

Education

Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China 09/2014 – 06/2017

Master of Engineering, Computer Science

GPA: **87.90/100.00**, Advised by Prof. Mingyu Chen

Master thesis: [An Application-driven Flow Scheduling in Data Centers](#) (in Chinese)

Huazhong University of Science and Technology, Wuhan, China

09/2010 – 06/2014

Bachelor of Engineering, Computer Science

GPA: **87.66/100**; Ranking: **7/320**

Publications

1. **Zhuang Wang**, Ke Liu, Long Li, Weiyi Chen, Mingyu Chen, Lixin zhang, “[A Novel Approach for All-to-All Routing in All-optical Hypersquare Torus Network](#),” in *Proc. of ACM International Conference on Computing Frontiers (CF)*, 2016.
2. Ke Liu, **Zhuang Wang**, Jack Y. B. Lee, Mingyu Chen, Lixin Zhang, “[Adaptive Rate Control over Mobile Data Networks with Heuristic Rate Compensations](#),” in *Proc. of IEEE/ACM International Symposium on Quality of Service (IWQoS)*, 2016.
3. **Zhuang Wang**, Ke Liu, Yifan Shen, Jack Y. B. Lee, Mingyu Chen, Lixin Zhang, “[Intra-host Rate Control with Centralized Approach](#),” in *Proc. of IEEE Cluster* 2016.
4. **Zhuang Wang**, Weifa Liang, Meitian Huang, Yu Ma, “[Delay-Energy Joint Optimization for Task Offloading in Mobile Edge Computing](#),” in CoRRabs/1804.10416 (2018)

Professional Experiences

Brown University

07/2018 – present

Advised by Prof. Theophilus Benson

- Probe TCP flows and packets information from the kernel with eBPF
- Trace packet transmission across different layers in the kernel
- Performance diagnosis in microservices architecture

Australian National University, Canberra, Australia

08/2017 – 05/2018

Research Assistant, Advised by Prof. Weifa Liang

- Designed task offloading algorithms in Mobile Edge Computing

Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China

01/2014 – 05/2014

Advised by Prof. Binzhang Fu

- Worked on congestion prediction in Network on Chips with machine learning methods

Awards and Honors

Award	Organization	Date
National Scholarship	Ministry of Education of P. R. China	2011
National Encouragement Scholarship	Ministry of Education of P. R. China	2013
National Scholarship	Ministry of Education of P. R. China	2016
International Postgraduate Research Scholarship (IPRS)	Australian government	2017

Selected Projects

μ BPF, a performance diagnosis framework in microservices architecture [\[GitHub\]](#)

μ BPF leverages eBPF to capture TCP metrics from the kernel for performance diagnosis in microservices architectures. It probes two levels of statistics: flows and packets. The flow-level statistics currently have sixteen metrics, such as flight size, CWnd, sampled RTT, number of fast retransmission and timeout. The packets-level statistics are the breakdown of the end-to-end delay, including latencies in TCP layer, IP layer and kernel space.

Haiyun, a labeled network system [\[GitHub\]](#)

Haiyun enable NICs to distinguish packets with different service-level agreements (SLAs). With the support of DPDK and mTCP, Haiyun could keep packets with different SLAs in different queues from NICs to applications to reduce the long tail delay in data centers.

My work consists of two components. One is a flow generator, which could generate more than 1 million concurrent TCP connections with just one physical server. The other is a third-party tool to measure the performance of Haiyun. To measure the delay resulted from packets processing in servers, we use switches' mirror function to monitor packets and measure their delays on a specific server. To reduce the overheads of operating system, we leverage DPDK to bypass the kernel to optimize the performance of this tool.

Panda, a flow scheduling in data centers [\[GitHub\]](#)

Panda can bound low latency for delay-sensitive applications and optimize the flow complete times for throughput-intensive applications on the premise that flow information is not known *a priori*. We observe that most packets generated by delay-sensitive applications are small, while by throughput-intensive applications are large. Panda takes advantage of the distinct flow size distributions to differentiate the two kinds of applications.

At its heart, Panda derives an optimal threshold to divide packets into two categories: large and small, ensuring that small packets dominate traffic from delay-sensitive applications and large ones dominate traffic from throughput-intensive applications. Panda then allocates each flow a counter which is initiated with zero. Large packets increase the counter while small packets decrease it. Then Panda assigns priorities to flows according to their counters.