

Mohammed A. Al Farhan

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|------------|---|---------------------|
| Interests | High Performance Computing (HPC), Computational Fluid Dynamics (CFD), Partial Differential Equations (PDE), Unstructured grids, Irregular computations, Sparse linear algebra, Fast Multipole Method (FMM), Structured grids, Thread- and data-level parallelism, Performance engineering of software systems, Parallel and distributed systems, and Computer and system architecture | |
| 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. COURSEWORK – Parallel programming paradigms (MPI), Data analytics (artificial intelligence, data mining, and machine learning), Programming languages (Ruby, Haskell, GO (https://modafarhan.com/CS242GObyGo/), and Python), Combinatorial machine learning, High performance computing I and II (algorithms, architectures, and applications), Computing systems and concurrency (Advanced operating systems), GPU and GPGPU Programming (OpenGL and CUDA), Scientific visualization (OpenGL), and Algorithm analysis and design (https://modafarhan.com/CS260SequenceAlignment/) | |
| | King Faisal University , Saudi Arabia | Aug 2007 – Feb 2012 |
| | B.Sc., Computer Science. SENIOR PROJECT – An RFID-based Distributed System for Smart Authentication | |
| 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 | |
| | RoboCrop Systems , Saudi Arabia. Co-Founder | Oct 2017 - Feb 2019 |
| | Worked (part time) as a Software Engineer for robotics, and business Analyst | |
| | 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 | <ol style="list-style-type: none">1. <i>ExaBEM: Exascale Boundary Element Method Solver for Acoustic Simulation</i> Mohammed A. Al Farhan, Mustafa Abduljabbar, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, and David E. Keyes To be submitted, SC 2020 [ACM Gordon Bell Prize] https://ecrc.github.io/ExaBEM/2. <i>Optimizing Unstructured Grid Computations for Emerging Architectures</i> Mohammed A. Al Farhan and David E. Keyes To be submitted, TPDS 2019 https://ecrc.github.io/KFUN3D/3. <i>Extreme Scale FMM-accelerated Boundary Integral Equation Solver for Wave Scattering</i> 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 (IPDPS) 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, and L^AT_EX

MODELS – x86 Compiler Intrinsic, OpenMP, pThreads, TBB, CUDA, and MPI

TOOLS – Make, CMake, Autotools, perf tools, and Valgrind