ONKAR PATIL

Research Staff Member
IBM Research Labs, Almaden, California

February 15, 1990
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Personal Statement

I am a motivated and passionate individual with a zest for research in High Performance Computing. My primary interest lie in Memory architectures, Compilers, Programming Languages and System Software.

Skills

Programming/Scripting Languages	C, C++, Java, HTML, Python, Perl, Shell
Platforms/Architectures	x86, Power9, Intel Optane DC, KNL, ARM9, NVIDIA Tesla
Tools	MPI, CUDA, OpenMP, OpenACC, MATLAB, GDB, qOp
Compilers	Cetus, OpenARC, LLVM, Clang
Operating Systems	Linux, EV3RT, XINU, ONTAP

Education

- **Ph.D. Computer Science** GPA: 3.182
  North Carolina State University, Raleigh, NC *2016 - 2021*
  - Thesis: Assessing the Performance of and Devising Optimization Strategies for Heterogeneous Memory under HPC Workloads
- **MS. Computer Science** GPA: 3.125
  North Carolina State University, Raleigh, NC *2012 - 2014*
  - Thesis: Efficient and Lightweight Inter-process Collective Operations for Massive Multi-core Architectures
- **BE. Information Technology** Avg: 69.2%
  Fr. Conceicao Rodrigues College of Engineering, Mumbai, MH, India *2008 - 2012*
  - Thesis: Design and Implementation of a Parallelized and Distributed Web Crawler

Publications

- **NVM-based energy and cost efficient HPC clusters** MEMSYS 2021
  O. Patil, L. Ionkov, J. Lee, F. Mueller, M. Lang *Sept. 2021*
- **PEARS: A Performance-Aware Static and Dynamic Framework for Heterogeneous Memory** MEMSYS 2021
  O. Patil, F. Mueller, L. Ionkov, J. Lee, M. Lang *Sept. 2021*
- **Symbiotic HW Cache and SW DTLB Prefetching for DRAM/NVM Hybrid Memory** MASCOTS 2020
  O. Patil, F. Mueller, L. Ionkov, J. Lee, M. Lang *Nov. 2020*
- **Performance characterization of a DRAM-NVM hybrid memory architecture for HPC applications using Intel Optane DC Persistent Memory Modules** MEMSYS 2019
  O. Patil, L. Ionkov, J. Lee, F. Mueller, M. Lang *Sept. 2019*
- **End-to-end Resilience for HPC Applications (GCS Award)** ISC 2019
  A. Rezai, H. Khetawat, O. Patil, F. Mueller, P. Hargrove, E. Roman *Jun. 2019*
- **Efficient & Predictable Group Communication Messaging over Manycore NoCs** ISC 2016
  K. Yagna, O. Patil, F. Mueller *May. 2016*
- **Persistent Regions that Survive NVM Media Failure** NVM 2017
  O. Patil, M. Kuscu, T. Tran, C. Johnson, J. Tucek, H. Kuno *Mar. 2017*
- **Sequential memory access on a high performance computing system** USPTO
  C. Johnson, O. Patil, M. Kuscu, T. Tran, J. Tucek, H. Kuno, M. Chabbi, W. Scherer *Jan. 2020*

- **Data update of shared fabric memory in a high performance computing system** USPTO
  C. Johnson, M. Kuscu, O. Patil, J. H. Park, H. Kuno, R. Schreiber *Feb. 2020*

Research/Work Experience

- **Research Staff Member** IBM Research, Almaden, CA
  Memory and Storage Systems Research *Aug. 2021 - Current*
  - Developing software platforms and programming support for heterogeneous memory systems enabled by CXL protocol, PGAS architecture models and active storage systems
- **High Performance Computing with Heterogeneous memory systems** NCSU, Raleigh, NC
  Ph.D candidate and Graduate Research Assistant under Dr. Frank Mueller *Aug. 2016 - 2021*
  - Performed static code analysis to enable automated memory allocation at runtime to improve performance and supplement HW/SW symbiotic prefetching techniques for heterogeneous memory
  - Developed a macro-based framework for HPC workloads in order to optimize HPC applications at a finer granularity for systems with multiple memory technologies
- **Visiting Student Researcher** Argonne National Laboratory, Lemont, IL
  Computer Science Research *Jan. 2021 - June. 2021*
  - Explored use cases and framework designs for extending heterogeneous memory support to OpenSHMEM
- **Summer Research Intern** New Mexico Consortium(LANL), Los Alamos, NM
  Computer Science Research *May. 2018/2019/2020 - Aug. 2018/2019/2020*
  - Analyzed the performance characteristics of Intel's Optane DC PMMs in a DRAM-NVM hybrid memory system for HPC applications
  - Developed a Compiler framework to identify critical code information for HPC applications to optimize for hybrid memory systems
- **Summer Research Intern** Oak Ridge National Laboratory, Oak Ridge, TN
  Computer Science Research *May. 2017 - Aug. 2017*
  - Designed, prototyped and evaluated a Runtime system to support Resilience Design Patterns for systems with persistent memory
- **Graduate Teaching Assistant** North Carolina State University, Raleigh, NC
  Department of Computer Science *Jan. 2018 - May. 2018; Aug. 2016 - Dec. 2016*
  - Assisted in organizing curriculum and syllabus for a seminar in Quantum Computing
  - Assisted in organizing and grading Paper reviews and talks for Advanced Distributed Systems
  - Assisted in organizing the Operating systems course for undergraduate students
- **Research Associate** Hewlett Packard Labs, Palo Alto, CA
  Software and Data Analytics *May 2016 - Aug. 2016*
  - Designed and Developed a framework for HPC Stencil applications to survive hardware failures in non-volatile memory systems with large pool of byte-addressable non-volatile memory
- **Member of Technical Staff-II** NetApp Inc., Sunnyvale, CA
  Engineering Product Support *Aug. 2014 - May 2016*
  - Provided solutions and code fixes for existing bugs related to External Authentication, CIFS, WAFL, OS, NAS
- **Pico/micro kernels for a scalable Multi-core Operating System** NCSU, Raleigh, NC
  Graduate Research Assistant under Dr. Frank Mueller *May. 2013 - May. 2014*
  - Developed and implemented pico-kernels for efficient point-to-point and collective inter-process communication avoiding contention and exploiting the shared memory architecture to achieve optimal performance up to 9x times other libraries

Awards and Scholarships

- **Summer Graduate Merit Award (GMA)** May 2021
  North Carolina State University, College of Engineering
- **Gauss Award** May 2019
  ISC 2019