

# Siyuan Liu

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## Education

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### Nanyang Technological University

Singapore

B.ENG. IN COMPUTER SCIENCE (HONOURS WITH HIGHEST DISTINCTION)

Aug. 2014 - Jun. 2018

- Cumulative GPA: 4.91 / 5.0 (ranked 1st).
- Specialization in High Performance Computing.

### National University of Singapore

Singapore

PART-TIME SEMESTER EXCHANGE

Aug. 2016 - Dec. 2016

- Focused on optimization algorithms and compiler design.

## Skills

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**Programming** C++/C/Python/Java/Scheme/Bash/Fortran  
**Tools** Vim/Git/Tmux/CMake/Allinea/Docker/Ansible/L<sup>A</sup>T<sub>E</sub>X  
**Frameworks** CUDA/MPI/OpenMP/OpenACC/Spark/Android/Django

## Professional Experience

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### National Supercomputing Centre (NSCC) Singapore

Singapore

RESEARCH ENGINEER

Jul. 2018 - Current

- Manage the ASPIRE1 petascale supercomputer.
- Optimize scientific computing programs.
- Supervise the NTU student cluster competition team.

### National University of Singapore

Singapore

RESEARCH INTERN

Jan. 2017 - Dec. 2017

- Added multi-GPU multi-node support with MPI for the GENIE (generic inverted index) GPU similarity search system.
- Implemented a RESTful API for interacting with GENIE.
- Performance optimization, architecture design, and code refactoring for GENIE.

### Nanyang Technological University

Singapore

STUDENT RESEARCH ASSISTANT

Mar. 2015 - Mar. 2017

- Backend Web server development with Django and MySQL, and service deployment with Docker.
- Bluetooth programming on Raspberry Pi with Python.

## Project Experience

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### Nanyang Technological University

Singapore

FINAL YEAR PROJECT

Jun. 2017 - May. 2018

- Design, implementation, benchmarking, and theoretical analysis of various distributed graph algorithms in vertex-centric, Spark, and MPI programming models.
- Compare between distributed graph algorithms and their sequential counterparts.

### Nanyang Technological University

Singapore

UNDERGRADUATE RESEARCH (URECA)

Aug. 2015 - Jun. 2016

- Terrorist image classification with pre-trained convolutional neural network and fine-tuning.
- URECA paper "Terrorist Image Classification: A Convolutional Neural Network Approach" featured in URECA Yearbook 2016.

## Extracurricular Activity

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## NTU Student Cluster Competition Team

Singapore

ADVISOR & LEADER & MEMBER

Dec. 2015 - Present

- Participates in international student cluster competitions including Asia Supercomputing Challenge (China), ISC-HPCAC Student Cluster Competition (Germany), and SC Student Cluster Competition (U.S.A).
- Organizes and hosts weekly training on competition related topics including compilers, math libraries, GPGPU, hardware, profiling, and performance optimization techniques.
- Performance optimization on miniDFT, a quantum chemistry application, on GPU for ISC-HPCAC SCC 17, best optimization among all teams.
- Performance optimization on Born, a seismic imaging application, on GPU for SC SCC 17, gained 20x speed up.
- Automated Linux HPC cluster deployment with Ansible and Kickstart.
- General hardware and software tuning for competition HPC applications.

## NTU Open Source Society

Singapore

PRESIDENT & TECHNICAL DIRECTOR

Aug. 2014 - Apr. 2017

- Planned weekly workshops on various technical topics.
- Collaborated with other tech communities to host events.
- Hosted technical workshops on Raspberry Pi, processor design, RESTful API design, and static website generator.

## Honors & Awards

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2018	<b>Highest LINPACK Award (team co-advisor)</b> , SC Student Cluster Competition 2018	Dallas, U.S.A
2018	<b>Nanyang Award (Teamwork)</b> , Nanyang Technological University	Singapore
2018	<b>Lee Kuan Yew Gold Medal</b> , Nanyang Technological University	Singapore
2018	<b>IMDA Gold Medal</b> , School of Computer Science and Engineering, NTU	Singapore
2018	<b>Dean's List (AY 2017-18)</b> , School of Computer Science and Engineering, NTU	Singapore
2018	<b>2nd Place Overall (team co-advisor)</b> , ISC-HPCAC Student Cluster Competition 2018	Frankfurt, Germany
2017	<b>Overall Champion (team leader)</b> , SC Student Cluster Competition 2017	Denver, U.S.A.
2017	<b>Highest LINPACK Award (team leader)</b> , SC Student Cluster Competition 2017	Denver, U.S.A.
2017	<b>Deep Learning Excellence Award (team leader)</b> , ISC-HPCAC Student Cluster Competition 2017	Frankfurt, Germany
2016	<b>Application Innovation Award (team member)</b> , Asia Supercomputing Challenge 2016	Wuhan, China
2016	<b>First Class Award (team member)</b> , Asia Supercomputing Challenge 2016	Wuhan, China
2016	<b>Dean's List (AY 2015-16)</b> , School of Computer Science and Engineering, NTU	Singapore
2015	<b>Dean's List (AY 2014-15)</b> , School of Computer Science and Engineering, NTU	Singapore
2013	<b>Senior Middle 2 Scholarship (Full scholarship)</b> , Ministry of Education, Singapore	Singapore

## Talks

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### SC17 Student Cluster Competition Experience Sharing

Singapore

SPEAKER FOR <SUPERCOMPUTING ASIA 2018 EDUCATION TRACK>

Mar. 2018

- Shared the NTU student cluster competition team's experience with a focus on the SC17 SCC competition

### Fundamentals of Accelerated Computing with CUDA and OpenACC

Singapore

INSTRUCTOR FOR <SUPERCOMPUTING ASIA 2018 TUTORIAL>

Mar. 2018

- Introduced the fundamentals of CUDA programming
- Introduced the fundamentals of OpenACC programming

### Supercomputing with CentOS

Singapore

SPEAKER FOR <CENTOS DOJO>

Mar. 2018

- Shared the NTU student cluster competition team's experience with CentOS

### Team NTU at Student Cluster Competitions

Singapore

SPEAKER FOR <ACCELERATED COMPUTING & DEEP LEARNING WORKSHOP>

Oct. 2017

- Shared the NTU student cluster competition team's experience with a focus on the usage of GPU.

### Free Blogging with GitHub

Singapore

SPEAKER FOR <NTUOSS TGIFHACKS #55>

Oct. 2016

- Introduced the concept of static website generator and how to set up a blog on GitHub pages with it.

### RESTful API Design

Singapore

SPEAKER FOR <NTUOSS TGIFHACKS #44>

Jan. 2016

- Introduced the basic principles and best practices for designing RESTful APIs.
- Introduced how to implement RESTful APIs with Django and django-rest-framework.

## Raspberry Pi Server

Singapore

SPEAKER FOR <NTUOSS TGIFHACKS #26>

Jan. 2015

- Introduced the basics of Raspberry Pi and Linux command line.
- Introduced how to set up a Samba file sharing server on Raspberry Pi.

## Processor Design

Singapore

CO-SPEAKER FOR <NTUOSS TGIFHACKS #23>

Oct. 2014

- Designed and implemented a simple Harvard-architecture processor for teaching and demonstration purposes.
- Introduced the basic concepts in processor design such as program counter, memory, register, ALU, decoder, multiplexer, etc.

## Services

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2018 **Mentor**, GPU Hackathon @ Pawsey Supercomputing Centre

Fremantle,  
Australia

## Publications

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- [1] Ying Hao Tan, Yiyang Shao, Siyuan Liu, and Bu-Sung Lee. Student cluster competition: Parconnect reproducibility task report. *Parallel Computing*, 70(Supplement C):11 – 17, 2017. SC16 Student Cluster Competition Reproducibility Initiative.
- [2] Jingbo Zhou, Qi Guo, H. V. Jagadish, Lubos Krcal, Siyuan Liu, Wenhao Luan, Anthony K. H. Tung, Yueji Yang, and Yuxin Zheng. A generic inverted index framework for similarity search on the gpu. In *Proceedings of the 34th IEEE International Conference on Data Engineering*, page to appear, 2018.
- [3] Siyuan Liu, Meiru Hao, and Bu-Sung Lee. Student cluster competition 2017, team nanyang technological university: Reproducing vectorization of the tersoff multi-body potential on the intel broadwell architecture. *Parallel Computing*, 77:118 – 124, 2018.
- [4] Siyuan Liu and Arijit Khan. An empirical analysis on expressibility of vertex centric graph processing paradigm. In *2018 IEEE International Conference on Big Data, BigData 2018, Seattle, WA, USA, December 10-13, 2018*, page to appear, 2018.