YANG YANG

PERSONAL INFORMATION

homepage	Elio-yang.github.io
official email	yangyang1519@mails.jlu.edu.cn
personal email	jluelioyang2001@gmail.com
github	Github.com/Elio-yang
address	Jilin University, 2699 Qianjin Street, Changchun, Jilin

EDUCATION

Bachelor of Computer Science and Technology

Jilin University, Changchun, China   *Sept. 2019 – Jul. 2023*
GPA: 3.69/4.0
Rank: 9%
Major: Computer Science and Technology
Interests: Computer Architecture · Compiler · High Performance Hardware · Machine Learning System

PUBLICATION

Yang Yang, Xueying Wang, Guangli Li*. Facilitating Profile Guided Compiler Optimization with Machine Learning. *In Student Research Competition of the 21st IEEE/ACM International Symposium on Code Generation and Optimization*.[Poster][Abstract]

- Achieving an average of 1.03× and 1.95× speedups on representative real-world applications and *Polybench* benchmark suite over the baseline (i.e., the programs without PGO), respectively.

- The performance of our machine learning-aided PGO is very close to the classic PGO (1.05× and 1.97× speedups over the baseline) while reducing 58.3% and 94.8% optimization costs.

RESEARCH EXPERIENCE

ETECA Lab

Emerging Technology Enabled Computer Architecture Lab   *Feb. 2022 – Present*
Jilin University, Changchun, Jilin, P.R.China
Research Assistant, Advisor: Prof. Jingweijia Tan
Research on: GPU Architecture & Reliability & Energy Efficiency & Accelerator
What We Do:

- Extended the **microarchitecture** of General-Purpose Graphics Processing Unit (**GPGPU**).

- Explored the **process variation** of **MCM**-GPUs based on **FinFET** and state-of-the-art **chiplet** technology.

- Exploited the potential of **FPGA** for building open-sourced GPU like **Vortex**.

Project: **LLAM: A Low-Level Power Modeling and Prediction Framework for Nvidia Ampere GPU**

- Implemented a <u>L</u>ow-<u>L</u>evel <u>A</u>nalysis and <u>M</u>odeling framework for **NVIDIA** Ampere GPU.

- Applied **deep learning** techniques for accurate power modeling.

- Examined the power-level effect of the instruction **control flag** when generating the SASS.

SKL Computer Architecture

State Key Laboratory of Computer Architecture   *Jul. 2022 – Present*
Institute of Computing Technology, Chinese Academy of Science, Beijing, P.R.China
Research Assistant, Advisor: Prof. Guangli Li
Research on: Compiler & Programming Systems & Deep Learning
What We Do:

- Improved the **optimization** ability of compilers based on application's **run-time** characteristics.

- Using **machine learning** methods to guide the **LLVM** compiler for better machine code **generation**.

Project: Facilitating Profile Guided Compiler Optimization with Machine Learning

- Formed a classification task based on over 2,000,000 branches distribution.

- Proposed a **branch predictor** using **XGBoost** based on **static** features.

- Explore the speedup sensibility of different programs towards different feature design.

SKILLS

Languages	C/C++ · Assembly (x86, RISC-V) · Python · Go
Frameworks	CUDA · Pytorch · LLVM
Hardware	Verilog · Vivado · FPGA
Software	LINUX/Windows · LaTeX · Markdown · GNU compiler (gcc, *etc.*) · gpgpu-sim · Varius-TC

AWARDS

Undergraduate Academic Year Scholarship	The First Class Fellowship	*Sept. 2020*
	The Second Class Fellowship	*Sept. 2021*
	The Third Class Fellowship	*Sept. 2022*

PROJECTS

MapReduce Engine

MapReduce Engine is a **Go** language implementation of the paper[1]. *Apr. 2022*

- **Fault tolerance** (failures like crash and communication-lose of workers) master and a worker cluster.
- Characterized cluster size and working functions (mapf & reducef).
- Communicate with the master through **Remote Procedure Call**.

This Engine is a basic component for building a large-scale distributed system. [**Codes** here.]

EOS

EOS is a 32bit ***nix** operating system developed in **C** language. *Sept. 2021*

- Basic **bootloader**, 2-level **paging**, 4GB **memory management** and **kernel multithreads**.
- Provide a set of traditional shell programs and **multi-process** mechanism.
- Follow the **x86 ABI**, so it's easy to port those x86 applications.

This project is still *active* and it will provide a library and compiler support in the future. [**Codes** here.]

WYZ-BAR

WYZ-BAR is a bar management system developed in **C** language. *Mar. 2020*

- WYZ-BAR is a *collaborative project* (WYZ stands for 3 members and Y is for me) and I am the leader.
- **Multi-process** organization for effective system building.
- Follow the **x86 ABI**, so it's easy to port those x86 applications.
- Re-implemented a simple **sqlite style database**.
- Used lots of **parsing** techniques for input checking.

WYZ-BAR is my *first* course project in the university. [**Codes** here.]

Others

You can find more projects including course labs (like MIT 6.828), Android application (SmogDetector), CUDA operators (FFT) *etc.*, in GitHub.

OTHER INFORMATION

Languages	CHINESE · Native proficiency.
	ENGLISH · Professional proficiency.
Interests	Literature (Latin-American, magic realism) · Physics · NBA (Golden State Warriors) · Classical (Chopin)
Characteristic	Strong patience · Highly self-motivated · Creative · Communication and collaboration skilled.

---

[1] Dean J, Ghemawat S. MapReduce: simplified data processing on large clusters. *Communications of the ACM*. 2008 Jan 1;51(1):107-13.