Mohammed A. Al Farhan

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Education

King Abdullah University of Science and Technology, Saudi Arabia — Aug 2014 – May 2019
Ph.D., Computer Science. Advisor: David E. Keyes
Dissertation – Unstructured Computations on Emerging Architectures

King Abdullah University of Science and Technology, Saudi Arabia — Aug 2012 – Dec 2013
M.Sc., Computer Science

King Faisal University, Saudi Arabia — Aug 2007 – Feb 2012
B.Sc., Computer Science

Experience

University of Tennessee, Knoxville, US. Postdoctoral Research Associate — Jun 2019 - Present
Director: Jack Dongarra
Research on developing numerical software libraries for solving linear algebra problems at scale

- Software for Linear Algebra Targeting Exascale (SLATE) to extract the full performance potential and maximum scalability from emerging HPC architectures in a highly portable manner, relying on the standard hybrid programming paradigm (MPI+OpenMP)
- Matrix Algebra on GPU and Multicore Architectures (MAGMA) Templates software project for data abstractions and APIs targeting heterogeneous systems portability

Saudi Electricity Company, Saudi Arabia. Software Engineer — May 2012 - Aug 2012
Developed distributed systems to monitor and detect anomalies in the reading meters

Saudi Aramco, Saudi Arabia. Software Engineer Intern — Summer 2011
Developed a distributed key-value store system to monitor IT incidents and infrastructure change requests

Saudi Aramco, Saudi Arabia. Software Engineer Intern — Summer 2010
Developed a database system to collect and log reports on IT problems for further processing with ease

Research

1. *ExaBEM: Exascale Boundary Element Method Solver for Acoustic Simulation*
   Mohammed A. Al Farhan, Mustafa Abduljabbar, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, David E. Keyes, and Jack Dongarra
   To be submitted, SC 2020
   https://ecrc.github.io/ExaBEM/
2. *Optimizing Unstructured Grid Computations for Emerging Architectures*
   Mohammed A. Al Farhan, David E. Keyes, and Jack Dongarra
   To be submitted, TPDS 2020
   https://ecrc.github.io/KFUN3D/
3. *Extreme Scale FMM-accelerated Boundary Integral Equation Solver for Wave Scattering*
   Mustafa Abduljabbar, **Mohammed A. Al Farhan**, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, and David E. Keyes
   SIAM Journal on Scientific Computing (SISC), 2019 [In press]
   https://ecrc.github.io/BEMFMM/
4. *Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures*
   Mohammed A. Al Farhan and David E. Keyes
   IEEE Transactions on Parallel and Distributed Systems (TPDS), 2018
5. *Performance Evaluation of Computation and Communication Kernels of the Fast Multipole Method on Intel Manycore Architecture*
   Mustafa Abduljabbar, **Mohammed A. Al Farhan**, Rio Yokota, and David E. Keyes
   International European Conference on Parallel and Distributed Computing (Euro-Par), 2017

6. *Unstructured Computational Aerodynamics on Many Integrated Core Architecture*
   Mohammed A. Al Farhan, Dinesh K. Kaushik, and David E. Keyes
   Elsevier Parallel Computing Journal (PARCO), 2016
7. *An Algorithm for Reduct Cardinality Minimization*
   Hassan AbouEisha, **Mohammed A. Al Farhan**, Igor Chikalov, and Mikhail Moshkov
   IEEE International Conference on Granular Computing (GrC), 2013
   `https://modafarhan.com/MinReduct/`

Services

Served as a peer reviewer for the *ACM Transactions on Parallel Computing (TOPC) 2019, PLOS One 2018, International Journal of High Performance Computing Applications (IJHPCA) 2018, IEEE Cluster 2016, and IEEE International Parallel & Distributed Processing Symposium (IPDSPS) 2019*

Teaching

AMCS 312: High Performance Computing. Teaching Assistant (TA) for David E. Keyes

- King Abdullah University of Science and Technology, Saudi Arabia
  - Fall 2014, Fall 2015, Fall 2016, Fall 2017, and Fall 2018
- Saudi Aramco, Saudi Arabia
  - Fall 2018
- Blue Waters Online Courses
  - Fall 2016 [Introduction to High Performance Computing]
- KAUST Visualization and Supercomputing Summer School, Saudi Arabia
  - Summer 2016 [Introduction to Portable, Extensible Toolkit for Scientific Computation (PETSc)]

Talks

Slides available at `https://speakerdeck.com/farhanma`

1. *Unstructured Computations on Emerging Architectures*
   (a) SIAM Conference on Computational Science and Engineering, 2019. Spokane, Washington, USA
2. *BEMFMM: An Extreme Scale FMM-Accelerated BIE Solver for Wave Scattering*
   (a) SIAM Conference on Computational Science and Engineering, 2019. Spokane, Washington, USA
   (b) Intel eXtreme Computing User Group (IXPUG) Meeting, 2018. KAUST, KSA
   (c) SIAM Conference on Parallel Processing for Scientific Computing, 2018. Tokyo, Japan
3. *Optimizations of Unstructured Aerodynamics Computations for Intel Knights Landing Architecture*
   (a) Intel eXtreme Computing User Group (IXPUG) Meeting, 2018. KAUST, KSA
   (b) SIAM Conference on Parallel Processing for Scientific Computing, 2018. Tokyo, Japan
   (c) Intel HPC Developer Conference, 2017. Denver, Colorado, USA
   (d) Fully Predictive Complex Computational Fluid Dynamics Workshop, 2017. KAUST, KSA
   (e) High Performance Computing Saudi Arabia (HPC Saudi) Conference, 2017. KAUST, KSA
   Received best poster award
   (f) SIAM Conference on Computational Science and Engineering, 2017. Atlanta, Georgia, USA
   (g) Scalable Hierarchical Algorithms for eXtreme Computing Workshop, 2017. KAUST, KSA
4. *Performance Evaluation of Fast Multipole Method on Intel Manycore Architecture*
   (a) International European Conference on Parallel and Distributed Computing (Euro-Par), 2017
   (b) HPC in Asia Poster Competition, International Supercomputing Conference (ISC), 2017
5. *Implicit Unstructured Computational Aerodynamics on Many-Integrated Core Architecture*
   (a) International Conference on Parallel Computational Fluid Dynamics, 2014. Trondheim, Norway
   (b) Scalable Hierarchical Algorithms for eXtreme Computing workshop, 2014. KAUST, KSA

Programming

Languages – C/C++, Python, Java, Shell Script, MATLAB, and LaTeX
Models – x86 Compiler Intrinsics, OpenMP, pThreads, TBB, CUDA, and MPI
Tools – Make, CMake, Autotools, perf tools, Valgrind, and Git