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Experience

3 years of experience at ORNL conducting research and development in supercomputing, data management, AI, and climate science. I am recently responsible for managing technical projects and staff, coordinating cross-ORNL and cross-laboratory working groups, and directly supporting scientists utilizing OLCF's leadership computing infrastructure.

Education

Ph.D., Computer Science, University of Chicago, USA, 2022.
M.S., Computer Science, University of Chicago, USA, 2018.
B.A., Applied Mathematics and Statistics, Macalester College, USA, 2016.

Work Experience

Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee

Research Scientist, Workflows; *June 2022 – Present*, Workflows and Ecosystems Services Group. I contribute to research and development efforts on Integrated Research Infrastructure (IRI) projects and technologies. I help lead the OLCF Secure Scientific Service Mesh (S3M) team, serve as a co-PI on a cross-facility workflows orchestration LDRD, and represent ORNL in the DOE-wide IRI technical interfaces subcommittee. My work involves supporting scientists at ORNL and beyond on projects related to AI, high-performance file transfer, climate science, and workflows. Collectively, these efforts focus on developing scientific software and research publications that ease technological barriers for scientists.

University of Chicago, Chicago, Illinois

Research Assistant*; June 2016 – May 2022*, Globus Labs. Led or contributed to several large-scale data systems, including leading the development of an automated metadata extraction system that scaled to 240 nodes of ALCF's Theta supercomputer, generating rich search indexes over millions of files. Explored machine learning techniques for file structure identification, outperforming Apache Tika and Linux File on scientific datasets. Published user study evaluating the usefulness of automatically generated search indexes. Assisted the Globus Compute team in developing, testing, and optimizing API clients, networking, and containerization. Mentored 14 students, many of whom published papers and won ACM student research competition awards. Published in HPDC, ICCS, eScience, and SSDBM.

IBM Research

Graduate Research Assistant, *Summer 2018*. Implemented a microservice-based genome assembly workflow in IBM's Functional Genomics Platform in the IBM Cloud.

Select Projects and Responsibilities within last 3 years

Secure Scientific Service Mesh (S3M) (2022 – Present)

Project Lead. I manage the S3M technical team, including members from ATS and Operations at NCCS, to define API specifications, policies, system requirements, and data movement strategies for diverse scientific users. My role includes overseeing research efforts to improve workflow support, ensuring compatibility with various workflow management systems. I am currently guiding S3M's transition from alpha to beta deployment on ACE, addressing user feedback, fixing bugs, and leading efforts to move S3M toward production both at OLCF and through strategic integrations with other labs' API initiatives.

INTERSECT, Workflows Orchestration (2022 – Present)

Co-PI. I oversee part of a research portfolio focused on workflow orchestration for autonomous experimentation. In this role, I collaborated with and managed an ORNL technical staff member to develop and test the Zambeze orchestration system, which has since transitioned to the */workflows* API of S3M. This system enables complex workflows to flexibly utilize OLCF computing resources. Our work has been shared with the community through a publication at PEARC 2024 and presentation at the Monterey Data Conference.

Climate Science Workflows Support (2023 – Present)

Researcher/Contributor. I develop tools to help climate scientists run analysis workflows on OLCF resources. Our research team has demonstrated how existing workflow tools like Globus Flows and Parsl can process simulation and observational data from ESGF and NASA repositories. This work involves collaboration with ATS, the Integrated Computational Earth Sciences group, and ANL. Currently, we are working on multi-facility scalable earth observation machine learning workflows for deployment, beginning with Frontier and ACE. These efforts have been shared through software demonstrations at the weekly ORNL IRI strategy meeting and a research paper at XLOOP 2024.

Globus Compute Task Force ***(2024 – Present)***

Lead. I lead stakeholders from across NCCS in implementing Globus Compute (GC) within OLCF. My role involves overseeing the deployment and testing of the multi-user GC endpoint on ACE, evaluating identity mapping solutions, and facilitating implementation and policy discussions between OLCF decision-makers and Globus staff. Additionally, I directly support scientists in connecting existing Globus Flows on OLCF.

Select Programmatic Contributions/Artifacts (since 2022)

2025

S3M

- Started as project lead of S3M
- Generate and oversee project milestones
- Guide technical staff in carrying out project goals
- Serve on IRI Technical Interfaces Subcommittee
- Oversee S3M integration with INTERSECT
- Launch support network for S3M users

Globus Compute Task Force

- Organize stakeholders to generate production deployment milestones
- Lead testing and documentation efforts
- Serve as a liaison between ORNL and Globus
- Directly assist OLCF users in leveraging Globus Compute on ACE

2024

S3M

- Led weekly technical team meetings
- Created specification for /workflows endpoint
- Worked with technical team and domain scientists to architect API and its user clients (currently alpha)
- Presented S3M at Monterey Data Conference

Globus Compute Task Force

- Oversaw multi-user endpoint deployment on ACE
- Presented tomography and climate science workflow demonstration at Globus World ’24 and the ORNL Data Assets Council

INTERSECT Orchestration

- Led team’s review, presenting to internal and external reviewers
- Delivered technical prototype for atomic microscopy use case executed on ACE
- Oversaw milestones for workflows orchestration system goals
- Managed a technical professional
- Published research paper on workflow orchestration system at PEARC ’24

Climate Science Workflows

- Architected and assisted with flow deployment on ACE and Frontier, leveraging Globus Flows and Parsl
- Presented ORNL’s ESGF IRI progress at ParslFest 2024
- Published research paper on Earth Observation ML workflows at XLOOP ’24

2023

S3M

- Created, tested, and demonstrated early sample API prototype
- Organized technical team meetings

INTERSECT Orchestration

- Received LDRD award to carry out workflows orchestration research
- Served as lead developer on workflow orchestration system
- Worked with PI to outline project goals

Scientific Data Management

- Published user study paper on data navigability at eScience ’23

2022

S3M

- Started as lead of technical team

Orchestration

- Served as lead developer on workflow orchestration system, delivering early prototypes with improved networking and workflow management.

Scientific Data Management

- Published paper on automated information extraction at ERROR ‘22.
- Guided senior scientists in designing data management toolkit

Peer-reviewed Publications

T. Kurihana, T. Skluzacek, V. Anantharaj, R. Ferreira da Silva. “Scalable Multi-Facility Workflows for Artificial Intelligence Applications in Climate Research”. 6th Annual Workshop on Extreme-Scale Experiment-in-the-Loop Computing. 2024.

W. Zheng, J. Kordas, T. Skluzacek, R. Kettimuthu, I. Foster. “Globus service enhancements for exascale applications and facilities”. International Journal of High Performance Computing Applications. 2024.

T. Skluzacek, R. Souza, M. Coletti, F. Suter, R. Ferreira da Silva. “Towards Cross-Facility Workflows Orchestration through Distributed Automation”. Practice and Experience in Advanced Research Computing (PEARC). 2024.

S. Oral, R. Ferreira da Silva, S. Abraham, R. Adamson, V. Anantharaj, T. Beck, A. Barker, K. Bethea, J. Brown, M. Brim, E. Cranfill, D. Dietz, B. Etz, A. George, J. Glaser, G. Jansen, O. Kuchar, J. Lange, K. Maheshwari, Z. Mayes, B. Messer II, R. Miller, R. Prout, D. Rogers, M.

Arjun Shankar, T. Skluzacek, V. Vergara, J. Webb, P. Widener, C. Zimmer. “OLCF’s Advanced Computing Ecosystem (ACE): FY24 Efforts for the DOE Integrated Research Infrastructure Program”. Oak Ridge National Laboratory Technical Report. 2024.

R. Souza, S. Caino-Lores, M. Coletti, T. Skluzacek, A. Costan. F. Suter. R. Ferreira da Silva. “Workflow Provenance in the Computing Continuum for Responsible, Trustworthy, and Energy-Efficient AI”. 2024.

T. Skluzacek, K. Chard, I. Foster. “Can Automated Metadata Extraction Make Scientific Data More Navigable?” IEEE 19th International Conference on e-Science (e-Science). 2023.

R. Souza, T. Skluzacek, S. Wilkinson, M. Ziatdinov, R. Ferreira da Silva. “Towards Lightweight Data Integration using Multi-workflow Provenance and Data Observability”. IEEE 19th International Conference on e-Science (e-Science). 2023.

T. Skluzacek, K. Chard, I. Foster. “Automated metadata extraction: challenges and opportunities”. IEEE 18th International Conference on e-Science (e-Science). 2022.

T. Skluzacek, E. Hsu, M. Chen, K. Chard, I. Foster. “Models and Metrics for Mining Meaningful Metadata”. Proceedings of the International Conference of Computational Science (ICCS). 2022.

T. Skluzacek, R. Wong, Z. Li, R. Chard, K. Chard, I. Foster. “A Serverless Framework for Distributed Bulk Metadata Extraction”. Proceedings of High-Performance Parallel and Distributed Computing (HPDC). 2021.

Z. Li, R. Chard, L. Ward, K. Chard, T. Skluzacek, Y. Babuji, A. Woodard, S. Tuecke, B. Blaiszik, M. Franklin, I. Foster. “DLHub: Simplifying publication, discovery, and use of machine learning models in science”. Journal of Parallel and Distributed Computing (JPDC). 2020.

R. Chard, Y. Babuji, Z. Li, T. Skluzacek, A. Woodard, B. Blaiszik, K. Chard, I. Foster. “funcX: a Federated Function Serving Fabric for Science”. Proceedings of High-Performance Parallel and Distributed Computing (HPDC). 2020.

T. Skluzacek, R. Chard, R. Wong, Z. Li, Y. Babuji, L. Ward, B. Blaiszik, K. Chard, I. Foster. “Serverless Workflows for Indexing Large Scientific Data”. 5th International Workshop on Serverless Computing (WoSC). 2019.

T. Skluzacek. “Dredging a Data Lake: Decentralized Metadata Extraction”. International Middleware Conference Doctoral Symposium. 2019.

R. Chard*, T. Skluzacek*, et al., K. Chard, I. Foster. “Serverless Supercomputing: High Performance Function as a Service for Science”. ArXiv Preprint: https://arxiv.org/abs/1908.04907. 2019. (*: co- first authors)

T. Skluzacek, R. Kumar, R. Chard, G. Harrison, P. Beckman, K. Chard, I. Foster. “Skluma: An extensible metadata extraction pipeline for disorganized data”. IEEE 14th International Conference on e-Science (e- Science). 2018.

P. Beckman, T. Skluzacek, K. Chard, I. Foster “Skluma: A Statistical Learning Pipeline for Taming Unkempt Data Repositories”. International Conference on Scientific and Statistical Database Management (SSDBM). 2017.

T. Skluzacek, K. Chard, I. Foster. “Klimatic: A Virtual Data Lake for Harvesting and Distribution of Geospatial Data”. In 1st Joint International Workshop on Parallel Data Storage and data Intensive Scalable Computing Systems (PDSW-DISCS). 2016.

Patent

T. Skluzacek. Full Patent. “Method for Interrupting Night Terrors During Sleep”. 2017. PTO#20200376231

Presentations and Tutorials

- Trinity Christian College Invited Talk. “Creating Better Research Repositories for Science”. 2024, 2025.
- ORNL Data Assets Council. “The ACE up our sleeve: Accelerating Science with Next Generation Computing”. 2024.
- ORNL Summer Internship Program. “Wonderful World of Workflows at OLCF.” 2024.
- Monterey Data Conference. “Enabling Distributed Research Orchestration Capabilities at ORNL”. Poster. 2024.
- ParslFest 2024. “A Workflows Ecosystem for ESGF Data”. 2024.
- GlobusWorld 2024. “Enhancing Research Orchestration Capabilities at ORNL”. 2024.
- ORNL Software Expo 2024. “Distributed Workflows Automation with Zambeze and Flowcept”. 2024.
- U.S. Department of Energy Cross-Facility Workflows Training. 2023.
- ParslFest 2023. “Parsl in Zambeze: rafting down your distributed science river.” 2023.
- World Usability Day Celebration – Cloudberry Creative. “PTSD and Digital Therapeutics: designing wearable applications for vulnerable populations.” 2022.
- ORNL Data Assets Council. “Automated metadata extraction to make data swamps more navigable.” 2022.
- Sandia National Labs Invited Talk. “Metadata Extraction for the Battery Modeling Community.”
- UChicago Data Science Institute Rising Stars Summit (Chicago, IL) “Enabling Data Utility Across the Sciences.” 2021.
- CERES Center for Unstoppable Computing Annual Summit (Virtual and Chicago, IL) “Draining the Data Swamp -- Funded Project Updates.” 2020.
- Data Science Institute Summer Research Lab “Making the most of your research summer.” 2019.

- SC19 Lightning Talk Series (Dallas, TX; Denver, CO)
  "Container Orchestration for Genome Sequencing Pipelines."
  "Serverless Metadata Extraction Workflows for Better Science." 2019.

Mentoring

- Data Science Institute Summer Lab, Summer Research Lab Coordinator. Performed application review, mentor matching, and provided student support for 15-35 students per summer. 2016—2019.
- Advised 14 students on research projects, with many contributing to publications, posters, and presentations. Students placed first and third in the ACM Student Research Competition at SC. 2016—2022.

Community Service

- Posters Chair, eScience '25.
- Publicity Chair, eScience '24, HPDC '25.
- Program Committee, HPDC '23, ICPP '23/'24, PEARC '23/'24, SC '23/'24, SciPy '21, WORKS '22/'23/'24.
- Data4All Data Science Bridge Workshop, Curriculum Development and Lecturer. In conjunction with Argonne National Lab and the University of Chicago, I co-developed a 10-lecture data science program for individuals from Chicago's southside public high schools. '21/'22/'23.
- SC Lead Student Volunteer '18/'19.
- DOE Science Bowl Judge '19.

Selected Media Coverage

Henry Ford's Innovation Nation with Mo Rocca on CBS, 2022
"NightWare | Innovation Nation."
(https://www.youtube.com/watch?v=ZV8tvlvHJwY)

Wired Magazine, 2020
"How a vibrating smartwatch could be used to stop nightmares."
(https://www.wired.com/story/how-a-vibrating-smartwatch-could-be-used-to-stop-nightmares/)

National Public Radio (NPR), 2020
"FDA Approves Smart Watch Application To Help Those With PTSD"
(https://www.npr.org/2020/12/06/943604709/fda-approves-smart-watch-application-to-help-those-with-ptsd)

PBS Almanac, 2016
"An app that combats PTSD"
(https://www.pbs.org/video/an-app-that-combats-ptsd-29441/)

Teaching

- (upcoming) Distributed Systems – Adjunct Professor – University of Chicago
- Advanced Data Visualization – Adjunct Professor – Trinity Christian College (IL)
- Machine Learning for Data Mining – Adjunct Professor – Trinity Christian College (IL)
- Introduction to Computer Science II – Principal Lecturer – University of Chicago
- TA for Kyle Chard – Distributed Computing (master's) – University of Chicago
- TA for Vas Vasiliadis – Cloud Computing (master's) – University of Chicago
- TA for Adam Shaw – Introduction to Computer Science I – University of Chicago
- TA for J. Peter Ferderer – Principles of Economics – Macalester College

Honors and Grants

Co-PI, Lab Directed Research and Development Grant, Workflows Orchestration, 2023—2025
Funding Amount: $670,000/year
ORNL Supplemental Performance Award, 2023
Data Science Institute (University of Chicago) Rising Star Awardee, 2021
Outstanding Graduate Research Award – CERES Center for Unstoppable Computing, 2017
Illinois Fifty for the Future – Illinois Technology Foundation, 2017
Nominet Trust 100 Award (myBivy), 2017
Minnesota Rising Technology Star, 2016
MentorMate MobDemo Startup Pitch Champion, 2016
Howard Hughes Medical Institute Statistics Fellow – Macalester College, 2015
HackDC: mobile solutions for PTSD Grand Champion, 2015