Mohammed Al Farhan

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Education

King Abdullah University of Science and Technology, PhD in Computer Science, 2014 — 2019
   Dissertation: Unstructured Computations on Emerging Architectures
   Committee: David Keyes, Mikhail Moshkov, Hakan Bagci, Markus Hadwiger, and Edmond Chow

King Abdullah University of Science and Technology, MSc in Computer Science, 2012 — 2013
   Emphasis on high performance computing, distributed systems, and scientific visualization

King Faisal University, BSc in Computer Science, 2007 — 2012
   Minor in Applied Mathematics

Experience

Hewlett Packard Enterprise, Staff Engineer, 2022 —
   Install, configure, support, and maintain large-scale systems optimized for HPC and AI workloads

King Abdullah Petroleum Studies and Research Center, Senior Researcher, 2022
   Research on data engineering and analytics solutions for energy, economy, and climate models

King Abdullah University of Science and Technology, Postdoctoral Researcher, 2020 — 2022
   Research on scalable algorithms exploiting data sparsity (with David Keyes)

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

King Abdullah University of Science and Technology, Graduate Researcher, 2012 — 2019
   Research on unstructured grids PDEs and fast multipole method (with David Keyes)

RoboCrop, Cofounder, 2017 — 2019
   Developed farming solutions for robot control and automation

Sadeem Technology, Software Consultant, 2015 — 2017
   Developed scalable scientific data visualization solutions

King Abdullah University of Science and Technology, Directed Research, Spring 2013
   Research on combinatorial machine learning (with Mikhail Moshkov)

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

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

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

Teaching Assistantship

AMCS 312 High Performance Computing course (with David Keyes)
   Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018, Fall 2019 (KAUST)
   Fall 2016 (Blue Waters online courses, funded by US NSF at UIUC)
   Fall 2018 (Saudi Aramco EXPEC Advanced Research Center)

Publication

Google Scholar: https://scholar.google.com/citations?user=CX9cRR8AAAAJ

Journal Articles

1. **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, *SAGE IJHPCA 2020*

2. 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, *SIAM SISC 2019*

3. **M. Al Farhan** and D. Keyes. Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures, *IEEE TPDS 2018*

4. **M. Al Farhan**, D. Kaushik, and D. Keyes. Unstructured Computational Aerodynamics on Many Integrated Core Architecture, *Elsevier Parallel Computing 2016*

Conference Papers

1. M. Gates, A. YarKhan, D. Sukkari, K. Akbudak, S. Cayrols, D. Bielich A. Abdelfattah, **M. Al Farhan**, and J. Dongarra. Portable and Efficient Dense Linear Algebra in the Beginning of the Exascale Era, *P3HPC 2022*

2. 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*

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

Technical Reports

1. 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

2. 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

3. 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

4. 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

5. 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

6. 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 Skills

Languages: C/C++, Python, Java, Go, Shell Scripts, Perl, MATLAB, SQL, PHP, Rust, LaTeX

Technologies: MPI, OpenMP, CUDA, pThreads, Singularity, ROCm/HIP, SYCL, OpenGL

DevOps: Git, Make, CMake/Autotools, HPCM, Docker, Kubernetes, Airflow, Jenkins

Oral/Poster Presentations

HiCMA: Hierarchical Computations on Manycore Architectures
    oneAPI Developer Summit at SC 2021, St. Louis, MO
    Intel IXPUG Annual Conference 2021, Austin, TX

Tile Low-Rank Matrix-Vector Multiplication for Scientific Applications
    oneAPI Developer Summit at SC 2021, St. Louis, MO
    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, 2021, and 2023, ACM PPoPP 2016, Euro-Par 2016 and 2021, IEEE Cluster 2016, 2021, and 2022, PLOS ONE 2018, SAGE IJHPCA 2018, IEEE IPDSPS 2019, ACM TOPC 2019, Elsevier Parallel Computing 2019 and 2020, ACM PASC 2020, ICCS 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, Spring 2015, and Summer 2022), and Scientific Software Engineering Lecture Series: Fundamentals of High Performance Computing (Summer 2014 and Summer 2015), PETSc: Portable, Extensible Toolkit for Scientific Computation (Summer 2016), and Version Control using Git (Fall 2017, Fall 2020, and Summer 2022), and DoltHub: Git for Data (Summer 2022)