

Nils Klarlund

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Degrees Ph.D. Computer Science, Cornell University, August 1990.
Thesis: “Progress Measures and Finite Arguments for Infinite Computations.”
Research Areas: automata theory, program verification, and theory of computation.
Committee Chairman: Dexter Kozen, Ph.D.
Minor in Mathematics.

M.Sc. Computer Science, University of Aarhus, Denmark, August 1986.
Thesis: “Temporal Rule Logic—Theory and Applications.”
Advisor: Erik Meineche Schmidt, Ph.D.
The degree incorporated studies carried out at Université des Sciences et Techniques du Languedoc, Montpellier, France; Technical University of Denmark; and University of Copenhagen, Denmark.

Journal Papers Relativizations for the logic-automata connection. *Higher-Order and Symbolic Computation*, accepted for publication, 2004. (Some material in this paper appeared in “A Theory of Restrictions for Logics and Automata,” *Computer Aided Verification, CAV '99*, LNCS 1633, 1999.)

The DSD Schema Language and its Applications (with A. Møller and M.I. Schwartzbach). *Automated Software Engineering*, 9:3, pp. 285–319, 2002. (This article is an extended version of “DSD: A Schema Language for XML,” *3rd Workshop on Formal Methods in Software Practice, 2000*; in addition, material from “XPML: Industrial Case Study” (see below) has been included.)

MONA Implementation Secrets (with A. Møller and M.I. Schwartzbach). *International Journal of Foundations of Computer Science*, Vol. 13, No. 4, pp. 571-586, 2002. (A shorter version appeared in *Fifth International Conference on Implementation and Application of Automata, CIAA ' 2000*, LNCS 2088, 2000.)

A Domain-Specific Language for Regular Sets of Strings and Trees (with Michael I. Schwartzbach) *IEEE Transactions On Software Engineering*, Vol. 25, pp. 378-386, IEEE, 1999. (Extended version of paper appearing in “USENIX Conference on Domain-Specific Languages”, Santa Barbara, 1997.)

An $n \log n$ Algorithm for Online BDD Refinement. *Journal of Algorithms*, Vol. 32, pp. 133-154, 1999. (Abbreviated version in *Computer Aided Verification, CAV '97*, LNCS 1254, 1997.)

Automata Based Symbolic Reasoning in Hardware Verification (with D. Basin). *Formal Methods In System Design*, Vol. 13, pp. 255-288, 1998. (Extended version of: “Hardware verification using monadic second-order logic,” *CAV '95*, LNCS 939.)

**Other
Refereed
Papers**

Rabin Measures (with Dexter Kozen). *Chicago Journal of Theoretical Computer Science*, No. 3, MIT Press, September, 1995. (Also in *Proc. Sixth Symp. on Logic in Computer Science*. IEEE, 1991.)

Progress Measures, Immediate Determinacy, and a Subset Construction For Tree Automata. *Journal of Pure and Applied Logic*, Vol. 69, pp. 243-268, 1994. (Also in *Proc. Seventh Symp. on Logic in Computer Science*. IEEE, 1992.)

Proving Nondeterministically Specified Properties Using Progress Measures (with F.B. Schneider). *Information and Computation*, Vol. 107, No. 1, pp. 151-170, 1993.

Regularity results for FIFO channels (with Richard Trefer). To appear, AVOCS, 2004.

Word n -grams for cluster keyboards (with Michael Riley). *Proceedings of the EACL 2003 Workshop on Language Modeling for Text Entry Methods*. 2003.

Editing by Voice and the Role of Sequential Symbol Systems for Improved Human-to-Computer Information Rates. *Proceedings of the 2003 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASS'03)*. Hong Kong, 2003. (Also in *Proceedings of the 2003 IEEE International Conference On Multimedia and Expo. Baltimore, 2003*.)

Towards SMIL as a Foundation for Multimodal Multimedia Applications (with Jennifer L. Beckham and Giuseppe Di Fabbrizio). Regular paper, *Eurospeech 2001*. Aalborg, Denmark.

ECLIPSE Feature Logic Analysis (with Gregory W. Bond. Franjo Ivancic, Richard Trefer). *Proceedings of the 2nd IP-Telephony Workshop*, New York, 2001, http://www.fokus.gmd.de/events/iptel2001/pg/final_program/proceedings.pdf.

Verification of a Sliding Window Protocol Using IOA and MONA (with M. Smith). *Formal Methods for Distributed System Development*, FORTE/PSTV 2000, IFIP TC6 WG6.1 Joint International Conference on Formal Description Techniques for Distributed Systems and Communication Protocols (FORTE XIII), and Protocol Specification, Testing, and Verification (PSTV XX), Eds. T. Bolognesi and DLatella, October 10-13, Pisa, Italy, pp. 19-34, Kluwer.

YakYak: Parsing with Logical Side Constraints (with N. Damgaard and M.I. Schwartzbach). *Developments in language theory. Foundations, applications, and perspectives*. Aachen, Germany, 6-9 July 1999., pp. 286-304, Editors: G. Rozenberg and W. Thomas, World Scientific, 2000.

Mona 1.x: New Techniques for WS1S and WS2S (with J. Elgaard and A. Møller) (demo paper). *Computer Aided Verification, CAV '98*, LNCS 1427, 1998.

Mona & Fido: The Logic-Automaton Connection in Practice (invited paper). *Computer Science Logic, CSL '97*, LNCS 1414, 1998.

Automatic Verification of Pointer Programs using Monadic Second-order Logic (with J.L. Jensen, M.E. Jørgensen, and M.I. Schwartzbach). *Proc. Programming Language Design and Implementation '97*, 1997.

A Case Study in Automated Verification Based on Trace Abstractions (with M. Nielsen and K. Sunesen). *Formal System Specification, The RPC-Memory Specification Case Study*, Springer Verlag, Eds. M. Broy, S. Merz, K. Spies, LNCS 1169, pp. 341-374, 1996.

Automated Logical Verification Based on Trace Abstractions (with M. Nielsen and K. Sunesen), *Proc. 15th Annual ACM Symposium on Principles of Distributed Computing*. ACM, 1996.

Algorithms for Guided Tree Automata. (with M. Biehl and T. Rauhe). *First International Workshop on Implementing Automata, WIA '96*, D. Raymond, D. Wood, and S. Yu (Eds.), LNCS 1260. Springer Verlag, 1996

Mona: Decidable Arithmetic in Practice (with M. Biehl and T. Rauhe) (short demo contribution). *FTSRTS '96. Proceedings of Formal Techniques in Real-Time and Fault-Tolerant Systems, 4th International Symposium*, LNCS 1135, 1996.

Formal Design Constraints (with J. Koistinen and M.I. Schwartzbach) *Proc. ACM SIGPLAN Conference On Object-Oriented Programming Systems, Languages and Applications '96*, 1996.

Determinizing Büchi Asynchronous Automata (with M. Mukund and M. Sohoni) *Foundations of Software Technology and Theoretical Computer Science*, (P.S. Thiagarajan (Ed.)), LNCS 1026, pp. 456-470, Springer-Verlag, 1995.

Mona: Monadic Second-Order Logic in Practice (with J.G. Henriksen, M.E. Jørgensen, J.L. Jensen, B. Paige, T. Rauhe, and A. Sandholm). *Tools and Algorithms for the Construction and Analysis of Systems, First International Workshop, TACAS '95*, LNCS 1019, 1996.

A Homomorphism Concept for ω -regularity. *Proc. Computer Science Logic '94* LNCS 933, 1995.

The Limit View of Infinite Computations. *Proc. CONCUR '94*, LNCS 836, 1994.

Graphs and Decidable Transductions Based on Edge Constraints (with M. Schwartzbach). *Proc. CAAP '94*, LNCS 787, 1994.

Determinizing Asynchronous Automata (with M. Mukund and M. Sohoni). *Proc. ICALP '94*, LNCS 820, 1994.

Graph Types (with M.I. Schwartzbach). In *Proc. Twentieth Symposium on Principles of Programming Languages*. ACM, 1993.

Progress Measures for Fair Termination. In *Proc. Eleventh Symp. on Principle of Distributed Computing*. ACM, 1992.

Progress Measures for Complementation of ω -Automata with Applications to Temporal Logic. In *Proc. 32nd Conf. on Foundations of Computer Science*. IEEE, 1991.

Liminf Progress Measures. In *Proc. Mathematical Foundations of Programming Semantics*. LNCS 598, 1991.

The Logic of Tensed Statements in English (with P. Øhrstrøm). In *Proc. Third IEEE Symposium on Logic Programming*. IEEE, 1986.

Book Chapters

XML: Model, Schemas, Types, Logics, and Queries (with Thomas Schwentick and Dan Suciu). In J. Chomicki, G. Saake and R. van der Meyden (eds.) *Logics for Emerging Applications of Databases*, Springer-Verlag, 2003, 1-41.

Technical Reports

ShortTalk: A proposal for improving dictation systems. *Web publication*, <http://www.research.att.com/~klarlund/ShortTalk/short.html>, 2002.

Input devices: a usage-driven approach. *Web publication*, www.clairgrove.com/input_devices, 2002.

MONA Version 1.4 User Manual (with A. Møller). *Web publication*, <http://www.brics.dk/mona/papers.html#Manual>; also, *BRICS Notes Series NS-01-1*, Department of Computer Science, University of Aarhus, 2001.

XPML: Industrial Case Study. *Web publication*, <http://www.research.att.com/projects/DSD/industrial-case.html>, 1999.

Document Structure Description 1.0 (with A. Møller). *Web publication*, <http://www.brics.dk/DSD/specification.html>, 1999.

Requirements for a markup language for HTTP-mediated interactive voice response services. *Web publication*, [http://www.research.att.com/~klarlund/external/from_my_server/articles/W3C-requirements-markup-language-](http://www.research.att.com/~klarlund/external/from_my_server/articles/W3C-requirements-markup-language-http-med-IVR.html)

[http-med-IVR.html](http://www.research.att.com/~klarlund/external/from_my_server/articles/W3C-requirements-markup-language-http-med-IVR.html) Peter Danielsen, Nils Klarlund, David Ladd, Peter Mataga, J. Christopher Ramming, and Kenneth Rehor. 1999

BDD algorithms and cache misse (with T. Rauhe). *BRICS Report Series RS-96-5*, 1996

Verification of Pointers (with M. Schwartzbach). Technical Report, PB-470, University of Aarhus, 1993.

Logic for Modeling and Verification. Lectures Notes for class in fundamental algorithms and data structures, Aarhus, 1994.

Time Representation and Use in Expert Systems. Technical report, DAIMI PB-211, University of Aarhus, 1986.

Formal Concepts for Specification and Automatic Testing of Ada Tasks. Technical Report. DDC International A/S, 1986.

Practical skills

C (author of the Mona BDD-library, which was six times faster than the then leading BDD package). Also, software for disambiguating input on reduced keyboards according to statistical language models.

LISP (author of the EmacsListen speech UI framework for GNU EMACS, approximately 10,000 lines).

HTML, XML, XSLT, CSS, Javascript, Bash (author of the Orion user interface, comprising a code browser and bug visualization).

OCAML (Orion project).

Python (generation of Web site from XML markup).

C++ and AspectC++ (automata algorithms, USB driver for input device, test driver for telephony switch software).

Ada, ML, Perl, Prolog (long time ago).

TurboCAD (for foot keyboard design).

Mechanical and electronic assembly of prototypes (keyboards, computers, etc.).

Patents

US06125376. Method and apparatus for voice interaction over a network using parameterized interaction definitions. 2000.

US05889510. Foot-operated device. 1999.

Six patents pending.

Committees

Program committees: CAV, FOCCAS, LICS, CIAA, FSTTCS, and various workshops. Reviewer for NSF. Member of various Ph.D. committees (worldwide). Member of the AT&T Labs Fellowship Program committee, 1998-2000 (ALFP provides grants to minority and women graduate students.) Technical lead for AT&T in VoiceXML forum, 1999–2000.

Honors	<p>Danish Research Council Postdoctoral Fellowship, 1991.</p> <p>SIAM Student Paper Competition, Honorable Mention, 1990.</p> <p>Alice & Richard Netter Scholarship of the Thanks to Scandinavia Foundation, 1989.</p> <p>IBM Fellowship, 1988 (declined).</p> <p>University of Aarhus, three-year research scholarship, 1986.</p>
Work Experience	<p><u>Member of Technical Staff (Visiting Scientist)</u>, Computing Sciences Research Center, Bell Labs, Lucent Technologies, NJ, 2003-present.</p> <p>Research in software verification: Orion (a static analyzer for C and C++), automatic test generation, XML and aspect oriented programming, regular language theory. Department head: Howard Trickey.</p> <p><u>Founder</u>, Clairgrove, LLC, NJ, 2004.</p> <p>Development of intellectual property in the area of user interfaces.</p> <p><u>Principal/Senior Technical Staff Member</u>, AT&T Bell Labs, now AT&T Labs – Research, NJ, 1995–2003</p> <p>Research in automata, verification, software engineering, and user interfaces. Worked under Michael Merritt (until 2002), then Mehryar Mohri.</p> <p><u>Researcher</u> BRICS Center, Department of Computer Science, University of Aarhus, Denmark, 1993–1995.</p> <p>Research in automata theory, concurrency, and programming logic.</p> <p><u>Postdoctoral Position</u> Department of Computer Science, University of Aarhus, Denmark, 1991–93.</p> <p>Research on infinite computations and on automata for traces of partially communicating events.</p> <p><u>Postdoctoral Position</u> IBM T.J. Watson Research Center, 1990–91.</p> <p>Research on automata for infinite objects.</p> <p><u>Programmer/Research Engineer</u> DDC-International, Copenhagen, 1983–86.</p> <p>Worked on testing, programming, tasking kernel design for Ada compiler.</p>
Teaching Experience	<p><u>Invited tutorial</u> Mona Tutorial–Automata-based Symbolic Computation. CONCUR '99, http://www.brics.dk/mona/teaching.html, 1999.</p> <p><u>Guest Lecturer</u> Taught one-semester course “Logic for Computer Scientists,” an advanced undergraduate/graduate course (1994), and taught parts of “Fundamental Models,” a sophomore theory course in computer science (1993 and 1994), University of Aarhus.</p>
References	<p>Six references are available upon request.</p>