Bojie Li

Last update on May 15, 2016

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2nd year Ph.D. student • Joint Ph.D. program with USTC and MSRA

Education

University of Science and Technology of China — Hefei, Anhui, China
Ph.D. in Computer Science — *Sept. '14 – present*
Joint Ph.D. program with Microsoft Research. Advisor: Kun Tan in Wireless and Networking group.

University of Science and Technology of China — Hefei, Anhui, China
B.S. in Computer Science (School of Gifted Young) — *Sept. '10 – June '14*

Research Interests

Data center networking: Network function virtualization.

Reconfigurable hardware: High level synthesis, Heterogeneous computing.

Publications

ClickNP: Highly Flexible and High-performance Network Processing with Reconfigurable Hardware
Bojie Li, Kun Tan, Layong (Larry) Luo, Yanqing Peng, Renqian Luo, Ningyi Xu, Yongqiang Xiong and Peng Cheng
Proceedings of the 2016 ACM conference on SIGCOMM (**SIGCOMM'16**) (to appear)

Fast and Cautious: Leveraging Multi-path Diversity for Transport Loss Recovery in Data Centers
Guo Chen, Yuanwei Lu, Yuan Meng, **Bojie Li**, Kun Tan, Dan Pei, Peng Cheng, Layong (Larry) Luo, Yongqiang Xiong, Xiaoliang Wang and Youjian Zhao
Proceedings of the 2016 USENIX Annual Technical Conference (**ATC'16**) (to appear)

Research Experience (selected)

ClickNP Packet Processing Platform on FPGA — Microsoft Research Asia
SIGCOMM'16, first author, instructed by Kun Tan — *July '15 – Jan. '16*

- The first FPGA-accelerated platform for general network functions, written completely in high-level language and achieving 40 Gbps line rate as well as $< 2\mu$s latency at any packet size.
- Support high throughput (25Gbps) and low latency (1μs) joint CPU-FPGA processing.
- Implement the ClickNP tool-chain, which can integrate with various commercial HLS tools.
- Work with two senior undergraduates to design and implement 100 elements and 5 network functions.

Fault-tolerant Switch Software Architecture — Microsoft Research Asia
B.S. dissertation, instructed by Kun Tan — *July '13 – May '14*

- Design and implementation of a fault-tolerant switch software architecture allowing any component to fail or upgrade without interrupting data plane.
- The control plane will automatically recover within 1 minute after the failed component restarts.
- Designed a daemon (SyncD) to virtualize lookup tables in programmable switching chip and resolve rule conflicts among clients.

Engineering Experience (selected)

USTC Freeshell — Univ. of Science and Tech. of China
Founder and main developer — *Jan. '13 – July '14*

- Container-based IaaS service based on OpenVZ virtualization, supporting various Linux distributions.
- Support migration, IPv4 & IPv6, NAPT, port mapping and HTTP(S) proxy.
- Support ~2,000 active containers with merely 7 compute nodes, 1 storage node, 1 controller node and 2 network nodes. Optimize NFS and leverage local disk cache to improve storage efficiency.
- The first IaaS service in USTC, have ~1,500 users. 7K lines of PHP and 1K lines of bash code.

LUG VPN — Univ. of Science and Tech. of China
Founder and main developer — *Jul. '13 – July '14*

- Geolocation DNS-based policy routing, load balancing and failure recovery.
- Access points and exit gateways in 6 ISPs, connected via GRE tunnels in star topology.
- ~1K active users, ~10K active flows and ~500 Mbps traffic in peak periods.

Embedding Backdoor in an Open Source Compiler — Univ. of Science and Tech. of China
Course project of Hacker Reverse Engineering Technology *Sept. '12 – Jan. '13*

- Implement Ken Thompson's Turing Award lecture *Reflections of Trusting Trust* on **tcc** compiler.
- Inserts backdoor to matches **sulogin** source code to insert login backdoor. The compiler backdoor bootstraps by matching its own source code.

Real-time Disk File System — Univ. of Science and Tech. of China
Course project of Principles and Design of Operating Systems *Mar. '12 – June '12*

- Improve block device scheduling algorithm and process scheduler for RTLinux-3.2 to enforce strict priority and eliminate disruptions from non-real-time tasks.
- Guarantee response time and throughput for real-time tasks with burst, random, streaming or pipeline I/O modes.

Selected Awards

Microsoft Young Fellowship Scholarship *Aug. '13*

Best Creativity Award, Robogame 2011, USTC *Oct. '11*

First Prize (rank 10^{th}), China Mathematical Olympiad in Hebei province *Oct. '09*

Bronze Medal (rank 69^{th}), National Olympiad in Informatics *Jul. '09*

First Prize (rank 2^{nd}), National Olympiad in Informatics in Hebei province *Nov. '08*

Extracurricular Activities

Teaching Assistant, Advanced Software Engineering course, MSRA *Sept. '15 – Jan. '16*

President, Linux User Group, USTC *May '12 – May '13*

DevOps, GewuIT Startup Team, USTC *Sept. '12 – May '13*

Founder, Technology team, Student Union, School of Gifted Young *Sept. '11 – May '12*

Skills

Programming: C, OpenCL, Python, Verilog, Bash.

Web development: JavaScript, HTML, CSS, PHP, Node.js, Flask.

Linux: Kernel development, Network management, Server operations and monitoring.

Gitlab: https://git.ustclug.org/u/boj