Ashish Panwar

+91-8861544256 ◇ ashishpanwar@iisc.ac.in ◇ GitHub

About Me

I am interested in building practical systems for solving fundamental systems problems. My primary interests lie at the intersection of operating systems, architecture and virtualization. My recent efforts have been centered around investigating operating system techniques for scaling virtual memory to large memory systems—in particular techniques to deal with the address translation wall.

Education

Ph.D. in Computer Science — August 2018—Present
Department of Computer Science and Automation — CGPA: 9/10
Indian Institute of Science, Bangalore
Research Supervisors: Prof. K. Gopinath, Dr. Arkaprava Basu

M.Sc. (Engg) in Computer Science — August 2012—July 2015
Department of Computer Science and Automation — CGPA: 6.3/8
Indian Institute of Science, Bangalore

B. Tech. in Information Technology — August 2007—May 2011
Meerut Institute of Engineering and Technology, Meerut — Percentage: 75%
Uttar Pradesh Technical University

Work Experience

- Research Intern at VMware Research, Palo Alto, USA — May'19—July'19
- Member of Technical Staff at Advanced Technology Group (ATG), NetApp India — Oct'16—July'18
- Software Engineer at Intel India Pvt. Ltd. — Aug'15—Oct'16
- Assistant System Engineer at Tata Consultancy Services Ltd. — Jan'12—July'12

Publications

- **Mitosis: Transparently Self-Replicating Page-Tables for Large-Memory Machines**
  Reto Achermann, Ashish Panwar, Abhishek Bhattacharjee, Timothy Roscoe, Jayneel Gandhi
  To appear in *ACM Architectural Support for Programming Languages and Operating Systems* (ASPLOS), 2020.
- **HawkEye: Efficient Fine-grained OS Support for Huge Pages**
  Ashish Panwar, Sorav Bansal, K. Gopinath
  Published in *ACM Architectural Support for Programming Languages and Operating Systems* (ASPLOS), 2019.
- **Making Huge Pages *Actually* Useful**
  Ashish Panwar, Aravinda Prasad, K. Gopinath
  Published in *ACM Architectural Support for Programming Languages and Operating Systems* (ASPLOS), 2018.
- **A Case for Protecting Huge Pages from the Kernel**
  Ashish Panwar, Naman Patel, K. Gopinath
  Published in *ACM SIGOPS Asia-Pacific Workshop on Systems* (APSys), 2016.
- **Towards Practical Page Placement for a Green Memory Manager**
  Ashish Panwar, K. Gopinath
  Published in *IEEE International Conference on High Performance Computing* (HiPC), 2015.

Courses at IISc

Compiler Design, Theory and Practice of Systems Security, Cryptography,
Stochastic Models and Applications, Design and Analysis of Algorithms,
Program Analysis and Verification, Linear Algebra and Probability

Mini (Course) Projects

- Implementation of "Points-To" analysis In Java (Eclipse, Java)
- Implementation of "Call-by-Name" parameter passing method In C (LLVM, Clang, C++)

Other Research Projects

- **Mitosis++:** Hypervisor Support for Self-Replicating Page-Tables in Virtualized Systems
  Involves extending Mitosis to virtualized systems where the underlying NUMA hardware configuration is typically not exposed to the guest operating systems (joint-effort with VMware Research).
- **Trident:** Transparent allocation of multiple page sizes
  This project explores softwarre techniques for supporting very large or gigantic pages (e.g., 1GB pages) for emerging big-memory workloads–that are often bottlenecked due to the overheads of virtual memory.
- **A Unified Storage Connector** for In-place Analytics in Hybrid Cloud
  This involves the design and implementation of a storage connector that unifies copy-then-compute workflow into a single step by transforming the data on-demand and eliminating the conventional extract-transform-load cycle. The Unified Storage Connector was built using HDFS (Hadoop Disttributed File System) primitives in contrast to prior works that provide HDFS compatibility by implementing a full file system layer on top of Hadoop.
- Memory Management for Nested Virtualization and Beyond
  Exploring novel techniques for efficiently virtualizing memory across multiple layers of virtualization.

Talks

- System Software Enhancements for Efficient Memory Management
  - Indian Design Review, Semiconductor Research Corporation, Bangalore, India, Jan 2020.
- JumpSwitches: Restoring the Performance of Indirect Branches in the Era of Spectre (Research Paper–ATC'19)
  - *Indian Institute of Science, October 2019*
- Making Huge Pages *Actually* Useful
  - *ACM Inter-Research-Institute Student Symposium, Kochi, India, Feb 2019*
  - *ACM Architectural Support for Programming Languages and Operating Systems, Virginia, US, April 2018*
  - *NetApp, Sunnyvale, US, April 2018*
  - *Qualcomm, Bangalore, India, March 2018*
- Light-Weight Contexts: An OS Abstraction for Safety and Performance (Research Paper–OSDI'16)
  - *Centre for Artificial Intelligence and Robotics, DRDO, Bangalore, India, Oct 2018*

Awards

- Recipient of the *Prime Minister's Fellowship Scheme for Doctoral Research* (2019-2023), co-sponsored by the Confederation of Indian Industry and Microsoft Research India.
- Recipient of the *Quantum Leaper* award at NetApp, 2017.
- Secured 23^{rd} position in *Quora-Hackathon* 2014, a worldwide programming contest.
- Secured 99.74^{th} percentile in *GATE-2012* (over 150k participants).
- Star Performer award during the *Initial Learning Program* at TCS in 2012.

Skill Set

Programming Languages	C, C++, Java, Python
Skills	Systems Programming and Instrumentation
Interests	Systems Research and Development, Technical Reading
Other Familiarities	Linux Kernel, KVM Hypervisor, HDFS File System, LLVM, Clang

References

Available upon request.