



CHRISTIAN ENGELMANN, PH.D.

DISTINGUISHED COMPUTER SCIENTIST/TECHNOLOGIST & RESEARCH GROUP LEADER

EXTREME-SCALE SUPERCOMPUTING | FAULT RESILIENCE | HARDWARE/SOFTWARE CO-DESIGN TOOLS
COMPUTING CONTINUUM | AUTONOMOUS EXPERIMENTS | ARTIFICIAL INTELLIGENCE

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SUMMARY

Dr. Engelmann is a highly-published Distinguished Computer Scientist & Technologist and the Intelligent Systems and Facilities Research Group Leader at Oak Ridge National Laboratory. With over 25 years of experience in software research and development for high-performance computing (HPC) systems, he specializes in HPC fault resilience, system software for the federated instrument-to-edge-to-Cloud-to-center computing continuum, lightweight simulation of future-generation extreme-scale supercomputers, and operating system and runtime software for parallel and distributed systems. His work focuses on scalability, dependability, interoperability, application-architecture co-design, AI for Science, and enabling science breakthroughs with autonomous experiments and AI-driven design, discovery, and evaluation.

ACCOMPLISHMENTS BY THE NUMBERS

19 Research grants: \$42.1M in total research funding \$10.9M with 7 grants as lead investigator 1 Co-advised Ph.D. thesis 8 Co-advised M.Sc. theses ✎ 6 Mentored postdoctoral research associates	122 Peer-reviewed articles and papers ✎: 13 Peer-reviewed journal articles 60 Peer-reviewed conference papers 49 peer-reviewed workshop papers 16 Peer-reviewed posters ✎: 68 Invited talks and seminars ✎	5,240 Publication citations ✎: Google Scholar H-index: 35 Google Scholar i10-index: 80 Erdős number: 3 211 Committees at 50 conferences ✎: 70 Reviews for 20 journals/publishers ✎
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AWARDS

DISTINGUISHED CONTRIBUTOR – IEEE COMPUTER SOCIETY ✎	12/2025
• Recognition for technical contributions to the computing profession, computing community, and humanity	
EARLY CAREER AWARD – US DEPARTMENT OF ENERGY ✎	8/2015
• Prestigious 5-year \$2.5M grant for research in high-performance computing resilience design patterns ✎	

RECENTLY IN THE NEWS

• DOE: <i>Energy Department Advances Investments in AI for Science</i> ✎	12/10/2025
• DOE ASCR: <i>1.1 million supercomputer node-hours awarded to Privacy-Preserving Federated Learning for Foundation Models</i> ✎	7/8/2025
• ORNL Review: <i>Creating the lab of the future: INTERSECT unites AI and automation to revolutionize scientific discovery</i> ✎	4/16/2025
• ORNL News: <i>New ORNL projects included in \$67 million from DOE for AI in science research</i> ✎	10/15/2024
• ORNL News: <i>INTERSECT launches autonomous 'labs of the future'</i> ✎	8/24/2023
• DOE ASCR: <i>New Approach to Fault Tolerance Means More Efficient High-Performance Computers</i> ✎	3/30/2021
• HPCwire: <i>What's New in HPC Research: GPU Lifetimes, the Square Kilometre Array, Support Tickets & More</i> ✎	1/4/2021

PROFESSIONAL EXPERIENCE

DISTINGUISHED R&D STAFF – OAK RIDGE NATIONAL LABORATORY (1.6 YEARS)	4/2025-PRESENT
• Manage and advise small and larger multi-institutional software research and development projects • Transformational AI Model Consortium: Creating the Data Broker Standards for the DOE Genesis Mission • American Science Cloud: Designing the Data Service architecture and APIs for the DOE Genesis Mission • Develop efficient privacy-preserving federated learning algorithms for large-scale foundation models • Create an error- and failure-resilient federated ecosystem for instrument science	
GROUP LEADER, INTELLIGENT SYSTEMS AND FACILITIES – OAK RIDGE NATIONAL LABORATORY (6.1 YEARS)	10/2020-PRESENT
• Lead a software research and development group of 5-9 computer scientists and technologists • Address computer system software research challenges for scientific instruments, infrastructures, and facilities	
SENIOR R&D STAFF – OAK RIDGE NATIONAL LABORATORY (7 YEARS)	4/2018-3/2025
• Manage small and larger multi-institutional software research and development projects (2-12 computer scientists) • Architect a federated instrument-to-edge-to-Cloud-to-center scientific computing ecosystem • Early Career Award: Create design patterns, models and tools for resilience in supercomputers • Establish a taxonomy, a catalog, and models of faults, errors and failures in extreme-scale systems	
R&D STAFF – OAK RIDGE NATIONAL LABORATORY (8.5 YEARS)	9/2009-3/2018
• Manage small multi-institutional software research and development projects (2-6 computer scientists) • Develop resilient operating system and runtime software for extreme-scale scientific HPC • Investigate resilient Monte Carlo solvers with natural fault tolerance for exascale HPC • Implement performance/resilience modeling and simulation tools for HPC hardware/software co-design • Prototype soft-error injection tools and study the vulnerability of scientific applications • Create a HPC system software framework for monitoring, fault prediction, and proactive fault avoidance • Investigate the feasibility of and prototype transparent MPI-level computational redundancy	

- Develop a light-weight simulation of extreme-scale HPC architectures with ~100,000,000 MPI processes

R&D ASSOCIATE – OAK RIDGE NATIONAL LABORATORY (5.3 YEARS)

5/2004-8/2009

- Contribute to small and large multi-institutional software research and development projects
- Create fault-tolerant MPI solutions: Scalable group membership, job pause, and process migration
- Develop a 99.9997% high availability solution for HPC system services, such as Torque and PVFS MDS
- Ph.D. thesis research: Create symmetric active/active high availability solutions for HPC system services
- Implement virtual system environments for “plug-and-play” HPC using hypervisors, such as Xen
- Enhance scientific application development via a common view across platforms, the Harness Workbench

POST-MASTER’S RESEARCH ASSOCIATE – OAK RIDGE NATIONAL LABORATORY (2.9 YEARS)

6/2001-4/2004

- Contribute to small multi-institutional software research and development projects
- Prototype the pluggable, lightweight, and fault tolerant Harness distributed virtual machine
- Develop a light-weight simulation of extreme-scale HPC architectures with ~1,000,000 MPI processes

SOFTWARE DEVELOPER – OAK RIDGE NATIONAL LABORATORY (6 MONTHS)

8/2000-1/2001

- M.Sc. thesis research: Develop distributed peer-to-peer control for Harness, a fault-tolerant runtime

SOFTWARE DEVELOPER – HEWLETT-PACKARD, GERMANY (1 YEAR)

10/1998-9/1999

- Product R&D: Architect a graphical user interface server for an embedded mobile patient monitor

EDUCATION

PH.D. IN COMPUTER SCIENCE – UNIVERSITY OF READING, UK

12/2008

M.SC. IN COMPUTER SCIENCE – UNIVERSITY OF READING, UK

7/2001

DIPL.-ING. (FH) IN COMPUTER SYSTEMS ENGINEERING – UNIVERSITY OF APPLIED SCIENCES BERLIN, GERMANY

2/2001

HIGHLY CITED PEER-REVIEWED PUBLICATIONS

- [1] M. Snir et al. **Addressing failures in exascale computing**. *Intl. J. of High Perf. Comp. Applications (IJHPCA)*, 28(2), 2014. doi: 10.1177/1094342014522573. 555 citations.
- [2] A. Nagarajan, F. Mueller, C. Engelmann, and S. Scott. **Proactive fault tolerance for HPC with Xen virtualization**. In *Intl. Conf. on Supercomputing (ICS)*, 2007. doi: 10.1145/1274971.1274978. Accept. rate 23.6%. 526 citations.
- [3] D. Fiala, F. Mueller, C. Engelmann, K. Ferreira, R. Brightwell, and R. Riesen. **Detection and correction of silent data corruption for large-scale high-performance computing**. In *Intl. Conf. on High Perf. Comp., Networking, Storage and Analysis (SC)*, 2012. doi: 10.1109/SC.2012.49. Accept. rate 21.2%. 397 citations.
- [4] C. Wang, F. Mueller, C. Engelmann, and S. Scott. **Proactive process-level live migration in HPC environments**. In *Intl. Conf. on High Perf. Comp., Networking, Storage and Analysis (SC)*, 2008. doi: 10.1145/1413370.1413414. Accept. rate 21.3%. 249 citations.
- [5] J. Elliott, K. Kharbas, D. Fiala, F. Mueller, K. Ferreira, and C. Engelmann. **Combining partial redundancy and checkpointing for HPC**. In *Intl. Conf. on Dist. Comp. Systems (ICDCS)*, 2012. doi: 10.1109/ICDCS.2012.56. Accept. rate 13.8%. 211 citations.

LATEST PEER-REVIEWED PUBLICATIONS

- [1] C. Engelmann, A. Ayres, S. DeWitt, M. Brim, and B. Eiffert. **Building resilient self-driving laboratories with the INTERSECT federated ecosystem**. In *Intl. Conf. on High Perf. Comp., Networking, Storage and Analysis (SC) Workshops: Annual Workshop on Extreme-Scale Experiment-in-the-Loop Comp. (XLOOP)*, 2026. To appear.
- [2] S. Boehm, C. Bridges, P. Widener, T. Jones, S. Ghafoor, C. Engelmann, and O. Kuchar. **The intersect scientific data layer: An ontological framework for data provenance for complex scientific workflows**. In *Lecture Notes in Comp. Science: European Conf. on Par. and Dist. Comp. (Euro-Par) Workshops: Workshop on High-Perf. eScience Tools and Applications (HiPES)*, 2026. To appear.
- [3] O. Kotevska, T. Nguyen, Rafael Ferreira da Silva, C. Engelmann, and P. Balaprakash. **Scalable federated learning for scientific foundation models on leadership-class systems**. In *European Conf. on Comp. Systems (EuroSys): European Workshop on Machine Learning and Systems (EuroMLSys)*, 2026. doi: 10.1145/3805621.3807639. Accept. rate 69.2%.
- [4] P. Valero-Lara, A. Young, T. Naughton, C. Engelmann, A. Geist, J. Vetter, K. Teranishi, and W. Godoy. **ChatMPI: LLM-driven MPI code generation for HPC workloads**. In *Supercomputing Asia / Intl. Conf. on High Perf. Comp. in the Asia-Pacific Region (SCA/HPCAsia)*, 2026. doi: 10.1145/3773656.3773659. Accept. rate 36.6%.
- [5] K. Kim, K. Raghavan, O. Kotevska, M. Dorier, R. Madduri, M. Ryu, T. Munson, R. Ross, T. Flynn, A. Kagawa, B. Yoon, C. Engelmann, and F. Yousefian. **Privacy-preserving federated learning for science: Challenges and research directions**. In *Intl. Conf. on Big Data (BigData)*, 2024. doi: 10.1109/BigData62323.2024.10825853. Accept. rate 18.5%.

OTHER IMPORTANT PROFESSIONAL ACTIVITIES

- Conference program committee (PC) member: *SC, ICS, ISC-HPC, ICPP, PDP, ARES, FTXS@SC* Present
- PC chair: *SC Workshop on Latest Advances in Scalable Algorithms for Large-Scale Heterogeneous Systems* 2010-Present
- Chair/PC chair: *Euro-Par Workshop on Resiliency in High Performance Computing in Clusters, Clouds, and Grids* 2008-2022
- PC member: *IPDPS, CCCrid, Cluster, HPCC, NAS, EuroMPI, ICA3PP, ISPA, MSST, PADS* Past

PROFESSIONAL SOCIETY MEMBERSHIPS

- Association for Computing Machinery (ACM) – Senior Member 
- Society for Industrial and Applied Mathematics (SIAM) 
- Institute of Electrical and Electronics Engineers (IEEE) – Senior Member 
- Advanced Computing Systems Association (USENIX) 

———— Full CV with more detailed information and separate full publications list available upon request. ————