

# Mohammed A. Al Farhan

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

farhan@icl.utk.edu  
(+1) (865) 801-4488  
modafarhan.com  
github.com/farhanma

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|------------|---|---------------------|
| Education  | <b>King Abdullah University of Science and Technology</b> , Saudi Arabia<br>Ph.D., Computer Science. Advisor: David E. Keyes<br>DISSERTATION – Unstructured Computations on Emerging Architectures  | Aug 2014 – May 2019 |
|            | <b>King Abdullah University of Science and Technology</b> , Saudi Arabia<br>M.Sc., Computer Science   | Aug 2012 – Dec 2013 |
|            | <b>King Faisal University</b> , Saudi Arabia<br>B.Sc., Computer Science   | Aug 2007 – Feb 2012 |
| Experience | <b>University of Tennessee</b> , Knoxville, US. Postdoctoral Research Associate<br>Director: Jack Dongarra<br>Research on developing numerical software libraries for solving linear algebra problems at scale  | Jun 2019 - Present  |
|            | <b>Saudi Electricity Company</b> , Saudi Arabia. Software Engineer<br>Developed distributed systems to monitor and detect anomalies in the reading meters   | May 2012 - Aug 2012 |
|            | <b>Saudi Aramco</b> , Saudi Arabia. Software Engineer Intern<br>Developed a distributed key-value store system to monitor IT incidents and infrastructure change requests   | Summer 2011         |
|            | <b>Saudi Aramco</b> , Saudi Arabia. Software Engineer Intern<br>Developed a database system to collect and log reports on IT problems for further processing with ease  | Summer 2010         |
| Books      | <ol style="list-style-type: none"><li>1. <i>High Performance Computing</i><br/><b>Mohammed A. Al Farhan</b> and David E. Keyes<br/>Under preparation, SIAM Press 2022<br/><a href="https://ecrc.github.io/hpc-book/">https://ecrc.github.io/hpc-book/</a></li></ol>   |                     |
| Research   | <ol style="list-style-type: none"><li>1. <i>MAGMA Templates for Scalable Linear Algebra on Emerging Architectures</i><br/><b>Mohammed A. Al Farhan</b>, Ahmad Abdelfattah, Stanimire Tomov, and Jack Dongarra<br/>To be submitted, IPDPS 2020<br/><a href="https://icl.cs.utk.edu/magmatemplates/">https://icl.cs.utk.edu/magmatemplates/</a></li><li>2. <i>ExaBEM: Exascale Boundary Element Method Solver for Acoustic Simulation</i><br/><b>Mohammed A. Al Farhan</b>, Mustafa Abduljabbar, Rui Chen, Hakan Bagci, and David E. Keyes<br/>To be submitted, SC 2020<br/><a href="https://ecrc.github.io/ExaBEM/">https://ecrc.github.io/ExaBEM/</a></li><li>3. <i>Optimizing Unstructured Grid Computations for Emerging Architectures</i><br/><b>Mohammed A. Al Farhan</b> and David E. Keyes<br/>To be submitted, TPDS 2020<br/><a href="https://ecrc.github.io/KFUN3D/">https://ecrc.github.io/KFUN3D/</a></li><li>4. <i>Extreme Scale FMM-accelerated Boundary Integral Equation Solver for Wave Scattering</i><br/>Mustafa Abduljabbar, <b>Mohammed A. Al Farhan</b>, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, and David E. Keyes<br/>SIAM Journal on Scientific Computing (SISC), 2019<br/><a href="https://ecrc.github.io/BEMFMM/">https://ecrc.github.io/BEMFMM/</a></li><li>5. <i>Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures</i><br/><b>Mohammed A. Al Farhan</b> and David E. Keyes<br/>IEEE Transactions on Parallel and Distributed Systems (TPDS), 2018</li></ol> |                     |

6. *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
7. *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
8. *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/reduct/>

## 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, MATLAB, and L<sup>A</sup>T<sub>E</sub>X

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

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