

JIACHENG MA

Ph.D. Student

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RESEARCH INTERESTS

My research is at the bottom of the software stack. I am interested in improving the performance, programmability, and scalability of heterogeneous system by engineering different system software. I am also interested in system virtualization and software-hardware co-design.

EDUCATION

University of Michigan

Ann Arbor, MI, USA

Ph.D. Pre-Candidate in Computer Science

Sep. 2018 – Present

Thesis Topic: Heterogeneous System in Virtualization

Advisor: Prof. Baris Kasikci

Shanghai Jiao Tong University

Shanghai, China

B.E. in Software Engineering

Sep. 2014 – Jun. 2018

Thesis: gMig: Efficient GPU Live Migration Optimized by Software Dirty Page for Full Virtualization

Advisor: Prof. Zhengwei Qi

PEER-REVIEWED PUBLICATIONS

- [1] A Hypervisor for Shared-Memory FPGA Platforms. Jiacheng Ma, Gefei Zuo, Kevin Loughlin, Xiaohe Cheng, Yanqiang Liu, Abel Mulugeta Eneyew, Zhengwei Qi, and Baris Kasikci. *Proceedings of the 25th International Conference on Architectural Support for Programming Languages and Operating Systems*, 2020.
- [2] gMig: Efficient vGPU Live Migration with Overlapped Software-based Dirty Page Verification. Qiumin Lu, Xiao Zheng, Jiacheng Ma, Yaozu Dong, Zhengwei Qi, Jianguo Yao, Bingsheng He, and Haibing Guan. *IEEE Transactions on Parallel and Distributed Systems*, 2019.
- [3] gMig: Efficient GPU Live Migration Optimized by Software Dirty Page for Full Virtualization. Jiacheng Ma, Xiao Zheng, Yaozu Dong, Wentai Li, Zhengwei Qi, Bingsheng He, and Haibing Guan. *Proceedings of the 14th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments*, pages 31–44, 2018.
- [4] Scalable GPU Virtualization with Dynamic Sharing of Graphics Memory Space. Mochi Xue, Jiacheng Ma, Wentai Li, Kun Tian, Yaozu Dong, Jinyu Wu, Zhengwei Qi, Bingsheng He, and Haibing Guan. *IEEE Transactions on Parallel and Distributed Systems*, 29(8):1823–1836, 2018.
- [5] gScale: Scaling up GPU Virtualization with Dynamic Sharing of Graphics Memory Space. Mochi Xue, Kun Tian, Yaozu Dong, Jiacheng Ma, Jiajun Wang, Zhengwei Qi, Bingsheng He, and Haibing Guan. *Proceedings of the 2016 USENIX Conference on Usenix Annual Technical Conference*, pages 579–590, 2016.

PROJECTS

FPGA Virtualization

Apr. 2018 – Aug. 2019

In this project, we create the first scalable hypervisor for shared-memory FPGA platforms. The hypervisor, called OPTIMUS, supports both spatial multiplexing and temporal multiplexing, and scales linearly until the memory bandwidth is saturated.

Optane as Memory

Aug. 2017 – Jun. 2018

This work explores using NVM (Intel Optane) as main memory for KVM guests. This work can break the hardware limitation of host memory size and provide memory overbooking for guests with near-native performance.

vGPU Live Migration

Dec. 2016 – Jul. 2017

Intel GVT-g is an open-source KVM/Xen based full GPU virtualization solution; however, it lacks the feature of live migration. This work enables live migrating vGPUs for cloud applications such as virtual desktops, cloud gaming farms, cloud transcoding services, etc.

Scaling up GPU Virtualization

Jan 2016 – Mar 2017

This project scales up the maximum number of vGPUs in Intel GVT-g and minimizes the performance impact. In Haswell architecture, Intel GVT-g only supports 3 guests; gScale extends it for 5x. This work makes GVT-g more consolidated, since more VMs with vGPU can be deployed on one physical machine.

EMPLOYMENT

Intel Cooperation

Shanghai, China

Software Developer Intern at Open Source Technology Center, SSG
Advisor: Dr. Yaozu Dong

Jul. 2016 – Jun. 2018

TEACHING

Programming and Data Structure (SE 117)

Shanghai, China

Teaching Assistant for Prof. Zhengwei Qi at Shanghai Jiao Tong University

Feb. 2016 – Jun. 2016

AWARDS AND HONORS

ASPLOS Student Travel Grant	2020
SOSP Student Travel Grant	2019
ASPLOS/VEE Student Travel Grant	2018

TECHNICAL SKILLS

Programming Language: C, C++, Verilog, System Verilog
Virtualization: KVM, QEMU, Mediated Pass-Through

REFERENCES

Available upon request

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