

# Yizhou Shan

Ph.D. Student  
Computer Science and Engineering  
UCSD

Email: [ys@ucsd.edu](mailto:ys@ucsd.edu)  
Web: [lastweek.io](http://lastweek.io)  
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## RESEARCH INTERESTS

My research interests span Distributed System, Operating System, and Computer Architecture, with a focus on building fast and reliable systems for datacenters. I work at Wuklab, UCSD, under the supervision of Prof. Yiyang Zhang.

## EDUCATION

<b>University of California San Diego</b> Ph.D. in Computer Science and Engineering	2019-2022 (expected)
<b>Purdue University</b> Ph.D. in Computer Engineering (Transferred to UCSD)	2016-2019
<b>Institute of Computing Technology, Chinese Academy of Sciences</b> Research Assistant	2014-2016
<b>Beijing University of Aeronautics and Astronautics</b> B.E. in Computer Engineering	2010-2014

## INDUSTRY EXPERIENCE

Research Intern, <b>VMware Research</b> Mentor: <i>Marcos K. Aguilera</i>	Palo Alto, CA, Summer 2019
Research Intern, <b>VMware Research</b> Mentor: <i>Stanko Novakovic</i>	Palo Alto, CA, Summer 2018

## PUBLICATIONS

Shin-Yeh Tsai, **Yizhou Shan**, Yiyang Zhang, “**Disaggregating Persistent Memory and Controlling Them Remotely: An Exploration of Passive Disaggregated Key-Value Stores**”, 2020 USENIX Annual Technical Conference (ATC '20)

Stanko Novakovic, **Yizhou Shan**, Aasheesh Kolli, Michael Cui, Yiyang Zhang, Haggai Eran, Liran Liss, Michael Wei, Dan Tsafir, Marcos Aguilera, “**Storm: a fast distributed storage system using remote memory primitives**”, 12th ACM International Systems and Storage Conference (SYSTOR '19) (**Best Paper Award**)

**Yizhou Shan**, Yutong Huang, Yilun Chen, Yiyang Zhang, “**LegoOS: A Disseminated, Distributed OS for Hardware Resource Disaggregation**”, 13th USENIX Symposium on Operating Systems Design and Implementation (OSDI '18) (**Best Paper Award**)

**Yizhou Shan**, Shin-Yeh Tsai, Yiyang Zhang, “**Distributed Shared Persistent Memory**”, Proceedings of the ACM Symposium on Cloud Computing 2017 (SoCC '17)

## WORKSHOPS AND POSTERS

**Yizhou Shan**, Yutong Huang, Yiyang Zhang, “Challenges in Building and Deploying Disaggregated Persistent Memory”, 10th Annual Non-Volatile Memories Workshop (NVMW '19)

**Yizhou Shan**, Shin-Yeh Tsai, Yiyang Zhang, “Distributed Shared Persistent Memory”, 9th Annual Non-Volatile Memories Workshop (NVMW '18)

**Yizhou Shan**, Yiyang Zhang, “Disaggregating Memory with Software-Managed Virtual Cache”, the 2018 Workshop on Warehouse-scale Memory Systems (WAMS '18) (co-located with ASPLOS '18)

Yiyang Zhang, **Yizhou Shan**, Sumukh Hallymysore, “Disaggregated Operating System”, 17th International Workshop on High Performance Transaction Systems (HPTS '17)

**Yizhou Shan**, Yilun Chen, Yutong Huang, Sumukh Hallymysore, Yiyang Zhang, “Lego: A Distributed, Decomposed OS for Resource Disaggregation”, Poster at the 26th ACM Symposium on Operating Systems Principles (SOSP '17)

**Yizhou Shan**, Sumukh Hallymysore, Yutong Huang, Yilun Chen, Yiyang Zhang, “Disaggregated Operating System”, Poster at the ACM Symposium on Cloud Computing 2017 (*SoCC '17*)

## AWARDS

[2020 Facebook Fellowship Finalist](#)

SYSTOR'19 Best Paper Award

OSDI '18 Jay Lepreau Best Paper Award

OSDI '18 Student Travel Grant

SOSP '17 Student Travel Grant

SoCC '17 Student Travel Grant

## PROFESSIONAL SERVICES

### Program Committee

ASPLOS'21 External Review Committee

### Journal Review

ACM Transactions on Storage (TOS): 2020

IEEE/ACM Transactions on Networking: 2020

## RESEARCH EXPERIENCE

**Programmable Disaggregated Memory System** (Under Submission) 2018-Current  
*Purdue University and UCSD*

We are building a hardware-based disaggregated memory system using FPGA. This is a follow-up work of LegoOS. The mComponent provides basic remote memory primitives, some higher-level interfaces such as key-value store.

**Serverless on Disaggregated Datacenter** (WIP) 2019-Current  
*UCSD*

We are trying to demonstrate when serverless means no server. Instead of using monolithic machines, we explore the possibility using disaggregated datacenter. Instead of optimizing existing VM and container technologies, we explore a new way to run serverless function: using library OS. The project involves heavy kernel and distributed systems hacking. We are targeting OSDI'20.

**An Operating System For Cloud FPGA** (Concluded) 2019-2020  
*UCSD*

We are building a new operating system for cloud FPGA. This new runtime overcomes the limitations of static compile-time approaches and provides a set of new services. We will show how this helps reduce cost and enable new FPGA apps.

**Optimize Page Faults** 2019 May-Aug  
*VMware Research*

Ancient old page fault handling is the driving wheel for many emerging datacenter systems and applications. But the page fault handling mechanism was designed for millisecond-level disk operations, there is a performance mismatch when it is used by fast devices like RDMA, or PM. We are now trying to close the gap.

**LegoOS: A Disaggregated Operating System** 2017-2018  
*Purdue University*

We propose a new OS model called the splitkernel to manage disaggregated systems. Splitkernel disseminates traditional OS functionalities into loosely-coupled monitors, each of which runs on and manages a hardware component. Using the splitkernel model, we built LegoOS, a new OS designed for hardware resource disaggregation.

**Hotpot: Distributed Shared Persistent Memory** 2016-2017  
*Purdue University*

We propose Distributed Shared Persistent Memory (DSPM), a new framework for using persistent memories in datacenter environments. We designed and implemented *Hotpot*, the first DSPM system in Linux kernel. Hotpot provides low-latency, transparent memory accesses, data persistence, data reliability and high availability.

**Non-Volatile Memory (NVM) Emulator** 2015-2016  
*Institute of Computing Technology, Chinese Academy of Sciences*

We designed and implemented a NVM emulator in Linux kernel, which leverages Intel's Performance Monitoring Unit to emulate NVM's slower read/write latency and smaller bandwidth on physical DRAM. This emulator runs on bare-metal x86 machines.

**ARMv8 CPU Project**

2013

*Institute of Computing Technology, Chinese Academy of Sciences*

I participated in the Register-Transfer Level design and verification of some blocks within cache unit and load-store unit.  
It is commercial project collaborated with Huawei.