

# Benoît GALLET, Ph.D.

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## SUMMARY

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Postdoctoral scholar in cybersecurity and computer science/ecoinformatics at Northern Arizona University.

PhD in Informatics and Computing from Northern Arizona University: "Efficient Euclidean Distance Calculations and Distance Similarity Searches: An Examination of Heterogeneous CPU, GPU and Tensor Core Architectures".

Expert in data analysis and clustering algorithms, high-performance computing, parallel and GPU computing, and algorithm performance optimization.

Authored and presented several publications in international conferences.

## EXPERIENCE

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### Northern Arizona University

Flagstaff, AZ

#### Postdoctoral Scholar in Cybersecurity

Jun 2023 – Jun 2024

- Porting Number Theoretic Transform (NTT) operations from the Post-Quantum Cryptography (PQC) algorithm Kyber from the CPU to GPU Tensor Cores using CUDA.

#### Postdoctoral Scholar in Computer Science/Ecoinformatics Jun 2023 – Jun 2024

- Designing and coding an algorithm to periodically retrieve satellite image data from several providers (PlanetLabs, NASA, ESA, USGS) for the state of Arizona, using Python.
- Designing and coding an algorithm to periodically ingest newly downloaded imagery, fit data onto a grid spanning Arizona, and update a model to compute the tree water and bark beetle stresses for each pixel. Uses C++, and OpenMPI for distributed computing.

#### Graduate Research Assistant

Aug 2018 – May 2023

- Worked on data analysis and clustering algorithms, in particular those computing similarity searches using the Euclidean distance.
- Designed several GPU algorithms and optimizations; a heterogeneous CPU-GPU algorithm; and a novel GPU algorithm using Tensor Cores to compute distance similarity searches.
- Published and presented several articles in international conferences.
- *Related to the PhD dissertation.*

#### CS450 Instructor

May 2022 – Aug 2022

- Instructor of record for the CS450 Instruction to Parallel Programming class for the summer 2022 term.
- Taught shared memory parallelism, including pthreads and OpenMP.
- Average course evaluation: 3.86 / 4.

### Université d'Orléans

Orléans, France

#### MSc Internship

Apr 2018 – Sep 2018

- *GPU Kernel Performance Optimizations for Efficient Similarity Joins.*
- Proposed several optimizations for a GPU distance similarity searches algorithm.

**Université d'Orléans / National Center for Scientific Research    Orléans, France**  
**BSc Internship    Apr 2016 – Jun 2016**

- *GPU Detection of Pulse Radio Signals.*
- Cleaned and formatted an existing sequential CPU code in C detecting pulse radio signals from neutron stars with a radio telescope.
- Ported the original code to the GPU using CUDA.

## EDUCATION

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**Northern Arizona University    Flagstaff, AZ**  
**PhD in Informatics and Computing    2023**

- *Efficient Euclidean Distance Calculations And Distance Similarity Searches: An Examination of Heterogeneous CPU, GPU, and Tensor Core Architectures*, supervised by Dr. Michael Gowanlock.
- Worked as a Graduate Research Assistant.
- Published 4 articles as first author, presented in several international conferences.

**Université d'Orléans    Orléans, France**  
**MSc in Computer Science    2018**

- With Honors.

**Université d'Orléans    Orléans, France**  
**BSc in Computer Science    2016**

## SKILLS

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- C, C++, Python, CUDA, OpenMP, MPI.
- Data analysis and clustering algorithms, high-performance computing, parallel and GPU computing, algorithms, data structures, performance optimizations.
- Conducting research, presenting, public speaking.
- French (native), English (bilingual), German (intermediate).

## PUBLICATIONS

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1. Michael Gowanlock, **Benoit Gallet** and Brian Donnelly, *Optimization and Comparison of Coordinate- and Metric-Based Indexes on GPUs for Distance Similarity Searches*. Proceedings of the International Conference on Computational Science (ICCS), pp. 357–364. doi: [10.1007/978-3-031-36021-3\\_37](https://doi.org/10.1007/978-3-031-36021-3_37), Prague, Czech Republic, July 2023.
2. **Benoit Gallet** and Michael Gowanlock, *Leveraging GPU Tensor Cores for Double Precision Euclidean Distance Calculations*. Proceedings of the 29th IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC), pages 135–144, doi: [10.1109/HiPC56025.2022.00029](https://doi.org/10.1109/HiPC56025.2022.00029), Bengaluru, India, December 2022.
3. Michael Gowanlock and **Benoit Gallet**, *Data-Intensive Computing Modules for Teaching Parallel and Distributed Computing*. NSF/TCPP Workshop on Parallel and Distributed Computing Education, Proceedings of the IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), pages 350–357, doi: [10.1109/IPDPSW52791.2021.00062](https://doi.org/10.1109/IPDPSW52791.2021.00062), Portland, USA, June 2021.
4. **Benoit Gallet** and Michael Gowanlock, *Heterogeneous CPU-GPU Epsilon Grid Joins: Static and Dynamic Work Partitioning Strategies*. Data Science and Engineering, Volume 6, pages 39–62, doi: [10.1007/s41019-020-00145-x](https://doi.org/10.1007/s41019-020-00145-x), October 2020.

5. **Benoit Gallet** and Michael Gowanlock, *HEGJoin: Heterogeneous CPU-GPU Epsilon Grids for Accelerated Distance Similarity Join*. Proceedings of the 25th International Conference on Database Systems for Advanced Applications (DASFAA), pages 372–388, doi: [10.1007/978-3-030-59419-0\\_23](https://doi.org/10.1007/978-3-030-59419-0_23), Jeju, South Korea, September 2020.
6. **Benoit Gallet** and Michael Gowanlock, *Load Imbalance Mitigation Optimizations for GPU-Accelerated Similarity Joins*. IEEE High-Performance Big Data, Deep Learning, and Cloud Computing Workshop, Proceedings of the 2019 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), pages 396–405, doi: [10.1109/IPDPSW.2019.00078](https://doi.org/10.1109/IPDPSW.2019.00078), Rio de Janeiro, Brazil, May 2019 (**Best Paper Award**).

## POSTER PRESENTATIONS

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1. **Benoit Gallet** and Michael Gowanlock, *Optimizing GPU-Accelerated Similarity Joins Addressing Data-Dependent Workloads*. IEEE International Parallel and Distributed Processing Symposium (IPDPS), PhD Forum, Rio de Janeiro, Brazil, 2019.
2. **Benoit Gallet** and Michael Gowanlock, *Exploring The Design-Space of GPU-Efficient Similarity Self-Join Kernels*. High-Level Parallel Programming and Applications (HLPP), 11th International Symposium, Orléans, France, 2018.

## SERVICE

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- Co-supervised MSc student research projects at Northern Arizona University (Flagstaff, USA) and University of Orléans (Orléans, France).
- Co-designed a Python coding course for the Tuba City high school.
- External reviewer for the International Conference on Computational Science (ICCS): 2020–2023.
- Reviewer for the Journal of Parallel and Distributed Computing (JPDC), Elsevier.
- Reviewer for the IEEE Transactions on Knowledge and Data Engineering (TKDE) journal.
- Reviewer for the Journal of Statistical Software.