

Education

2017.9–2021.7 **Sun Yat-sen University**, Guangzhou, China.
B.Sc. in Computer Science, School of Data and Computer Science
Overall GPA: 91.7/100 (3.89/4.00) Ranking: 3/240

Publications

1. **Hongzheng Chen**, Minghua Shen, *A Deep-Reinforcement-Learning-Based Scheduler for FPGA HLS*, in Proceedings of the 38th International Conference on Computer-Aided Design, 2019.
2. Minghua Shen, **Hongzheng Chen (Corresponding author)**, Nong Xiao, *Entropy-Directed Scheduling for FPGA High-Level Synthesis*, in Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2019.

Research Experience

2018.8–Present **Large-Scale Graph Processing Systems and Accelerators.**

Supervisor: Dr. Minghua Shen and Prof. Nong Xiao, National Supercomputer Center in Guangzhou

2018.8–2019.8 **Project 1: High-Performance Concurrent Graph Processing System.**

- Designed a graph processing system *Krill* that consists of a compiler and a runtime, enabling to execute multiple graph applications on a shared graph concurrently.
- Proposed property buffer and its compiler to enable data layout transformation, and graph kernel fusion for runtime system to maximumly reduce the number of memory accesses.
- Shown up to 7x speedup, 5x memory access reduction, and 4x latency reduction compared with the state-of-the-art graph processing system.
- This work has been submitted to anonymous peer-review and is open-sourced on Github
<https://github.com/chhzh123/krill>.

2019.12–Present **Project 2: Heterogeneous Platform for Graph Neural Network Inference.**

- Designing operators for graph neural network (GNN), integrating them into deep learning compiler TVM, and partitioning heterogeneous tasks in computational graph level.
- Designing runtime for cluster CPU parallelism and performing heterogeneous task scheduling for aggregate and update tasks of GNN.
- Designing an accelerator for GNN, equipped with prefetching and pipelining techniques to accelerate graph traversal and matrix computation.

2018.3–2019.1 **High-Level Synthesis for Field-Programmable Gate Array (FPGA).**

Supervisor: Dr. Minghua Shen and Prof. Nong Xiao, National Supercomputer Center in Guangzhou

2018.3–2018.7 **Project 1: Entropy-Directed Scheduler for FPGA HLS.**

- Proposed a heuristic scheduler based on information entropy for FPGA HLS.
- Established a connection between the maximum entropy principle and resource/time-constrained scheduling problems theoretically.
- Integrated the scheduler into the open-source HLS system *Legup* and obtained up to 20% performance improvement.
- This work has been published in Transaction on Computer-Aided Design of Integrated Circuits and Systems (TCAD).

2018.7–2019.1 **Project 2: Deep-Reinforcement-Learning-Based Scheduler for FPGA HLS.**

- Designed a novel state and action representation for leveraging deep reinforcement learning in HLS scheduling.
- Proposed a training pipeline that consists of supervised learning and reinforcement learning enabling better scheduling performance.
- This work has been accepted by International Conference on Computer-Aided Design (ICCAD'19).

Awards & Honors

- 2018-2019 **National Scholarship**, Ministry of Education of PRC (Top 2% of 240).
2017-2019 **First-Prize Scholarship** × 2, Sun Yat-sen University (Top 5% of 240).
2017-2018 **Samsung Scholarship**, Samsung Electronics (Top 1% of 240).
2019.7 **Second Place**, *IEEE EDathon*, IEEE Council on Electronic Design Automation (CEDA).
2019.1 **Meritorious Winner**, *Mathematical Contest in Modeling (MCM)*, COMAP.

Selected Projects

- 2019 Fall **Chatbot-Based Agenda Management System**.
Project link: <https://github.com/chhzh123/AID0>
- Designed a chat bot based on natural language processing, which can grab user's schedule information and add it to database when chatting.
 - Provided functions like daily chatting, agenda management, and voice input.
 - Ranked the 1st in *Database System* course among 190 students.
- 2019 Spring **Advanced Operating System in Protected Mode**.
Project link: <https://github.com/chhzh123/AdvancedOS>
- Implemented an operating system running in 32-bit protected mode from a bare machine, which enables to load and run user programs concurrently in a time-sharing setting.
 - Provided a simple shell with multiple consoles, a FAT file system with C file operations support, and a basic *pthread* library that can be directly called from user programs.
 - Attained the only full score (100/100) in *Operating Systems* course among 190 students.
- 2019 Spring **BitTorrent Protocol for Peer-to-Peer Networks**.
- Implemented the BitTorrent Protocol in sever and client programs using C++ sockets.
 - Enabled the severs and clients to create and parse BitTorrent seeds, as well as download and upload files concurrently.
 - Awarded as one of the best projects in *Computer Networking* course.
- 2018 Fall **Multi-Cycle CPU in MIPS Architecture**.
- Designed a multi-cycle CPU, implemented in Verilog, and fully emulated on FPGA.
 - Proposed a simple assembler written in Python, enabling MIPS operations to be transformed into binary instructions automatically.
 - Ranked the 1st in *Computer Organization* course among 190 students.

Selected Courses

Operating Systems	100/100	Computer Networking	95/100
Parallel Computing	95/100	Distributed Systems	96/100
Computer Organization Principle	98/100	Database Systems	96/100
Artificial Intelligence	97/100	Pattern Recognition	95/100

Skills

Programming	C, C++, Python, Haskell, Prolog, x86 assembly, Verilog
Toolkits	Pytorch, Wolfram Mathematica, Matlab, Vivado HLS, \LaTeX
Languages	English (fluent), Chinese (native)