Tianyi **Cui**

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Education

University of Washington   *Seattle, US*

MSTER IN COMPUTER SCIENCE   *Sep. 2018 - Dec. 2022*

- Research focus on Datacenter Networking and Systems
- Advisor: Arvind Krishnamurthy
- GPA: 3.94

University of Science and Technology of China, Special Class for the Gifted Young[1]   *Hefei, China*

B.S.E. IN COMPUTER SCIENCE   *Sep. 2014 - July 2018*

- **Overall GPA: 3.93/4.3   Rank: 2/147**
- Honor Class Student

Publications

[1] B. Li, **T. Cui**, Z. Wang, W. Bai, L. Zhang, "SocksDirect: Datacenter Sockets can be Fast and Compatible." Proceedings of the 2019 ACM SIGCOMM Conference(**SIGCOMM '19**) (**Co-First author**)

[2] M. Liu, **T. Cui**, H. Schuh, A. Krishnamurthy, S. Peter, K. Gupta "iPipe: A Framework for Building Distributed Applications on Multicore SoC SmartNICs." Proceedings of the 2019 ACM SIGCOMM Conference(**SIGCOMM '19**)

[3] **T. Cui**, W. Zhang, K. Zhang, A. Krishnamurthy "Offloading load balancers onto SmartNICs." Proceedings of the 12th ACM SIGOPS Asia-Pacific Workshop on Systems(**APSys '21**)

Experience

Detecting CPU caused packet drops with MilliSampler   *Meta*

SOFTWARE ENGINEERING INTERN, MANAGER: **NEIL SPRING**   *June 2022 - Sep 2022*

- Identified packet drop is caused by host or CPU
- Captured networking stack and NIC driver counters with C++
- Developed a tool to analyze the counters inside the datacenter
- Found out the top hosts suffered from host based packet drops among 140k servers

Offloading load balancers onto SmartNICs   *University of Washington*

RESEARCH ASSISTANT, ADVISOR: PROF. **ARVIND KRISHNAMURTHY**   *June 2019 - May 2022*

- Offloading L7 load balancer to SmartNICs with DPDK
- Accelerated the load balancer with packet-processing engine on SmartNICs
- Designed a lightweight networking stack and efficient data structures
- Identified a bug in DPDK
- Achieved 20x throughput compared with Nginx running on Bluefield

Intelligent Buffer Tuning for SONiC   *Microsoft Research, Redmond*

INTERN, ADVISOR: **WEI BAI**   *July. 2020 - Dec. 2020*

- Identified a performance bottleneck in the Datacenter
- Designed an optimization algorithm for switch buffer management
- Achieved zero packet lose and eliminated Pause Frames for testbed

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[1] I entered the university one year earlier than my peers.

SocksDirect: Datacenter sockets can be Fast and Compatible *Microsoft Research Asia*
INTERN, ADVISOR: **LINTAO ZHANG** *Oct. 2017 - July. 2018*

- Designed and implemented a Linux socket API compatitable communication Framework
- Leverage RDMA for inter-host communication and shared memory for intra-host communication
- Designed sophisticated techniques to bridge the gap of socket semantics and RDMA
- Achieved 17x latency improvement and 7x message throughput improvement

HTTPS Gateway using FPGA *Microsoft Research Asia*
INTERN, ADVISOR: **KUN TAN** *July. 2016 - Aug. 2016*

- Offloaded cryptographic RSA decryption in HTTPS handshakes to FPGA
- Designed an efficient and scalable RSA algorithm on FPGA with high level C-like language
- Our accelerator saved up to 13 CPU cores previously used for RSA decryption to maintain 16K HTTPS connections per second
- Won the **global 2nd place** of the "Quality for cloud customers" challenge out of 200+ projects worldwide in Microsoft Hackathon

Courses

Au 2018	**CSE 550**, Systems for all	*4.0*
Wi 2019	**CSE 551**, Operating Systems	*4.0*
Sp 2019	**CSE 552**, Distributed Systems	*4.0*
Sp 2020	**CSE 547**, Machine Learning for Big Data	*3.9*

Awards

Oct. 2017	**Guo Moruo Scholarship**, Highest honor in USTC, awarded top 1.7% of our university	*USTC*
Oct. 2016	**National Scholarship**, Top 0.2% of the nation	*USTC*
Aug. 2016	**Global 2nd prize of "Quality for cloud customers" challenge**, Microsoft Hackathon	*Microsoft*
Jan. 2016	**Outstanding Project**, Topic of An analysis of the privacy and security of MI Phone	*USTC*
Dec. 2015	**Outstanding Scholarship Award**,	*USTC*
Oct. 2015	**Gold Medal**, International Genetically Engineered Machine Competition (iGEM)	*Boston, US*
Aug. 2014	**Bronze Medal**, National Olympiad in Informatics (NOI) (nationwide)	*Shenzhen, China*

Activities

Technical Group of the College of the Gifted Young *USTC*
PRESIDENT *May 2015-May 2016*

- Maintained the web servers and network gateways of our college
- Built the website of our college
- Organized the Capture the Flag competition in USTC

Linux User Group *USTC*
PRESIDENT *May 2016 - June 2017*

- One of the largest Linux User Groups in China
- Maintained a VPN server for hundreds of users
- Organized Linux Install Party, Software Freedom Day, several talks etc. Each time hundreds of students attend them

Skills

Programming Language	Python, C/C++, CUDA, Hack, JS
Systems	Distributed Systems, Linux kernel
Networking	DPDK, RDMA, TCP stack, SmartNIC, Switches and Router config

Community Services

Reviewer	IEEE IOT, IEEE TCC, IEEE TNET, IEEE TDSC, IEEE Micro
Artifact Evaluation Committee	SIGCOMM 2022
Teaching Assistant	CSE452 Distributed Systems, CSE 461 Computer Networks