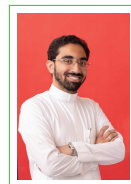


MOHAMMED ALFARHAN

Postdoctoral Research Associate, Innovative Computing Laboratory
The University of Tennessee, Knoxville

1122 Volunteer Blvd
Knoxville, TN 37996
☎ +966 (0) 556168331
✉ farhan@icl.utk.edu
📁 farhanma.github.io
🌐 github.com/farhanma



Education

- 2014-2019 **PhD, Computer Science**, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.
Dissertation: Unstructured Computations on Emerging Architectures. Advisor: David E. Keyes.
- 2012-2013 **MSc, Computer Science**, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.
- 2007-2012 **BSc, Computer Science**, King Faisal University, Hofuf, Saudi Arabia.

Experience

Research

- 2019-Present **Postdoctoral Research Associate**, The University of Tennessee, Knoxville, Tennessee, United States.
Research on developing numerical software libraries for solving linear algebra problems at scale. PI: Jack Dongarra.
 - SLATE: Software for Linear Algebra Targeting Exascale. Co-PI: Mark Gates and Jakub Kurzak.
 - MAGMA: Matrix Algebra on GPU and Multicore Architectures. Co-PI: Stanimire Tomov.
- 2013-2019 **PhD Student**, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.
Developed performance-centric algorithms for high performance computing architectures. PI: David E. Keyes.
- 2012-2013 **Directed Research**, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.
Developed a dynamic programming combinatorial algorithm for multi-pruning of decision trees. PI: Mikhail Moshkov.

Industry

- 2017-2019 **Co-founder and Software Consultant**, RoboCrop Systems, Thuwal, Saudi Arabia.
Worked as a robotics software engineer and full stack developer for a robotics solutions startup.
- 2012 **Software Engineer**, Saudi Electricity Company, Riyadh, Saudi Arabia.
Developed distributed systems to monitor and detect anomalies in the reading meters.
- Summer 2011 **Software Engineer Intern**, Saudi Aramco, Dhahran, Saudi Arabia.
Developed a distributed key-value store system to monitor IT incidents and infrastructure change requests.
- Summer 2010 **Software Engineer Intern**, Saudi Aramco, Dhahran, Saudi Arabia.
Developed a database system to collect and log reports on IT problems for further processing with ease.

Teaching

- 2014-2018 **Teaching Assistant**, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.
Worked as a TA for High Performance Computing (AMCS 312) course. Instructor: David E. Keyes.
 - KAUST CEMSE Division: Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018.
 - Saudi Aramco: Fall 2018.
 - Blue Waters Online Courses: Fall 2016 (Introduction to High Performance Computing).
 - High Performance Computing Short Courses at KAUST:
 - Summer 2016 (KAUST Visualization and Supercomputing Summer School).
 - Summer 2015 (KAUST Gifted Student Program).
 - Summer 2014 (KAUST Saudi Research Science Institute).

Research

Preprints and Working Papers

- [1] **Mohammed A. Al Farhan**. *Demystifying High Performance Computing Dense Linear Algebra Implementation: An In-depth Analysis for the Parallel and Distributed Algorithms*. To be submitted, CSUR 2021.
- [2] **Mohammed A. Al Farhan**, Hakan Bagci, and David E. Keyes. *ExaBEM: Exascale Boundary Element Method Solver for Acoustic Simulation*. To be submitted, SC 2021.
<https://ecrc.github.io/ExaBEM/>.
- [3] **Mohammed A. Al Farhan** and David E. Keyes. *GPU-Optimized Unstructured Computations*. To be submitted, TPDS 2021.
<https://ecrc.github.io/kfun3d>.
- [4] **Mohammed A. Al Farhan**, Ali Charara, Mark Gates, Asim YarKhan, Dalal Sukkari, Jakub Kurzak, and Jack Dongarra. *Object-Oriented Framework for Scalable Dense Linear Solvers Targeting Accelerator-Driven Supercomputing*. To be submitted, TOMS 2020.
- [5] **Mohammed A. Al Farhan**, Ali Charara, Mark Gates, Asim YarKhan, Dalal Sukkari, Jakub Kurzak, and Jack Dongarra. *Dense Linear Algebra Solvers at Scale*. To be submitted, SC 2020.

Conference and Journal Articles

- [6] **Mohammed A. Al Farhan**, Ahmad Abdelfattah, Stanimire Tomov, Mark Gates, Dalal Sukkari, Azzam Haidar, Robert Rosenberg, and Jack Dongarra. *MAGMA Templates for Scalable Linear Algebra on Emerging Architectures*. The International Journal of High Performance Computing Applications, 2019. (Under review.)
- [7] Mustafa Abduljabbar, **Mohammed A. Al Farhan**, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, and David E. Keyes. *Extreme Scale FMM-accelerated Boundary Integral Equation Solver for Wave Scattering*. SIAM Journal on Scientific Computing (SISC), 2019.
<https://ecrc.github.io/bemfmm/>.
- [8] **Mohammed A. Al Farhan** and David E. Keyes. *Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures*. IEEE Transactions on Parallel and Distributed Systems (TPDS), 2018.
- [9] Mustafa Abduljabbar, **Mohammed A. Al Farhan**, Rio Yokota, and David E. Keyes. *Performance Evaluation of Computation and Communication Kernels of the Fast Multipole Method on Intel Manycore Architecture*. International European Conference on Parallel and Distributed Computing (Euro-Par), 2017.
- [10] **Mohammed A. Al Farhan**, Dinesh K. Kaushik, and David E. Keyes. *Unstructured Computational Aerodynamics on Many Integrated Core Architecture*. Elsevier Parallel Computing Journal (PARCO), 2016.
- [11] Hassan AbouEisha, **Mohammed A. Al Farhan**, Igor Chikalov, and Mikhail Moshkov. *An Algorithm for Reduct Cardinality Minimization*. IEEE International Conference on Granular Computing (GrC), 2013.
<https://farhanma.github.io/MinReduct/>.

Services

Reviewer	The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2015, International European Conference on Parallel and Distributed Computing (Euro-Par) 2016, Symposium on Principles and Practice of Parallel Programming (PPoPP) 2016 [Artifact Evaluator], IEEE Cluster 2016, PLOS One 2018, International Journal of High Performance Computing Applications (IJHPCA) 2018, IEEE International Parallel & Distributed Processing Symposium (IPDSPS) 2019, ACM Transactions on Parallel Computing (TOPC) 2019, Elsevier Parallel Computing (PARCO) 2019.
Member	KAUST IEEE Student Chapter (2012-2013), KAUST Graduate Council (2012-2014), KAUST ACM/SIAM Student Chapter (2012-2019), and KAUST Code Clinics (2014-2019).
Co-organizer	Python programming tutorials (2013-2015).

Talks

- [1] **Unstructured Computations on Emerging Architectures**.
 - SIAM Conference on Computational Science and Engineering (CSE), 2019, Spokane, Washington.
- [2] **BEMFMM: An Extreme Scale FMM-Accelerated BIE Solver for Wave Scattering**.
 - SIAM Conference on Computational Science and Engineering (CSE), 2019, Spokane, Washington.
 - Intel eXtreme Computing User Group (IXPUG) Meeting, 2018, KAUST, Thuwal.
 - SIAM Conference on Parallel Processing for Scientific Computing (PP), 2018, Tokyo, Japan.
- [3] **Optimizations of Unstructured Aerodynamics Computations for Intel Knights Landing Architecture**.
 - Intel eXtreme Computing User Group (IXPUG) Meeting, 2018, KAUST, Thuwal.
 - SIAM Conference on Parallel Processing for Scientific Computing (PP), 2018, Tokyo, Japan.
 - Intel HPC Developer Conference (DevCon), 2017, Denver, Colorado.
 - Fully Predictive Complex Computational Fluid Dynamics Workshop, 2017, KAUST, Thuwal.
 - High Performance Computing Saudi Arabia Conference (HPC Saudi), 2017, KAUST, Thuwal.
 - Best Poster Award.
 - SIAM Conference on Computational Science and Engineering (CSE), 2017, Atlanta, Georgia.
 - Scalable Hierarchical Algorithms for eXtreme Computing Workshop (SHAXC), 2017, KAUST, Thuwal.
- [4] **Performance Evaluation of Fast Multipole Method on Intel Manycore Architecture**.
 - International European Conference on Parallel and Distributed Computing (Euro-Par), 2017, Galicia, Spain.
 - HPC in Asia Poster Competition, International Supercomputing Conference (ISC), 2017, Frankfurt, Germany.
- [5] **Implicit Unstructured Computational Aerodynamics on Many-Integrated Core Architecture**.
 - International Conference on Parallel Computational Fluid Dynamics, 2014, Trondheim, Norway.
 - Scalable Hierarchical Algorithms for eXtreme Computing Workshop (SHAXC), 2014, KAUST, Thuwal.

Programming

Languages	C/C++, Python, Java, Unix Shell, MATLAB, \LaTeX .
Models	Intrinsics, MPI, OpenMP, pThreads, CUDA, TBB, HIP, ROCm, SYCL, OpenCL, Cilk.
Tools	Make, CMake, Autotools, perf tools, Valgrind, GDB, Git, Tracing and profiling for performance optimization.