

Weitao Wang

weitaowang@gmail.com • (+1) 281-236-7550 • weitaowang.site/about

Education

Rice University, Houston, Texas

Aug. 2018 – Nov. 2024

- Ph.D. in Computer Science • Advisor: Prof. T. S. Eugene Ng
- Research Interests: Transport protocol design, decentralized algorithm design, application-infrastructure co-design, cluster scheduling, programmable hardware, systems for AI

Shanghai Jiao Tong University, Shanghai, China

Sept. 2014 – Jun. 2018

- B.S. in Engineering • IEEE Honor Class • Major GPA: 90.45 / 100 (Rank: 4 / 69)

Work Experiences

High Precision Datacenter-scale Clock Synchronization

Nov. 2024 – Present

Google Cloud | Software Engineer

- Designed a new large-scale clock synchronization system to achieve single-digit nanosecond precision.
- Reduced both systematic and random errors and tested on 1000+ machines with < 10 nanosecond precision.
- Leveraged redundancy design to achieve agile and reliable clock synchronization services.
- Prototyped for the Chicago Mercantile Exchange (CME) and earned long-term collaborations.

Data Center Congestion Control Via In-band Network Telemetry

Nov. 2024 – Present

Google Cloud | Software Engineer

- Prototyped a new congestion control for next-generation networks with in-band network telemetry (INT)
- Achieve ultra-low latency ($< 50 \mu s$), high utilization ($> 96\%$), and max-min fairness.
- Reduce the average job completion time by 42.4% and tail completion time by 99.1% for RPC workload.
- Validate on both [simulator](#) and testbed in the production environment.

Machine Learning Network Telemetry and Analysis

Nov. 2024 – Present

Google Cloud | Software Engineer

- Built systems for collecting and debugging data from multiple layers, like NCCL, transport, NIC hardware.
- Provided information on the traffic locality, transport errors, straggler node, grey failure, and so on.
- Integrated the telemetry information into the optimization process to achieve more agile responses.
- Accelerated the debugging and mitigation process for network problems and network hardware problems.

Patents

- [\[Patent Link\]](#) Congestion Control for Networks Using Deployable INT
Masoud Moshref Javadi, **Weitao Wang**, Yuliang Li, Gautam Kumar, Nandita Dukkkipati, Neal Cardwell

Selected Publications

- [\[OSDI'25\]](#) Soze: One Network Telemetry Is All You Need For Per-flow Weighted Bandwidth Allocation at Scale
Weitao Wang, T. S. Eugene Ng
- [\[NSDI'23\]](#) Poseidon: Efficient, Robust, and Practical Datacenter CC via Deployable INT
Weitao Wang, Masoud Moshref, Yuliang Li, Gautam Kumar, T. S. Eugene Ng, Neal Cardwell, Nandita Dukkkipati
- [\[NSDI'22\]](#) RDC: Relieving Data Center Network Congestion with Topological Reconfigurability at the Edge
Weitao Wang, Dingming Wu, Sushovan Das, Afsaneh Rahbar, Ang Chen, T. S. Eugene Ng
- [\[NSDI'22\]](#) SpiderMon: Harnessing Wait-For Relations for Performance Debugging with Programmable Switches
Weitao Wang, Xinyu Crystal Wu, Praveen Tamma, Ang Chen, T. S. Eugene Ng

- [\[HotNets'21\]](#) MXDAG: A Hybrid Abstraction for Cluster Applications
Weitao Wang, Sushovan Das, Xinyu Crystal Wu, Zhuang Wang, Ang Chen, T. S. Eugene Ng
- [\[OptSys'21\]](#) Abstractions for Reconfigurable Hybrid Network Update and A Consistent Update Approach
Weitao Wang, Sushovan Das, T. S. Eugene Ng
- [\[SoSR'20\]](#) Grasp the Root Causes in the Data Plane: Diagnosing Latency Problems with SpiderMon
Weitao Wang, Praveen Tamma, Ang Chen, T. S. Eugene Ng
- [\[SIGCOMM'25\]](#) Firefly: Scalable, Ultra-Accurate Clock Synchronization for Datacenters
Pooria Namyar, Yuliang Li, **Weitao Wang**, Nandita Dukkipati, KK Yap, Junzhi Gong, Chen Chen, Peixuan Gao, Devdeep Ray, Gautam Kumar, Yidan Ma, Ramesh Govindan, Amin Vahdat
- [\[SIGCOMM'23\]](#) Augmented Queue: A Scalable In-Network Abstraction for Data Center Network Sharing
Xinyu Wu, Zhuang Wang, **Weitao Wang**, T. S. Eugene Ng
- [\[WORDS'23\]](#) Aurelia: CXL Fabric with Tentacle
Shu-Ting Wang, **Weitao Wang**
- [\[NeurIPS'23\]](#) Scissorhands: Exploiting the Persistence of Importance Hypothesis for LLM KV Cache Compression at Test Time
Zichang Liu, Aditya Desai, Fangshuo Liao, **Weitao Wang**, Victor Xie, Zhaozhuo Xu, Anastasios Kyrillidis, Anshumali Shrivastava
- [\[ToN'22\]](#) Shufflecast: An Optical, Data-rate Agnostic and Low-Power Multicast Architecture for Next-Generation Compute Clusters
Sushovan Das, Afsaneh Rahbar, Xinyu Wu, Zhuang Wang, **Weitao Wang**, Ang Chen, T. S. Eugene Ng

Skills

Programming language: C/C++, Python, P4, MATLAB, Java, Labview, Verilog, HTML5/CSS3

Tools & Platforms: NS-3, Mininet, Tofino, OpenFlow, Gurobi, SCIP

Selected Project Experiences

A Decentralized Host-based Weighted Bandwidth Allocation Algorithm Mar. 2023 – Oct. 2024

- Provide a bandwidth allocation system that each flow could arbitrarily get proportionally higher bandwidth.
- Without a central controller or smart switches, the weight can be changed directly by flows on the end-host.
- Achieves an agile weight update for all flows and an accurate weighted bandwidth allocation.

A Decentralized Zero-queue Congestion Control with Max-min Fair May 2022 – Mar. 2023

- A congestion control algorithm that achieves zero-queuing despite traffic patterns and topology.
- Precisely monitor and maintain the bandwidth usage of links for $< 100\%$ with in-network telemetry.
- Achieve zero-queuing, fast convergence, max-min fair, and maintain network utilization at $\geq 90\%$.

A Decentralized Task Scheduler with Resource Sharing Knowledge Apr. 2021 – Mar. 2022

- Schedule the tasks in MXDAG (a cluster APP abstraction) precisely by understanding the resource sharing.
- Parse the code to obtain MXDAG and communicate with the cluster for precise resource allocation.
- Reduce the job completion time and minimize the resource usage for all the cloud service users.

A Default-Off Network Diagnostic System with Programmable Switches Mar. 2020 – May 2021

- Achieve network-wide monitoring with zero overhead and reactive diagnosis with low latency.
- Implement the prototypes on both **Barefoot Tofino** Switches and **NS3-Bmv2** simulator.
- Reduce the memory overhead by more than **99%** compared to a record-all monitoring solution.

A Reconfigurable Pod-Centric Data Center Network Architecture Oct. 2018 – May 2020

- Optimize the data center network traffic with the dynamically reconfigurable network topology.
- Deploy a **Hadoop/MPI/Memcached** datacenter prototype with 16 servers and 5 **openflow** switches.
- Achieve an average path length **35%** shorter and improve the job completion times by **1.1-2.7x**.