiroDEB scripts set and maintained automatic build scripts based on this.
- Participated in the company-hosted external technical sharing activities, shared technical insights, and introduced work results (2023-11 Wuhan LUG).
- Used Docker technology and Github Action to continuously integrate the ShiroDEB working environment, creating the clean room build environment.

Personal Projects

2023.12 – 2023.8 **Safety Training Information Platform and Surrounding Facilities**

Personal freelance project. Written and maintained in my spare time during the internship. Implemented a safety training signup information records and exam information management platform, and supports the import and export functions of Excel files. It is currently in the maintenance period.

- Use Django and Django REST Framework for backend implementation
- Use Vue3.0, Electron for the management system, and use Svelte for the student registration page.
- Implemented exam check-in software based on the ID100 ID card reader and Java FX. This software communicates with both this management platform and the Government-designated examination management system.
- Use Docker and Docker-Compose to implement containerization, improving deployment efficiency.

Full-stack Docker

2023.10 – 2023.7 **VirtIO Drivers implementation based on NXOS Kernel**

Project of OSPP 2023 (an event like GSOC), implemented VirtIO Drivers Framework and frontend devices drivers for NXOS Kernel. Project mentors expressed high approval of this project.

- Implemented VirtIO Over PCI Bus and VirtIO Over MMIO
- Implemented various VirtIO devices, such as Net, Block, Input, Sound, etc.
- Implemented generic framework for any other VirtIO devices to be implemented in the future
- Fixed Bugs in NXOS Kernel codebase
- Archived compatibility to error implementations beyond specification through studying the sources of Linux kernel and QEMU

C | VirtIO | QEMU | Low-level | Driver

2023.7 – 2023.4 **Safety Training Online Platform**

Personal freelance project. Implemented an online video training platform with features of online training, face recognition, quiz tests and comments.

- Using Django and Django REST Framework for backend implementation
- Using Vue3.0 and Vue-Pure-Admin framework for administration panel
- Implemented the same functionality by Vue and WeChat mini program for trainee frontend
- Containerize the whole project with Docker and Docker-Compose to improve the deployment efficiency

Python | Django | Django REST Framework | Vue | Full-stack | Docker

2022.7 – 2022.5 **OS Kernel on RISC-V Architecture**

Project for Kernel Design Competition to University Student, a macro-kernel based on RISC-V 64 architecture. Communicate with hardware via SBI and therefore the portability and universality could be archived.

- Implemented SMP multi-processor via spinlock and sleeplock
- Implemented Buddy Page Allocator and RB-Tree based Slab objects allocator
- Implemented CoW Fork to improve performance
- Implemented the support of Flatten Device Tree along with extensible driver framework
- Implemented some generic POSIX syscalls like execve, dup and pipe and some Linux syscalls
- Support QEMU and K210, and implemented virtio-mmio/virtio-disk for QEMU
- Developed `RISCV-GDB-Paging` for debugging SV39/SV48 paging information for RISC-V on QEMU. Written in Python and Scheme Lisp

C | CMake | Low-level | Kenrel | RISC-V | GDB | Python

2022.3 – 2021.10 **Self Service Car Washing Solution, Embedded Software**

Embedded part of Self Service Car Washing solutions, this project implemented the terminal electrical controlling and user-end GUI.

- As the project manager of the whole team, coordinated developers in other parts and collaborated with partner company
- Using STM32F4 as MCU and developed based on STM32 HAL
- Ported LVGL using DMA2D for higher performance, decoupling the LVGL GUI from embedded functionality for easier debugging and development
- Communicate with LTE IoT modules and ESP32 via AT commands, enabling interaction with server-side systems
- Implemented the configurating from PC via USB-FS and FATFS
- Use FreeRTOS as the embedded operating system, using tasks to handle different sub-procedures

C | STM32 | LVGL | FreeRTOS | Embedded

Other Personal Projects

- **OmochaOS**:
  Toy kernel for study of x86 development, using micro-kernel architecture. Implemented drivers for essential components such as HPET, PCI, APIC, and AHCI. Additionally, a modular framework to ensure extensibility and flexibility within the system has been implemented.
  C | CMake | Kernel development | Low-level developement
- **AiR Air Quality Monitoring System**:
  The AiR Air Quality Monitoring System based on ESP32. With MQTT, HTTP API and HTTP Frontend support, also with display support on onboard LCD.
  C | Embedded | FreeRTOS | ESP32
- **OmegaGomoku**:
  A Gomoku AI using PyTorch and the DQN algorithm. Optimized DQN reward calculation. Achieved moderate AI performance after 100k training games. Outperformed MiniMax with 95% max win rate and 50% average win rate at 2-level search depth. Report: Click Here
  Python | PyTorch | DQN | Machine Learning | Deep Learning
- **Rust-shunting_yard**:
  Expression evaluation tool written in Rust using the Shunting Yard algorithm, equipped with function definition capabilities.
  Rust | Algorithm
- **Rust-headless-chrome(Code contribution)**:
  Contributed code to the Chrome DevTools Protocol implementation API in Rust, enhancing and refining certain API application methods. Additionally, fixed errors within the code generation tool (`auto_generate_cdp`) to solve the functionality issue of the project.
  Rust | Library | Chrome DevTools
- **ShiroDL**:
  Asynchronous concurrent small-files download library in Rust, designed for versatility and extensibility. Includes a command-line program for batch downloading small files.
  Rust | Library | Tool developement

Awards and Certificates

- Google Code-in 2017
- 2020“FLTRP·ETIC Cup”English Reading Contest Shandong Provincial Final Third Award
- 2021 14th Chinese Collegiate Computing Competition Shandong Provincial Third Award
- 2021 3rd National College Computer Ability Challenge Program design C++ Eastern China area Excellence Award
- “Sai Guan Cup”8th Shandong Provincial College Students’ Electronic and Information Technology Application Competition Second Award
- 2022 15th Chinese Collegiate Computing Competition Shandong Provincial Second Award
- 2022 Computer System Development Capability Competition - Kernel Design Competition Preliminary Excellence Award
- 13rd Blue Bridge Cup Shandong Provincal C/C++ College B Group First Award
- 13rd Blue Bridge Cup National Finals C/C++ College B Group Third Award
- National Copyright Administration of China Computer software copyright registration certificate AiR Air Quality Monitoring System