Mohammed Al Farhan

https://farhanma.github.io mohammed.farhan@kaust.edu.sa

Education

King Abdullah University of Science and Technology (KAUST) 2014-2019
PhD, Computer Science
Topic: Unstructured Computations on Emerging Architectures
Advisor: David E. Keyes

King Abdullah University of Science and Technology (KAUST) 2012-2013
MSc, Computer Science

King Faisal University 2007-2012
BSc, Computer Science

Research Experience

Postdoctoral Researcher, KAUST 2020-Present
- Research on scalable algorithms exploiting data sparsity (with David E. Keyes)

Postdoctoral Researcher, University of Tennessee, Knoxville 2019-2021
- Research on distributed, GPU-accelerated dense linear algebra (with Jack Dongarra)

Graduate Researcher, KAUST 2012-2019
- Research on unstructured grid PDEs and fast multipole method (with David E. Keyes)

Directed Research, KAUST Spring 2013
- Research on combinatorial machine learning (with Mikhail Moshkov)

Industrial Experience

Co-founder, RoboCrop 2017-2019
- RoboCrop is a startup initiative that develops automated farming solutions

Software Engineer, Saudi Electricity Company 2012
- Developed a smart system to detect anomalies in the reading meters

Software Engineer Intern, Saudi Aramco Summer 2011
- Developed a distributed key-value store system to track IT change requests

Software Engineer Intern, Saudi Aramco Summer 2010
- Developed a database management system to log IT reported incidents

Teaching Assistantships

- AMCS 312 High Performance Computing course (with David E. Keyes)
  - Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018 (KAUST)
  - Fall 2016 (Blue Waters online courses, funded by US NSF at UIUC)
  - Fall 2018 (Saudi Aramco EXPEC Advanced Research Center)

Publications

Journal Articles
- **M. Al Farhan**, A. Abdelfattah, S. Tomov, M. Gates, D. Sukkari, A. Haidar, R. Rosenberg, and J. Dongarra. MAGMA Templates for Scalable Linear Algebra on Emerging Architectures, *IJHPCA 2020*
- M. Abduljabbar, **M. Al Farhan**, N. Al-Harthi, R. Chen, R. Yokota, H. Bagci, and D. Keyes. Extreme Scale FMM-Accelerated Boundary Integral Equation Solver for Wave Scattering, *SISC 2019*
- **M. Al Farhan** and D. Keyes. Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures, *IEEE TPDS 2018*
- **M. Al Farhan**, D. Kaushik, and D. Keyes. Unstructured Computational Aerodynamics on Many Integrated Core Architecture, *Parallel Computing 2016*

Conference Papers
- M. Abduljabbar, **M. Al Farhan**, R. Yokota, and D. Keyes. Performance Evaluation of Computation and Communication Kernels of the Fast Multipole Method on Intel Manycore Architecture, *Euro-Par 2017*

- H. AbouEisha, **M. Al Farhan**, I. Chikalov, and M. Moshkov. An Algorithm for Reduct Cardinality Minimization, *IEEE GrC 2013*

Technical Reports

- A. Abdelfattah, **M. Al Farhan**, C. Brown, M. Gates, D. Sukkari, A. YarKhan, and J. Dongarra. SLATE port to AMD and Intel platforms, SWAN No. 16 (ICL-UT-21-01), *ICL, UTK*, Apr 2021
- A. YarKhan, **M. Al Farhan**, D. Sukkari, M. Gates, and J. Dongarra. SLATE Performance Report: Updates to Cholesky and LU Factorizations (ICL-UT-20-14), *ICL, UTK*, Oct 2020
- A. Charara, M. Gates, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. SLATE Developers' Guide, SWAN No. 11 (ICL-UT-19-02), *ICL, UTK*, Aug 2020
- M. Gates, A. Charara, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. SLATE Users' Guide, SWAN No. 10 (ICL-UT-19-01), *ICL, UTK*, Jul 2020
- M. Gates, **M. Al Farhan**, A. Charara, J. Kurzak, D. Sukkari, A. YarKhan, and J. Dongarra. SLATE Working Note 13: Implementing Singular Value and Symmetric/Hermitian Eigenvalue Solvers (ICL-UT-19-07), *ICL, UTK*, Apr 2020
- M. Gates, A. Charara, A. YarKhan, D. Sukkari, **M. Al Farhan**, and J. Dongarra. SLATE Working Note 14 Performance Tuning SLATE (ICL-UT-20-01), *ICL, UTK*, Jan 2020

Programming

- **Languages:** C/C++, Python, Java, POSIX Shell, MATLAB, LaTeX
- **Models:** MPI, OpenMP, CUDA, POSIX Threads, TBB, ROCm, SYCL/DPC++

Oral/Poster Presentations

- HiCMA: Hierarchical Computations on Manycore Architectures
  - oneAPI Developer Summit at SC, St. Louis, MO
  - Intel IXPUG Annual Conference 2021, Austin, TX
- Tile Low-Rank Matrix-Vector Multiplication for Scientific Applications
  - Intel IXPUG Annual Conference 2021, Austin, TX
- SLATE: Software for Linear Algebra Targeting Exascale
  - ECP Annual Meeting 2020, Houston, TX
- Unstructured Computations on Emerging Architectures
  - SIAM CSE 2019, Spokane, Washington
- BEMFMM: An Extreme Scale FMM-Accelerated BIE Solver for Wave Scattering
  - SIAM CSE 2019, Spokane, Washington
  - Intel IXPUG 2018, KAUST
  - SIAM PP 2018, Tokyo, Japan
- Optimizations of Unstructured Aerodynamics Computations for Intel KNL Hardware
  - Intel IXPUG 2018, KAUST
  - SIAM PP 2018, Tokyo, Japan
  - Intel HPC Developer Conference 2017, Denver, Colorado
  - PCCFD Workshop 2017, KAUST
  - HPC Saudi Conference 2017, KAUST [best poster award]
  - SIAM CSE 2017, Atlanta, Georgia
  - SHAXC-3 Workshop 2017, KAUST
- Performance Evaluation of Fast Multipole Method on Intel Manycore Architecture
  - Euro-Par 2017, Santiago de Compostela, Spain
  - ISC 2017, Frankfurt, Germany
- Implicit Unstructured Computational Aerodynamics on MIC Architecture
  - ParCFD 2014, Trondheim, Norway
  - SHAXC-2 Workshop 2014, KAUST

Service and Outreach

- **Reviewer:** ACM/IEEE SC 2015, ACM PPoPP 2016, Euro-Par 2016, IEEE Cluster 2016, PLOS One 2018, IJHPCA 2018, IEEE IPDSPS 2019, ACM TOPC 2019, Parallel Computing 2019, ACM PASC 2020, Parallel Computing 2020, ICCS 2021, Euro-Par 2021, ACM/IEEE SC 2021, IEEE Cluster 2021
- **Artifact Evaluator:** ACM PPoPP 2016, ACM/IEEE SC 2021
- **Vice president:** KAUST IEEE Student Chapter (2012-2013), KAUST ACM Student Chapter (2012-2015), and KAUST SIAM Student Chapter (2012-2017)
- **Treasurer:** KAUST SIAM/ACM Student Chapter (2017-2019)
- **Member:** KAUST Graduate Council: Academic and Research Committee (2012-2013) and University Relation Committee (2013-2014)
- **Co-organizer:** KAUST Code Clinic (2014-2019), Python Programming Camp (Spring 2014 and 2015), and Scientific Software Engineering Lecture Series: Fundamentals of High Performance Computing (Summer 2014 and 2015), PETSc: Portable, Extensible Toolkit for Scientific Computation (Summer 2016), and Version Control using Git (Fall 2020)