Matthew Alan Le Brun

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Education

University of Glasgow *2022 – Present*
PhD Computing Science

- Thesis: *Multiparty Session Types for Distributed and Failure-Prone Systems*
- Supervisors: Ornela Dardha, Simon Fowler, and Paul Harvey
- On track to submit in April 2025

University of Malta *2020 – 2021*
Master of Science

- Thesis: *On Extending and Verifying the Raft Consensus Algorithm*
- Supervisor: Adrian Francalanza
- Passed with Distinction

University of Malta *2017 – 2020*
BSc (Hons) (Computing Science)

- Final Year Project: *On Implementing and Evaluating the Raft Distributed Consensus Algorithm*
- Supervisors: Adrian Francalanza and Duncan Paul Attard
- Focus: Computability and Complexity, Programming Languages, Concurrency and Distributed Systems

Publications

Matthew Alan Le Brun, Simon Fowler, and Ornela Dardha. *Multiparty Session Types with a Bang!*. To appear in European Symposium on Programming (ESOP) 2025.

Matthew Alan Le Brun and Ornela Dardha. *MAGπ!: The Role of Replication in Typing Failure-Prone Communication*. In International Conference on Formal Techniques for Distributed Objects, Components, and Systems (FORTE), pp. 99-117. 2024.

Matthew Alan Le Brun and Ornela Dardha. *MAGπ: Types for Failure-Prone Communication*. In European Symposium on Programming (ESOP), pp. 363-391. Cham: Springer Nature Switzerland, 2023.

Matthew Alan Le Brun, Duncan P. Attard, and Adrian Francalanza. *Graft: General Purpose Raft Consensus in Elixir*. In Proceedings of the 20th ACM SIGPLAN international workshop on Erlang, pp. 2-14. 2021.

Work Experience

Software Engineer (Part Time) *2020 – 2021*
CCBill EU

- Integrated a centralised log monitor for a distributed microservices architecture.

Software Development Intern *2018 – 2020*
CCBill EU

- Developed a WebApp (full-stack) for an internal-use employee management system.

Research Outreach

Organiser

- Scottish Programming Languages Seminar (SPLS) July 2022
- Concurrency Lab (CoLab) Reading Club 2022-2023
- Scottish Programming Languages and Verification Summer School (SPLV) 2026

Programme Committee Member

- 15th Workshop on Programming Language Approaches to Concurrency and Communication-cEntric Software (PLACES) 2024
- 17th Interaction and Concurrency Experience (ICE) 2024
- 18th Interaction and Concurrency Experience (ICE) 2025

Artifact Evaluation Committee Member

- International Joint Conferences on Theory and Practice of Software (ETAPS): ESOP/FASE/FoSSaCS 2024

Publicity Co-Chair

- International Federated Conference on Distributed Computing Techniques (DisCoTec) 2025 and 2026

External Reviewer

- **Conferences and Workshops**: Euro-Par 2021, CONCUR 2022, FORTE 2023
- **Journals**: Information and Computation

Invited Participant

- Behavioural Application Program Interfaces (BehAPI) Tutorial Day 2023

Summer Schools

- Participant and speaker (lightning talk) at the Scottish Programming Languages and Verification Summer School (SPLV) 2022
- Participant at the Scottish Programming Languages and Verification Summer School (SPLV) 2024

Science Communicator

- Glasgow Science Festival 2022 and 2023

Research Visits

- Secondment at Carnegie Mellon University, PA, USA (duration: 1 month), 2023

Researcher Representatives Committee Member

- University of Glasgow's junior representative for the Scottish Programming Languages Institute (SPLI)

Open Source

I am the primary developer and maintainer of the open source library Graft, an Elixir library for building fault-tolerant applications over the Raft consensus algorithm. The library follows community standards to offer seamless integration of OTP applications with a consensus backend, and can be optionally deployed with runtime monitors to verify the correctness of production applications. `https://github.com/MatthewAlanLeBrun/graft`.

Presentations

Invited Talk: *Multiparty Session Types with a Bang!.* *February 2025*
Theoretical Computer Science Seminar, University of Birmingham.

Talk: *MAGπ!: The Role of Replication in Typing Failure-Prone Communication.* *June 2024*
19th International Federated Conference on Distributed Computing Techniques.

Invited Talk: *MAGπ!: The Role of Replication in Typing Failure-Prone Communication.* *March 2024*
PLUG Seminar, University of Glasgow.

Invited Talk: *MAGπ: Types for Failure-Prone Communication.* *February 2024*
Programming Languages and Systems (PLAS) Seminar, University of Kent.

Talk: *Towards Session-Typed Consensus.* *October 2023*
30 Years of Session Types (ST30).

Talk: *MAGπ: Types for Failure-Prone Communication.* *April 2023*
32nd European Symposium on Programming.

Talk: *MAGπ: Types for Failure-Prone Communication.* *April 2023*
14th Workshop on Programming Language Approaches to Concurrency and Communication cEntric Software.

Talk: *MAGπ: Types for Failure-Prone Communication.* *March 2023*
Scottish Programming Languages Seminar (SPLS).

Invited Talk: *Non-Classical Logics: True, False and Everything In-Between.* *February 2023*
Concurrency Lab (CoLab) Reading Club, University of Glasgow.

Invited Talk: *MAGπ: Types for Failure-Prone Communication.* *November 2022*
PLUG Seminar, University of Glasgow.

Lightning Talk: *Session Types for Distributed Communication.* *July 2022*
Scottish Programming Languages Seminar (SPLS).

Invited Talk: *On Extending and Verifying the Raft Consensus Algorithm.* *January 2022*
Concurrency Lab (CoLab) Reading Club, University of Glasgow.

Talk: *Graft: General Purpose Raft Consensus in Elixir.* *August 2021*
20th ACM SIGPLAN International Workshop on Erlang.

Funding

- SICSA Research Scholar fund. Awarded to attend and present at the *30 years of session types* (ST30) workshop. *£500*
- Behavioural Application Program Interfaces (BehAPI) secondment. Awarded to establish an international collaboration with Carnegie Mellon University (CMU) and investigate logical interpretations of session types for failure-prone communication. *€2,000*
- University of Glasgow College of Science and Engineering mobility scholarship. Awarded to supplement living expenses for my collaboration with CMU. *£2,000*

Teaching Experience

Graduate Teaching Assistant

This role involves leading lab and tutorial sessions, guiding students through worksheets in an interactive classroom setting, addressing any questions on the course material, and assisting with the design and marking of assignments.

Programming Languages — *2023 – Present*
Theory of Computation — *2023*

Tutor

This role involved leading tutorial sessions, guiding students through worksheets in an interactive classroom setting, and addressing any questions on the course material.

Programming Paradigms — *2021*
Formal Languages and Automata — *2020 – 2021*

Invited Lectures

- *Programming Languages (H).* University of Glasgow, 2024. Delivered two lectures of 2 hours each on the foundations of programming language implementation; one lecture discussed the approached of interpretation and compilation, the other was on approaches to parsing.
- *Theory of Computation (H).* University of Glasgow, 2023. Delivered two lectures of 2 hours each on the pi-calculus as a foundation for concurrent computation; one lecture focused on equivalence theories, the other on type systems.
- *Programming Paradigms.* University of Malta, 2021. Delivered two lectures of 2 hours each on concurrent programming with asynchronous message passing. Lectures focused on the actor model and Erlang, with an in-depth look at fault-isolation and fault-tolerance.

Supervision

- Ruby Graham (MSci integrated masters). Co-supervised with Ornela Dardha. *An implementation of MAGπ: Types for Failure-Prone Communication.* 2023 – 2024.
- Yuge Wang (MSc CS+). *Extending Graft with Dynamic Cluster Membership.* 2023.