本简历由 Github Action 自动构建，请访问本链接查看最新版本

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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

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Haoxuan Han

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

Love and understand low-level and kernel development, Passionate about operating system technology. Developed kernels for x86 and RISC-V architectures. Familiar with Linux kernel and GNU/Linux. Experienced in embedded software development. With extensive experience in bare-metal development, and be capable of designing, implementing and debugging large projects independently. Knowing many popular development environments and toolchains. Good at learning new technologies rapidly. Outstanding practical application ability, capable of performing full-stack engineering work. Enjoy the open-source community, have 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** Excellent , **Python** Excellent , **TypeScript** Proficient , **Rust** Proficient , **Shell** Excellent
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++Easten China area Excellence Award
- “Sai Guan Cup”8th Shandong Provincial College Students’ Electronic and Information Techno 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