

Github:

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EDUCATION

Virginia Tech

Aug 2024 – present

Ph.D. in Computer Science

Advisor: Dr. Dan Williams

Research Interest: Operating System, Cloud System

Duke University

Aug 2022 – May 2024

M. Eng. in Electrical and Computer Engineering – Software Development GPA 4.0/4.0 (ranked 1/26)

- **Coursework:** Enterprise Storage System, Compiler, Computer and Information security, Computer Architecture

The Chinese University of Hong Kong, Shenzhen

Aug 2018- May 2022

B.Sc. in Statistics - Data Science, Graduate with First Class Honors, GPA 3.84/4.0 (ranked 6/199)

- **Coursework:** Programming Paradigms(A), Database Management(A), Machine Learning(A), Deep Learning(A)
- **Awards:** Undergraduate Research Award (2 times), Dean's List (6 semesters), Academic Performance Scholarship (2 times)

INTERNSHIP EXPERIENCE

AlibabaCloud-Container Service Team-System and Infrastructure Develop Intern

May 2023 – Aug 2023

Key Technology: Kubernetes, Docker, Container, OpenKruise, Golang

Development and Support of AlibabaCloud Network Service Mesh (NSM)

- Implemented hot-update capability for NSM's Sidecar access component using OpenKruise and Unix Domain Socket
 - Achieved seamless migration of services during updates, ensuring uninterrupted service and continuity of existing long-lived connections
 - Designed a custom communication protocol for state synchronization during hot updates
 - Developed Python scripts for automated end-to-end testing within the cluster
- Daily Support and Solutions
 - Customized Socks5 forwarding solution for tailored business needs, enabling controlled flow of north-south traffic
 - Utilized iptables rules for seamless traffic redirection, ensuring transparent forwarding.
 - Upgraded containerd image pull proxy, deploying the proxy within an isolated net namespace to reduce reliance on host kernel parameters
 - Actively participated in NSM's daily development, operational tasks, and troubleshooting efforts
 - Engaged in NSM code reviews, contributing to the codebase with multiple fixes for production incidents

PROJECT EXPERIENCE

Tiger Compiler

Jan 2024 – May 2024

- Developed a MIPS compiler for a Pascal like language “Tiger” using SML in a functional programming paradigm, which is a Turing complete language with strong type system and a runtime library
- Implemented lexical analysis, parsing, semantic analysis, intermedia representation generation, code generation and register allocation.
- Applied optimizations to the compiler including common sub-expression elimination and constant propagation
- Designed and documented an automatic test pipeline with python which tested the compiler on 128 different test programs

Dropbox Client in Linux FUSE filesystem

Feb 2024 – May 2024

- Developed a Dropbox Client using Python SDK of Dropbox API and Linux Filesystem in Userspace (FUSE)
- Implemented SmartSync Feature using Linux FUSE to hijacking filesystem call to enhance efficient synchronization by only downloading files when accessed to saving disk space and network bandwidth
- Designed an asynchronous synchronization mechanism to manage local and remote file updates to achieve both low-latency and no race-condition
- Developed a Python-Nemo extension for displaying file sync statuses in Linux Mint's file explorer.
- Developed tests using pytest and set up Github CI pipeline to automate unit tests and integrated tests

Gomoku Online

Mar 2024 – May 2024

- Developed an online multi-player Gomoku game website using TypeScript, utilized Vue3 as frontend and Express, SocketIO, MongoDB as backend
- Applied design patterns and principles developed functionality including OIDC authentication, join/leave room, gameplay, update profile, ranking etc.

- Enabled scale-out by using Kubernetes as load-balancer and set up a CI/CD pipeline to deploy the project
- Deployed the project with Nginx as reverse proxy and automated Playwright E2E tests on the CI pipeline
- Used github to manage the project progress and collaboration

Tiny-TikTok Back-end Development

Jan 2023 – Feb 2023

- Developed services including Video Feed, Registration and Login, Video Upload, etc. for a Simplified TikTok application based on **Golang**
- Built Web Service based on **Gin**, designed and implemented **MySQL** tables, used **Gorm** to operate the database
- Conducted version control and collaboration using **Git** and **Github**, finished documentation of the project

Malloc: Implementation of Dynamic Memory Allocation in C

Jan 2023 -Feb 2023

- Implemented malloc & free function with FILO explicit free list in C using sbrk() system call
- Realized efficient memory usage by aligning the data by double words and using hidden pointers in free block
- Benchmarked the malloc & free performance for different allocation policies including best-fit and first-fit policy

Gitlet Version Control System

Nov 2022 – Dec 2022

- Built a Git-like version control system using **Java**, support commands including add, commit, checkout, merge, etc.
- Realized version control and comparison by creating an index for files using the **SHA-1** function; Boosted query performance by storing files in a **tree structure**
- Conducted unit and integration tests using **JUnit** and **Python** Script respectively, and designed test cases for them

GateToTetris: Implementation of a Single Cycle Processor and its Application

Oct 2022-Nov 2022

- Implemented a **single-cycle processor** supporting 16 MIPS-like instructions using **Verilog** gate level circuits on the **FPGA** platform and ran the Tetris game on it
- Utilized PS2 keyboard and VGA monitor as input and output device designed a **VGA buffer** based on memory layout for data transfer between the processor and VGA monitor
- Developed assembly for Tetris based on the instruction set of the processor and converted assembly to binary instructions by building an assembler in **Python**

RESEARCH EXPERIENCE

Probabilistic Safe Reinforcement Learning for Autonomous Vehicle Ramp Merging Control

Jun 2021-Aug 2021

Research Assistant; Adviser: Prof John M. Dolan

Carnegie Mellon University

- Eliminated the Avoid Constraint Violation by introducing the **Control Barrier Function** to the optimization process and successfully developing a **safety-assured Reinforcement Learning** algorithm for ramp merging
- **Paper published on RISS Journal (2021)** [\[Link\]](#)

Adaptive Network Routing based on Reinforcement Learning

Jul 2020-Jul 2021

Research Assistant; Advisor: Prof. Yi Chen

Chinese University of Hong Kong

- Conducted extensive research and designed a **multi-agent deep reinforcement learning**-based solution for the network routing problem
- **Paper published on IEEE Globecom (2021)** [\[Link\]](#)

LEADERSHIP

Reinforcement Learning Seminar

Chinese University of Hong Kong

Leader & Instructor of Markov Decision Process Parts

Oct 2020-Dec 2020

- Organized and instructed sessions for 7 faculties and 5 PhD students to learn Reinforcement Learning Theory

SKILLS

Programming Language: Golang, C/C++, Java, Python (Pytorch, Skitlearn, Pandas, Matplotlib) Web Development (JavaScript, HTML, CSS), MySQL

Development Tool: Unix, Git, Vim, Valgrind

教育经历

杜克大学

预计毕业:2024.05

- **电子与计算机工程硕士** – 软件开发方向, 成绩 4.0/4.0 (排名 1/26)
- **相关课程:** 数据结构与算法、计算机系统导论、软件工程、计算机系统编程

香港中文大学 (深圳)

2018.08-2022.05

- **数据科学学士**, 甲等荣誉毕业, 成绩 3.84/4.0 (排名 6/199)
- **奖项:** 本科生科研奖学金 (2020 & 2021), 院长荣誉名单 (6 学期), 本科生学业奖学金(2020&2021)

专业技能

- 熟练掌握 C/C++, 熟悉指针应用及内存管理, C++封装继承多态, STL 常用容器
- 熟悉 Linux 网络协议栈源码, 熟悉 TCP/IP 五层模型, 对 HTTP、DNS 等协议有了解
- 熟悉常用的算法及数据结构, 了解 MySQL 关系型数据库的使用, 及掌握 Linux 常用命令
- 熟练掌握英语, 能进行无障碍进行商务和日常交流 (托福 109/120)

实习经历

阿里云-容器服务团队-基础架构研发实习生

相关技术: Kubernetes, OpenKruise, Docker, Golang

2023.05-2023.08

支持阿里云内部 Network Service Mesh(NSM) 的控制面研发, 为云产品提供南北向跨 VPC 网络打通能力

Sidecar 热更新:

- 基于 OpenKruise 和 Unix Domain Socket 为 NSM 的 Sidecar 接入组件实现了热更新能力, 实现了更新过程中服务不中断和存量长连接的无损迁移
- 设计自定义通信协议实现热更新更新过程中的状态同步并开发 Python 脚本在集群进行自动化 E2E 测试

日常支持:

- 为业务定制 Socks5 转发方案实现控制流量南北向访问, 应用 iptables 规则进行流量劫持进行达成无感转发
- 升级 containerd 镜像拉取代理, 将代理部署在独立的 net namespace 解除对宿主机内核参数的依赖
- 参与 NSM 日常开发、运维和问题排查, 参与 NSM 代码库 Code Review, 多次参与解决线上故障

项目经历

抖音简易版-后端开发

相关技术: Golang, Gin, Gorm, JWT, MySQL, Web 开发

2023.01 – 2023.02

- 基于 Go 语言 Gin 开发了简易版抖音后端功能, 实现了用户登录, 视频流推送, 上传, 关注, 评论等功能
- 项目应用 JWT 实现权限控制, 设计并实现 MySQL 数据库、索引及事务, 使用 Gorm 框架进行数据库操作
- 使用 Git 进行版本控制, 通过 GitHub 进行团队协作并为项目编写单元和集成测试, 完成项目相关文档

实现 Malloc 动态内存分配函数

相关技术: C, Make, gdb, valgrind

2023.01 – 2023.02

- 使用 C 语言和 sbrk()系统调用实现了 malloc 和 free 库函数动态内存分配和释放的功能
- 项目应用先进后出的显式释放列表加快寻找速度, 使用 free 块中闲置空间存储指针, 增加内存利用率
- 测试了 First-fit, Best-fit, Second-fit 等不同分配策略下 malloc 函数的时间和空间性能

Gitlet 版本控制系统

相关技术: Java, JUnit

2022.11 – 2022.12

- 使用 Java 实现了与 Git 功能类似的版本管理系统, 支持 add, commit, checkout, merge 等常用操作
- 通过 SHA-1 函数对目录内文件和对象创建索引, 实现版本对比和控制, 使用树型存储结构提升查询性能
- 应用 JUnit 库进行单元测试, 并编写 Python 和 Make 脚本进行集成测试, 针对以上测试编写测试用例

GateToTetris: 单周期处理器的实现与俄罗斯方块

相关技术: Verilog, FPGA, Python

2022.10 – 2022.11

- 在 FPGA 平台使用 Verilog 门电路设计并完成支持 16 种指令的单周期处理器, 在上面运行俄罗斯方块
- 利用 PS2 键盘和 VGA 显示器和用户交互, 根据内存结构设计 VGA Buffer 实现处理器与显示器的数据传输

- 针对处理器的指令集完成俄罗斯方块的汇编代码，使用 **Python** 编写汇编器，进行汇编到二进制指令的转换

科研经历

用于自动驾驶并线问题的概率安全强化学习算法

卡内基梅隆大学-机器人学院

研究助理；指导老师：John M. Dolan 教授

2021.06 – 2021.08

- 设计了约束深度强化学习算法 SAPO-RM, 解决训练中约束违背的问题，成果收录于 CMU 暑期研究论文集[\[Link\]](#)

基于强化学习的自适应路由算法

香港中文大学

研究助理；指导老师：陈怿教授

2020.07 – 2021.07

- 提出了一种基于图注意力网络的深度强化学习路由规划解决方案, 论文发表于 IEEE Globecom 2021[\[Link\]](#)

课外活动

强化学习研讨会

香港中文大学

组织者；主讲

2021.06 – 2021.08

- 组织为期一学期的强化学习研讨会, 研读强化学习理论教材《Reinforcement Learning: Theory and Algorithm》, 担任马尔可夫决策过程部分主讲, 参与者包含 2 位教授, 7 位博士研究生和本科生