Duc-Than Nguyen

dnguye96@uic.edu • ducthan.net • orcid.org/0000-0002-6810-897X

Research Interests

My primary research interest lies in advancing provably correct software, with a focus on developing and applying formal verification techniques for concurrent programs. In particular, I am developing techniques to verify the correctness of concurrent C programs using the Verified Software Toolchain and Iris, with the goal of proving the correctness of realistic systems-level concurrent code and developing simpler, more scalable approaches to reasoning about fine-grained concurrency.

Education

University of Illinois at Chicago — *IL, USA*
Doctor of Philosophy in Computer Science — *Jan 2021 – Dec 2026*
- Advisor: Assistant Professor William Mansky

University of Melbourne — *VIC, Australia*
Master of Philosophy in Computing and Information Systems — *June 2018 – Dec 2020*
- Thesis: *Foundations for Reasoning about Holistic Specifications*
- Advisors: Professor Toby Murray and Professor Benjamin Rubinstein

Vietnam National University, University of Science — *HCM, Vietnam*
Bachelor of Science (Honors Program) in Information Technology — *Sept 2009 – July 2013*
- Thesis: *Attacks on Low Private Exponent RSA Cryptosystems*
- Advisors: Associate Professor Dinh-Thuc Nguyen and Dr. Dinh-Long Tran

Publications

A Formal Interface for Concurrent Search Structure Templates
Duc-Than Nguyen, William Mansky
10.1007/978-3-032-22723-2_5
ESOP 2026 (European Symposium on Programming)

Compositional Verification of Concurrent C Programs with Search Structure Templates
Duc-Than Nguyen, Lennart Beringer, William Mansky, Shengyi Wang
10.1145/3636501.3636940
CPP 2024 (ACM SIGPLAN International Conference on Certified Programs and Proofs)

Compass: Strong and Compositional Library Specifications in Relaxed Memory Separation Logic
Hoang-Hai Dang, Jaehwang Jung, Jaemin Choi, **Duc-Than Nguyen**, William Mansky, Jeehoon Kang, Derek Dreyer
10.1145/3519939.3523451
PLDI 2022 (ACM SIGPLAN International Conference on Programming Language Design and Implementation)

Efficient Privacy Preserving Data Audit in Cloud
Hai-Van Dang, Thai-Son Tran, **Duc-Than Nguyen**, Thach V. Bui, Dinh-Thuc Nguyen
10.1007/978-3-319-17996-4_17
ICCSAMA 2015 (Advanced Computational Methods for Knowledge Engineering)

Attacks on Low Private Exponent RSA: An Experimental Study
Thuc D. Nguyen, **Than Duc Nguyen**, Long D. Tran
10.1109/ICCSA.2013.32
ICCSA 2013 (International Conference on Computational Science and Its Applications)

Research Experience

Research Assistant *Chicago, IL*

Department of Computer Science, University of Illinois at Chicago *Jan 2021 – present*

- VST & concurrency: Extended the VST soundness proof and program logic to support concurrency, atomic operations, and weak-memory reasoning.
- CCris: Built an annotation-based verification framework on top of VST using RefinedC.
- Concurrent Search Structure Templates: Implemented template-based verification techniques in VST and applied them to prove the correctness of fine-grained concurrent search structure implementations in C.
- Specifications for Relaxed Libraries in Iris: Developed stronger specifications for relaxedmemory libraries by combining logical atomicity with enriched partial-order reasoning, targeting the weaker memory model of Repaired C11 and building on top of the Iris framework.

Research Student *VIC, Australia*

School of Computing and Information Systems, University of Melbourne *June 2018 – Dec 2020*

- Foundations for reasoning about Holistic Specifications: Formalized the theory of Holistic Specifications in Isabelle to describe correctness properties of complex programs, laying the groundwork for future verification methods based on holistic reasoning.

Research Assistant *Singapore*

PLSE Lab, Department of Computer Science, National University of Singapore *Feb 2016 – Dec 2017*

- Dynamic Symbolic Analysis for Security Vulnerabilities in Web Applications: Applied dynamic symbolic execution techniques to analyze JavaScript programs and detect security vulnerabilities in web applications.

Research Intern *Tokyo, Japan*

Echizen Laboratory - Content Security Lab, National Institute of Informatics *Feb 2015 – Aug 2015*

- Lattice-based Cryptography and its Applications: Developed cryptographic applications based on hard lattice problems, focusing on the Short Integer Solution and Learning With Errors assumptions.

Research Intern *HCM, Vietnam*

Dept. of Knowledge Engineering, FIT, University of Science, Vietnam National University *Sept 2013 – Jan 2016*

- Co-developed auditing solutions using cryptographic hash functions and the Chinese Remainder Theorem.
- Co-organized weekly seminars for the university's cryptography group, covering topics in number theory, abstract algebra, and lattice-based cryptography.

Teaching Experience

Graduate Teaching Assistant *IL, USA*

University of Illinois at Chicago

- CS 211: Programming Practicum (Spring 2024, Fall 2023, Spring 2023)

Graduate Tutor *VIC, Australia*

University of Melbourne

- COMP 90038: Algorithms and Complexity (Semester I, 2019)

Teaching Assistant *Singapore*

National University of Singapore

- CS 1010E: Programming Methodology (Spring 2017)

Teaching Assistant *HCM, Vietnam*

Vietnam National University, University of Science

- Automata and Formal Languages (Spring 2014)
- Computer System Programming (Fall 2014)
- Data Structures and Algorithms (Fall 2015, Fall 2014)
- Introduction to Algorithms and Complexity (Fall 2015, Fall 2014, Fall 2013)
- Introduction to Cryptography (Spring 2014)
- Languages and Compiler Design I (Fall 2015, Fall 2014)

Research Mentor *HCM, Vietnam*

Vietnam National University, University of Science

- Xuan-Huy Ngo, Undergraduate (2014)

Honors and Awards

- SIGPLAN PLMW at PLDI, Student Travel Grant, San Diego, CA, USA (2022)
- Graduate Assistantship, University of Illinois at Chicago, IL, USA (2021)
- Melbourne Research Scholarship, University of Melbourne, VIC, Australia (2018)
- SIGPLAN PLMW at ICFP, Student Travel Grant, Japan (2016)
- Outstanding Achievement in Research, Vietnam National University, University of Science, HCM, Vietnam (2013)
- Distinction Graduation, Vietnam National University, University of Science, HCM, Vietnam (2013)
- Scholarships for Excellent Students, Vietnam National University, University of Science, HCM, Vietnam (2012)
- Bronze Medal, National Creativity Contest for Teenagers, Vietnam Fund for Supporting Technological Creations (VIFOTEC) (2005)
- Silver Medal, The Young Scientist Competition, Vietnam Ministry of Education and Training, Vietnam (2003)

Skills

Interactive Theorem Prover: Rocq, Isabelle

Programming Languages: C/C++, OCaml

Editors and IDEs: Emacs (Spacemacs), VS Code, Vim

Version Control: Git, GitHub, Bitbucket

Talks

- Compositional Verification of Concurrent C Programs with Search Structure Templates, NJPLS (November 2023)
- Attacks on Low Private Exponent RSA: An Experimental Study, ICCSA (June 2013)

Activities

- Artifact Evaluation Committees: PLDI'25, ICFP'24
- Attended NJPLS seminar, Princeton University, NJ, November 2023
- Attended virtual conferences: POPL'21, PLDI'21, and in-person conference PLDI'22
- Attended in-person conferences: ICCSA'13 in Vietnam, and ICFP'16 in Japan
- Participated in the South East Asian Mathematical Society (SEAMS) School 2015
- Founded/Administered the online mathematics forum (`mathfriend.org`) from 2005 to 2007