BRIAN A PAGE, PhD

-HIGH PERFORMANCE COMPUTING RESEARCHER
-SENIOR SOFTWARE ENGINEER

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SUMMARY

Seasoned high-performance computing (HPC) and advanced simulation researcher, I lead and participate in innovative modeling and simulation projects to identify and solve performance and scalability issues HPC will face in the future. Pioneered the first gate-level processor model in SST, assisted in the foundation the ModSim Tool Consortium for open-source tools, performed novel and emerging architecture characterization studies, and developed hardware specific algorithm implementations.

SKILLS

Languages: C, C++, Python, Fortran, Verilog, CUDA, JavaScript, PHP, SQL, Cilk

Technologies: FPGA, Vivado, Xilinx, Distributed Memory, Heterogeneous Computing, RISC-V, Hardware/Software Co-Design, PIM, MPI, RDMA, OpenMP, Asynchronous Communication, GPU, Graph Analytics, Knowledge Graphs, SST, Gem5, HPC, Machine Learning, Version control, GIT.

EXPERIENCE

NASA Senior Software Engineer   Aug 2024 - Present
Science Applications International Corp (SAIC)

- Updated the Unified Atmospheric Algorithm (UAA) software within NASA's Orbiting Carbon Observatory Science Software (OCSSW) suite to integrate new data extraction requirements in NetCDF files, facilitating advanced scientific processing.
- Conduct performance analysis on scientific computing applications written in Python and C/C++ for the purpose of optimization at scale.

  Job Skills: C, C++, Fortran, Software Development, NetCDF, Regression Testing, Troubleshooting, Version Control, GIT.

Technical Director - Contract   May 2024 - Nov 2024
PKB Research Labs

- Implemented the first-ever gate-level processor model in SST, a pipelined RISC-V design.
- Developed *ArionAI* a domain specific GPT based generative AI model for computer architecture modeling and simulation.
- Served as software engineering technical lead for reinforcement learning from human feedback (RLHF) projects seeking to improve accuracy and domain specificy of generative AI.

  Job Skills: C, C++, Python, QT/PythonQT, Generative AI, HuggingFace, Machine Learning, Transformers, Reinforcement Learning, Distributed Training, Software Development, DevOps, Regression Testing, Troubleshooting, Version Control, GIT.

Computing and Physical Sciences Researcher   Mar 2022 - Oct 2024
National Security Agency

- Led the Modeling, Simulation, and Emulation team, managing day-to-day operations, setting strategic goals, and providing long-term vision. Proactively drove innovation and team development.
- Managed projects by defining scope and requirements, overseeing funding and budgets, and assessed productivity and risk.
- Initiated the founding of the ModSim Tool Consortium, a member-driven entity focused on the longevity and maintenance of open-source modeling and simulation tools.
- Conducted High Performance Computing (HPC) scaling and performance research.
- Characterized and evaluated novel and emerging computer architectures including network interconnects, processing in memory (PIM), silicon photonics, and custom accelerator design.
- Developed custom component libraries and models for the Structural Simulation Toolkit (SST).

  Job Skills: Team Leadership & Management, Strategic Planning & Vision Setting, RISC-V, Verilog, FPGA, Modeling & Simulation, Gem5, SST, Processing in Memory, Computer Architecture, Software Development, Troubleshooting, Version Control, GIT.

Data Scientist - Postdoctoral Researcher   Aug 2021 - Mar 2022
Lawrence Livermore National Laboratory
- Implemented and evaluated various knowledge and property graph analytics.
- Performance and scalability evaluations for heterogeneous distributed memory based HPC class systems, including Sierra Systems.
- Utilized the YGM asynchronous communication library to evaluate scalefree knowledge graphs on large scale HPC systems

Job Skills: Graph Analytics, HPC, Distributed Memory, MPI, RDMA, C/C++

Postdoctoral Researcher   Jan 2021 - Aug 2021
University of Notre Dame
- Conducted architectural design space exploration for performance optimization on novel systems.
- Developed and evaluated high performance computing (HPC) applications
- Implemented hybrid applications with multi-processing and multi-threading, utilizing both distributed and shared memory with MPI and OpenMP.
- Developed hardware-specific AI/ML algorithms employing communication avoidance and overhead mitigation techniques.
- Emphasis on real time streaming and machine learning, on novel migratory thread architectures and execution.

Job Skills: Migratory Execution, AI/ML, Multi-threading, Cilk, Performance Analysis

Visiting Student Scholar   Feb 2018 - Jun 2018
Lawrence Livermore National Laboratory
- Developed distributed and heterogeneous exascale graph analytics.
- Utilized the YGM asynchronous communication library to enable and optimize evaluation of astronomy data (big-data) for the purpose of identifying unique objects and identify their orbital paths. Terabytes of data across millions of individual files, requiring distributed computing via MPI.
- Focus on higher order network (HONs) and temporal bi-partite matching using Sierra Supercomputing systems.

Job Skills: Big Data Analytics, Graph Analysis, Scale-free networks, Heterogeneous Compute, Performance Optimization, MPI+OpenMP, C/C++

PhD Candidate - High Performance Computing Researcher   Aug 2016 - Dec 2021
University of Notre Dame
- Conducted exploratory research into the scalability of irregular memory access applications.
- Developed hybrid (shared+distributed memory) parallel software of sparse linear algebra.
- Conducted performance analysis of HPC-class heterogeneous systems, incorporating GPUs and custom accelerators such as the Intel Xeon Phi Knights Landing.
- Investigated experimental hardware implementations of SpMV and SpMM.
- Implemented hybrid applications with multiprocessing and multi-threading, utilizing both distributed and shared memory with MPI and OpenMP.
- Instructor of Record - Planned lectures, developed course materials, lectured on topics including multi-processing and multi-threading.

Job Skills: Hybrid Execution, MPI+OpenMP, C/C++, Strong Scaling, Heterogeneous Computing

EDUCATION

Doctor of Philosophy (PhD) in Computer Science and Engineering   2020
University of Notre Dame
Thesis Topic: Scalability of Irregular Algebra Applications

Masters of Science (MS) in Computer Science and Engineering   2019
University of Notre Dame

Bachelor of Science (BS) in Computer Science   2016
California State Polytechnic University, Humboldt
Minor in Applied Mathematics