

Bingnan Chen

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EDUCATION

School of Computer Science and Engineering, HKUST

Aug. 2023 - Now

Doctor of Philosophy (PhD) in Computer Science

School of Computer Science and Engineering, HKUST

Sept. 2021- Aug. 2023

Master of Philosophy (MPhil) in Computer Science

School of Computer Science, USTC

Aug. 2017-Sept.2021

Bachelor of computer science

RESEARCH EXPERIENCE

Design and implement data-oblivious algorithms in TEE

HKUST, Jan. 2022 – Now

Advisor: Ke Yi, Professor at School of Computer Science and Engineering, HKUST

<https://github.com/ChampionNan/OQSORT>

➤ Overview:

We design and implement a data-oblivious sorting algorithm in the external memory model based on distribution sort. We minimize the gap between the data-oblivious algorithm and the original non-oblivious external memory sorting algorithms. We use feistel permutation network to generate pseudo-random permutation to optimize IO cost. Finally, we could achieve $(1+o(1)) \cdot \text{sort}(N)$ IO cost in cache-aware model, which is close to the non-oblivious one. To guarantee the secure of execution environment, we implement the algorithm using SGX supported by Azure. Plus, we provide simulation code for convenient use in non-SGX environment. For making our work more convincing, we compare our results with bucket oblivious sort and merge sort.

Research on Cross-site scripting (XSS) based on taint tracking for Chromium v8

JHU, June 2020 - Sept. 2020

Advisor: Yinzhi Cao, Professor at School of Computer Science, Johns Hopkins University

➤ Overview:

Our goal is to record all of such listener functions along each data flow, and then regard them as constraints to put into a constraint solver. The constraint solver is responsible for giving a solution under all the constraints, and we can use the solution to generate exploits. Then we get relevant information about the exploit by testing different websites, and then use this information to suggest possible methods to reduce web application vulnerability. The process includes these four steps: record listener functions, put into constraint solver, generate exploit and get related information as come up effective strategies.

PROJECT EXPERIENCE

Computer Vision Projects & Machine Learning Projects | Supervisor: Prof. Dan Xu, Prof. Nevin L. Zhang

<https://github.com/ChampionNan/Computer-Vision>

Feb. 2022 - May 2022

➤ Overview:

This project mainly implements some work in the field of computer vision, including local feature detection algorithms, neural networks for recognition, homographies & RANSAC & image stitching and 3D reconstruction.

C minus Compiler| Supervisor: Prof. Cheng Li

Sept. 2019 - Dec. 2019

<https://github.com/ChampionNan/C-minus-compiler>

➤ Overview:

There are three main steps to finish a C minus compiler : lexical analyzer, syntax analyzer, intermediate code generation and producing RISC-V code.

➤ 1. Lexical analyzer :

Used flex to build a lexical analyzer, doing some analyses and outputting five attributes tuple for syntax analyzer.

➤ 2. Syntax analyzer :

Used bison to build a syntax analyzer, depending on the input tokens to do certain actions and producing a syntax tree.

➤ 3. Intermediate code generation:

Used LLVM C++ interface to generate LLVM IR, exchanging syntax tree(generated in previous steps) to C++ syntax tree with the help of visitor mode.

<https://github.com/ChampionNan/RISCV>

- *Overview:* Implemented RISCV32I cpu, group-connected and fully-connected cache(fifo, lru), branch prediction part(btb, bht). –language: verilog & system verilog

INTERN EXPERIENCE

ALIBABA CLOUD (DATABASE GROUP)

Aug. 2023 - Feb. 2024

- *Overview:* Participate in the design and implementation of optimization algorithm in OLAP database system. –language: python & java & scala

SENSETIME (RESEARCH INSTITUTE)

Jan. 2021 - July 2021

- *Overview:* Participate in the design and implementation of operators in the deep learning framework and JIT-related optimization. –language: c++ & python

SCHOLARSHIPS

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| ➤ 2020 Mathematical Contest in Modeling(Meritorious Winner) | 2020 |
| ➤ Outstanding Student Scholarship(Bronze Top 30%): | 2019 |
| ➤ Outstanding Student Scholarship(Bronze Top 30%): | 2018 |
| ➤ Outstanding Student Scholarship(Freshman Top 30%) | 2017 |

PROGRAMMING-SKILLS

- Languages: C/C++, Python, Matlab, Verilog & System Verilog, HTML & CSS & JSP, x86 Assembly language, Mysql
- Skills: Latex, Pytorch, Numpy & Matplotlib, Git, OOP, Django, Vue, Flask

LANGUAGE

- Chinese: *Native*
- English: TOEFL (Recent) : 98(R:28, L:22, S:22, W:26), TOEFL (My Best Scores) : 105(R:28, L:26, S:25, W:26)