

Duc-Thân Nguyen

dnnguye96@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

Doctor of Philosophy in Computer Science

IL, USA

Jan 2021 – present

- Advisor: Assistant Professor William Mansky

University of Melbourne

Master of Philosophy in Computing and Information Systems

VIC, Australia

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

Bachelor of Science (Honors Program) in Information Technology

HCM, Vietnam

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-Thân Nguyen, William Mansky

ESOP 2026 (European Symposium on Programming)

Compositional Verification of Concurrent C Programs with Search Structure Templates

Duc-Thân Nguyen, Lennart Beringer, William Mansky, Shengyi Wang

[10.1145/3636501.3636940](https://doi.org/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-Thân Nguyen**, William Mansky, Jeehoon Kang, Derek Dreyer

[10.1145/3519939.3523451](https://doi.org/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-Thân Nguyen**, Thach V. Bui, Dinh-Thuc Nguyen

ICCSAMA 2015 (Advanced Computational Methods for Knowledge Engineering)

Attacks on Low Private Exponent RSA: An Experimental Study

Thuc D. Nguyen, **Thân Duc Nguyen**, Long D. Tran

[10.1109/ICCSA.2013.32](https://doi.org/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 relaxed memory 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