Rajeev Jain

Principal Research Software Specialist · Argonne National Laboratory Chicago· Mathematics and Computer Science

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Summary

I have 14 years of experience managing/developing software projects and two masters degree: one in computer science and the other in structural enginneering. I like to manage risks, solve-problems and learn new things, I am familiar with several programming languages and tools used to execute complex projects.

Work Experience

2018 – 2022 **Principal Research Software Specialist**, Mathematics and Computer Science Argonne National Laboratory

- ⇒ Conceptualized software products, developed coding/testing practices and supervised junior developers to accomplish project goals.
- ⇒ Significantly reduced the time taken by domain scientists to launch and analyze large runs on super-computers.
- ⇒ Used our hyperparameter optimization on COVID-19 deep neural network (DNN) models and delivered improved results. Scripted big runs on HPC clusters.
- ⇒ Wrote reports and published papers in peer-reviewed journals and conferences such as the supercomputing conference.

2011 – 2018 **Software Developement Specialist**, Mathematics and Computer Science Argonne National Laboratory

- ⇒ Handled the coupled urban exascale simulation project, lead a diverse team of experts from different national labs and universities.
- ⇒ My reactor generator tool was used by Kitware Inc. to write and get SBIR funding Phase 1 for $225k and Phase 2 for $750k for a 2 year period. They developed GUI and added some new features to the toolset.
- ⇒ Greatly improved the runtime and memory utilization of simulation codes by using distributed computing techniques and libraries.
- ⇒ Lead the developer of MeshKit, presented yearly updates to the U.S. scientific funding agencies located in Washington D.C.

2009 – 2011 **Pre-doctoral Appointee**, Mathematics and Computer Science Argonne National Laboratory

- ⇒ Gathered requirements and developed the scalable reactor geometry and mesh generation (RGG) tool using C++ and other open-source libraries.

2007 – 2009 **Research and Teaching Assistant**, Civil Engineering in the School of Sustainable Engineering and the Built Environment Arizona State University

- ⇒ Mentored students to solve structural engineering problems and graded assignements.
- ⇒ Wrote an MPI based optimization algorithm for finding the best dimensions in a FEM-based blast simulation problem using LS-DYNA software.

2006 – 2007 **Project Engineer**, SAP/Java Wipro Technologies, Bangalore/Hyderabad, India

- ⇒ Completed Java programming course and worked on a mobile payment systems for Nokia (Bangalore).
- ⇒ 3 months of training in SAP ABAP and started working on a process-optimization project with Kodak (Hyderabad).

Summer 2005 **Research Trainee**, Engineering Research Division Tata Motors, Pune, India

- ⇒ Performed hot and cold circuit trials on an automobile engine fitted with a 3rd party retarder.

Software Projects

2020 – present **Co-Developer**, UXarray GitHub link

Helped design and code the first draft of the popular UXARRAY API, wrote python functions to integrate and read/write unstructured grids.

2016 – present **Co-Developer**, ECP-CANDLE GitHub link

Published papers on model robustness with counterfactuals / noise injection and hyper-parameter optimization framework “Supervisor”. Currently focussed on testing claims made by the recent artificial inteligence (AI-based) cancer drug-response papers, creating a framework for understanding model sensitivity and XAI.

2018 – present **Co-Developer**, Flash-X DOCUMENTATION

Designed/coded asynchronous write and compression of HDF5 checkpoint file. Help with performance benchmarking on DOE supercomputers, CI, documentation. Review/manage GitHub policies, actions, PRs, issues etc.

2009 – 2016 **Lead Developer**, MeshKit BITBUCKET LINK

Principal Investigator for MeshKit (mesh generation C++ toolkit) for the reactor geometry generation package (RGG). Wrote several mesh/geometry generation algorithms and published in peer-reviewed conferences/journals.

Selected Publications

1. **R. Jain**, A. Shah. J. Mohd-Yusof. et al."Probing Decision Boundaries in Cancer Data Using Noise Injection and Counterfactual Analysis." (2021)
2. **R. Jain**, K. Weide. S. Chawdhary. T. Klostermann. "Checkpoint/Restart for Lagrangian particle mesh with AMR in community code FLASH-X." *arXiv preprint arXiv:2103.04267* (2021)
3. **R. Jain**, X. Luo. G. Sever. T. Hong. C. Catlett. "Representation and evolution of urban weather boundary conditions in downtown Chicago." *Journal of Building Performance Simulation* 13, 182–194 (2020)
4. J. M. Wozniak. **R. Jain**, P. Balaprakash. et al."Candle/supervisor: A workflow framework for machine learning applied to cancer research." *BMC bioinformatics* 19, 59–69 (2018)
5. P. O'Leary. J. Becker. R. O'Bara. D. Thompson. **R. Jain**, et al."Providing a Graphical Tool for Modeling Reactor Cores." *Transactions of the American Nuclear Society* 118, (2018)
6. **R. Jain**, T. J. Tautges. "PostBL: Post-mesh boundary layer mesh generation tool." *Proceedings of the 22nd International Meshing Roundtable* 331–348 (2014)
7. T. J. Tautges. **R. Jain**, "Creating geometry and mesh models for nuclear reactor core geometries using a lattice hierarchy-based approach." *Engineering with Computers* 28, 319–329 (2012)
8. **R. Jain**, "M.S. Thesis: Blast Mitigation solutions via FEM-Based Design Optimization." (2009)

Honors

2020 **Invited: Reviewer and Program Committee Member**, Managed and reviewed papers NUMGRID

2010 – present **Mentor**, Supervised several summer students/postdocs and staff members ARGONNE NATIONAL LABORATORY

2015 **Reviewer and Session Chair** COMPUTATIONAL GEOMETRIES, SNA AND MC CONFERENCE

2015-2017 **Advisor and Developer** Commercialization of RGG: click for details KITWARE INC. FOR SBIR PHASE I AND II

2011 **Co-chair** ARGONNE/CSUI UNDERGRADUATE/GRADUATE RESEARCH SYMPOSIUM

2007 – 2009 **University Graduate Fellowship**, $4000 ARIZONA STATE UNIVERSITY

2004 – 2004 **1st Prize for Low Budget Car Design Contest**, INR 40k+ TECH FEST IIT KHARAGPUR AND MINDA LTD. DELHI

Education

2017 – 2020 **Masters of Science** Computer Science UNIVERSITY OF CHICAGO

2007 – 2009 **Master of Science** Structural Engg. (Minor Computer Science) ARIZONA STATE UNIVERSITY

2002 – 2006 **B.Tech** Mechanical Engineering IIT DHANBAD, INDIA

Other skills and activities

2012-present **Mentor** School kids with STEM Mentoring Cafe

2011-2017 **Reviewer** International Meshing Roundtable (IMR).

2015 **Reviewer** SBIR (Small Business Funding Proposals)

2015 **ATPESC scholar** world-class training for selected applicants on HPC and big data

2017-present **Member** Association for Computing Machinery (ACM) and American Nuclear Society (ANS).

Following: Cricket, Biking, Table-tennis, Crypto-currencies and International affairs.