

Resumé

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Employment

February 2014 – present. Computer Scientist in Two Sigma’s “Labs” group. I continue my research into *compiler generation* applications of higher-order term rewriting theory, and lead aspects of the development of Two Sigma’s advanced software.

September 2013 – present Adjunct Professor in Computer Science at New York University, where I teach the class in *compiler construction* every semester.

July 2000 – February 2014. Research Scientist at IBM Research (“Advisory” until 2002). I worked in *compiler generation* and techniques for *static and dynamic analysis and optimization* of data access and data processing using declarative techniques; all theoretical results have subsequently been applied in practice.

- Foundational and practical work on using *higher order rewriting* as the implementation language for compilers [28, 34, 33, 1, 11]. Applied to generating complete compilers for embedded systems directly from their formal rewrite specification; lead the development of the DataPower appliance compiler for XQuery, JSONiq, and JSON validation, using clean formal techniques (leading five engineers) based on formal specifications of these functional languages [39, 16, 21, 2].
- Develop XML Virtualization to meet the need of using XML processing for a wide variety of data sources [8, 15, 3].
- I designed and implemented core parts of an XSL Stylesheet Editor that allows editing the stylesheet by manipulating the formatted output [24, 25, 26, 27].

September 1997 – July 2000. Associate professor (“professeur associé”) in computer science at ENS-Lyon/LIP¹ funded by the French Ministry of Education. I worked in Pierre Lescanne’s “PLUME” formal methods research group on

- the basic paradigms of explicit substitutions [44, 43] and a new approach to merging explicit substitutions and memory models [46, 41, 40];
- higher-order rewriting for program transformation [17, 4]; an interesting spin-off is an extremely short partial evaluator for a subset of Haskell [47];

¹Laboratoire d’Informatique du Parallélisme; École Normale Supérieure de Lyon; 46, allée d’Italie; F-69364 Lyon 7 (France); <http://www.ens-lyon.fr/LIP>.

In addition I also taught graduate and undergraduate courses in functional programming, machine architecture, compilers, and semantics, and supervised student projects.

February 1997 – September 1997 (until May part time). Consultant (“konsulent”) in the Intranet group at CRI, Computer Resources International (Birkerød, Denmark).

June 1996 – May 1997. Post-doc (“forskningsadjunkt”) at BRICS (Aarhus, Denmark) with Peter Mosses,² funded by the Danish National Research Foundation.

March – May 1996. Post-doc contract with Pierre Lescanne³ of the EURECA group at INRIA Lorraine (Nancy, France). My research here centers around the synthesis of explicit substitution and abstract machines in close collaboration with Zino Benaissa⁴ [18].

January – April 1994. “Visiting fellow” invited to develop X_{ypic} [9, 31] with Ross Moore⁵ at Macquarie University (Sydney, Australia).

Education

February, 1996: Ph.D. Awarded Ph.D. degree at DIKU with the thesis “Operational Reduction Models for Functional Programming Languages” [22] supervised by Neil Jones⁶.

March 1992: M.Sc. Awarded Master of Science (“cand. scient”) degree from the Faculty of Natural Sciences at the University of Copenhagen. The thesis “Graph Operational Semantics” [23] awarded a “silver medal” by the University of Copenhagen.

Community

I regularly serve on program committees, latest PPDP 2013 and RTA 2013; next year I am the Program Chair for our dedicated Higher Order Rewriting meeting. I have been on three Ph.D. committees (Lionel Villard, Pierre Geneves, and Cynthia Kop). I of course frequently contribute as a referee of conferences and journals in (mostly theoretical) computer science.

Finally, I am a member of the Association for Computing Machinery since 2005, a Debian GNU/Linux Developer since 1993, a member of the IFIP working group 1.6 on Term Rewriting, and a member (former chair) of the Steering Committee of the FSCD conference.

Publications

Major Journals & Book Chapters

- [1] Kristoffer Rose, Roel Bloo, and Frédéric Lang. On explicit substitution with names. *J. Autom. Reasoning*, 49(2):275–300, 2012. doi:10.1007/s10817-011-9222-5

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- [2] Giorgio Ghelli, Kristoffer Rose, and Jérôme Siméon. Commutativity analysis for xml updates. *ACM Trans. Database Syst.*, 33:29:1–29:47, December 2008. doi:10.1145/1412331.1412341
- [3] K. H. Rose, S. Malaika, and R. J. Schloss. Virtual XML: A toolbox and use cases for the XML world view. *IBM Syst. Journ.*, 45(2):411–424, 2006. <http://www.research.ibm.com/journal/sj/452/rose.pdf>
- [4] Olivier Danvy, Morten Rhiger, and Kristoffer Rose. Normalization by evaluation with typed abstract syntax. *Journ. Funct. Progr.*, 11(6):673–680, November 2001. doi:10.1017/S0956796801004166
- [5] Eva Rose and Kristoffer Rose. Java access protection through typing. *Concur. and Comp.: Pract. and Experience*, 13:1125–1132, 2001. doi:10.1002/cpe.599
- [6] Kristoffer Høgsbro Rose. Graph-based operational semantics of a lazy functional language. In Plasmeijer, editor, *Term Graph Rewriting*, chapter 22, pages 303–316. Wiley, 1993.

Keynotes

- [7] Kristoffer H. Rose. Virtual XML and XQuery—rewriting XQueries for heterogenous data sources. Keynote presentation at PLAN-X 2008, January 2008.
- [8] Kristoffer H. Rose. The XML world view. Keynote presentation at DocEng 2004—Document Engineering, October 2004. <http://www.sdml.info/doceng2004/>
- [9] Kristoffer Høgsbro Rose. λ -pic and notation for categorical diagrams. Invited talk at ECCT '94—European Colloquium on Category Theory, July 1994.

Major International Conferences

- [10] Kristoffer Høgsbro Rose, Lionel Villard, and Naoto Sato. A data flow language for hybrid query and programming languages. In Tom Schrijvers and Peter Thiemann, editors, *Functional and Logic Programming - 11th International Symposium, FLOPS 2012, Kobe, Japan, May 23-25, 2012. Proceedings*, volume 7294 of *Lecture Notes in Computer Science*, pages 228–242. Springer, 2012. doi:10.1007/978-3-642-29822-6_19
- [11] Kristoffer H. Rose. CRSX – combinatory reduction systems with extensions. In Manfred Schmidt-Schauß, editor, *Proceedings of the 22nd International Conference on Rewriting Techniques and Applications (RTA 2011)*, volume 10 of *LIPICs*, pages 81–90, Novi Sad, Serbia, 2011. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik. doi:10.4230/LIPICs.RTA.2011.81
- [12] Giorgio Ghelli, Nicola Onose, Kristoffer Høgsbro Rose, and Jérôme Siméon. XML query optimization in the presence of side effects. In *SIGMOD Conference*, pages 339–352. ACM, 2008. doi:10.1145/1376616.1376653
- [13] Giorgio Ghelli, Nicola Onose, Kristoffer Høgsbro Rose, and Jérôme Siméon. A better semantics for XQuery with side-effects. In *Selected papers from DBPL 2007—International Symposium on Database Programming Languages*, volume 4797 of *Lecture Notes in Computer Science*, pages 81–96, Vienna, Austria, September 2007. Springer.

- [14] Giorgio Ghelli, Kristoffer Høgsbro Rose, and Jérôme Siméon. Commutativity analysis in XML update languages. In *ICDT 2007—11th International Conference on Database Theory*, pages 374–388, January 2007.
- [15] Kristoffer Rose and Lionel Villard. Phantom XML – if you look too hard, it isn’t there. In *XML 2005—Extensible Markup Language Conference*. IDEAlliance, November 2005.
- [16] Achille Fokoue, Kristoffer Rose, Jérôme Siméon, and Lionel Villard. Compiling XSLT 2.0 into XQuery 1.0. In *WWW 2005—World Wide Web Conference*, pages 682–691. ACM, 2005.
- [17] Olivier Danvy and Kristoffer Høgsbro Rose. Higher-order rewriting and partial evaluation. In *RTA ’98—Rewriting Techniques and Applications*, volume 1379 of *Lecture Notes in Computer Science*, pages 124–140, 1998. Extended version available as the technical report BRICS-RS-97-46.
- [18] Zine-El-Abidine Benaïssa, Pierre Lescanne, and Kristoffer Høgsbro Rose. Modeling sharing and recursion for weak reduction strategies using explicit substitution. In Herbert Kuchen and Doaitse Swierstra, editors, *PLILP ’96—Eighth International Symposium on Programming Languages: Implementation, Logics and Programs*, number 1140 in *Lecture Notes in Computer Science*, pages 393–407, Aachen, Germany, September 1996. Springer-Verlag.
- [19] Roel Bloo and Kristoffer Høgsbro Rose. Combinatory reduction systems with explicit substitution that preserve strong normalisation. In H. Ganzinger, editor, *RTA ’96—Rewriting Techniques and Applications*, number 1103 in *Lecture Notes in Computer Science*, pages 169–183, New Brunswick, New Jersey, July 1996. Rutgers University, Springer-Verlag.
- [20] Kristoffer Høgsbro Holm. Graph matching in operational semantics and typing. In A. Arnold, editor, *CAAP ’90—15th Colloquium on Trees and Algebra in Programming*, number 431 in *Lecture Notes in Computer Science*, pages 191–205, Copenhagen, Denmark, March 1990. Springer-Verlag.

Standards

- [21] Denise Draper, Peter Fankhauser, Mary Fernández, Ashok Malhotra, Kristoffer Rose, Michael Rys, Jérôme Siméon, and Philip Wadler. XQuery 1.0 and XPath 2.0 formal semantics. Recommendation, World Wide Web Consortium, November 2007. <http://www.w3.org/TR/2007/REC-xquery-semantics-20070123/>

Thesis

- [22] Kristoffer Høgsbro Rose. *Operational Reduction Models for Functional Programming Languages*. PhD thesis, DIKU, University of Copenhagen, Universitetsparken 1, DK-2100 København Ø, February 1996. DIKU report 96/1.
- [23] Kristoffer Høgsbro Rose. GOS—graph operational semantics. Speciale, DIKU (University of Copenhagen), Universitetsparken 1, DK-2100 København Ø, Denmark, March 1992. Awarded a silver medal by the University of Copenhagen.

Patents

- [24] Sharon C. Adler et al. Method and system for stylesheet-centric editing. US patent 7,191,395, 2008.
- [25] Adam R. Clarke et al. Method and system for stylesheet execution interactive feedback. US patent 7,337,391, 2008.
- [26] Kristoffer H. Rose. Method and system for copy and paste technology for stylesheet editing. US patent 7,992,088, 2011.
- [27] Sharon C. Adler et al. Method and system for stylesheet rule creation, combination, and removal. US patent 8,117,533, 2012.

Software

- [28] Kristoffer Rose. Combinatory reduction systems with extensions. SourceForge project *crsx.sourceforge.net*, October 2012. <http://crsx.sourceforge.net>
- [29] Kristoffer Høgsbro Rose et al. Virtual XML garden. IBM alphaWorks, November 2005. <http://www.alphaworks.ibm.com/tech/virtualxml>
- [30] Kristoffer Høgsbro Rose. Generating fast XML processors and applications. SourceForge, December 1999. <http://flexml.sourceforge.net/>
- [31] Kristoffer Høgsbro Rose and Ross R. Moore. *Xy-pic*, version 3. T_EX Users Group, June 1995. Includes User's Guide and Reference Manual. <http://tug.org/applications/Xy-pic/>

Selected Miscellaneous papers with some impact

- [32] Kristoffer Rose. Higher order rewriting for real programmers. In Makoto Hamana, editor, *6th International Workshop on Higher-Order Rewriting*, pages 17–22, Nagoya University, Japan, June 2012. <http://www.cs.gunma-u.ac.jp/events/hor/hor2012.pdf>
- [33] Kristoffer H. Rose. Higher-order rewriting for executable compiler specifications. In *International Workshop on Higher Order Rewriting*, volume 49 of *Electronic Proceedings in Theoretical Computer Science*, pages 31–45, 2010. doi:10.4204/EPTCS.49.3
- [34] Hanne Gottliebsen and Kristoffer H. Rose. Converting between combinatory reduction systems and big step semantics. In Jens Palsberg, editor, *Semantics and algebraic specification*, volume 5700 of *Lecture Notes in Computer Science*, pages 297–314. Springer, 2009.
- [35] Kristoffer H. Rose. CRSX – an open source platform for experimenting with higher order rewriting. Presented in absentia at HOR 2007—<http://kristoffer.rose.name/papers>, June 2007.
- [36] Kristoffer Høgsbro Rose. Mapping non-XML to XML with the data format description language (DFDL). Tutorial at XML 2005—Extensible Markup Language Conference, November 2005.

- [37] Pierre Genevès and Kristoffer Høgsbro Rose. Compiling XPath for streaming access policy. In *DocEng 2005—Document Engineering*. ACM SigWeb, 2005.
- [38] Kristoffer Høgsbro Rose. The data format description language (DFDL). Tutorial at Extreme Markup Conference, August 2005.
- [39] Pierre Genevès and Kristoffer Høgsbro Rose. Compiling XPath into a state-less forward-only subset. In *First International Workshop on High Performance XML Processing*. ACM SigPlan, 2004. <http://wam.inrialpes.fr/www-workshop2004/Program.html>
- [40] Frederic Lang, Dan Dougherty, Pierre Lescanne, and Kristoffer Rose. Addressed term rewriting systems. Technical Report RR 1999-30, ENS-Lyon/LIP, June 1999. <ftp://ftp.ens-lyon.fr/pub/LIP/Rapports/RR/RR1999/RR1999-30.ps.Z>
- [41] Daniel Dougherty, Frédéric Lang, Pierre Lescanne, Luigi Liquori, and Kristoffer Rose. A generic object-calculus based on addressed term rewrite systems. Technical Report RR 1999-54, LIP, ENS-Lyon, France, December 1999. <ftp://ftp.ens-lyon.fr/pub/LIP/Rapports/RR/RR1999/RR1999-54.ps.Z>
- [42] Eva Rose and Kristoffer Høgsbro Rose. Lightweight java bytecode checker in prolog. In T. Jensen, editor, *Réunion de l'action coopérative Java Card*, St. Malo, France, July 1999.
- [43] Kristoffer Høgsbro Rose. TWUB or why using variables is more efficient than first-order codings, July 1999. Invited talk for 2nd Workshop on Linear Abstract Machines, University of Birmingham, England.
- [44] Frédéric Lang and Kristoffer Høgsbro Rose. Two equivalent calculi of explicit substitution with confluence on meta-terms and preservation of strong normalization. In Fairouz Kamareddine, editor, *WESTAPP '98—Workshop on Explicit Substitutions*, Tsukuba, Japan, March 1998.
- [45] Eva Rose and Kristoffer Høgsbro Rose. Lightweight bytecode verification. In *FUJ '98—Formal Underpinnings of Java (OOPSLA Workshop)*, 1998.
- [46] Kristoffer Høgsbro Rose. Explicit substitution, abstract machines, and memory. Invited talk for Workshop on Linear Abstract Machines, August 1998.
- [47] Kristoffer Høgsbro Rose. Type-directed partial evaluation in haskell. Presented at the Normalisation by Evaluation '98 workshop, Göteborg, Sweden, June 1998.
- [48] Kristoffer Høgsbro Rose. Explicit substitution – tutorial & survey. Lecture Series LS-96-3, BRICS, Dept. of Computer Science, University of Aarhus, Ny Munkegade (bld.540), 8000 Aarhus C, Denmark, September 1996. <ftp://ftp.brics.dk/LS/96/3/>
- [49] Roel Bloo and Kristoffer Høgsbro Rose. Preservation of strong normalisation in named lambda calculi with explicit substitution and garbage collection. In *CSN '95—Computing Science in the Netherlands*, pages 62–72, Koninklijke Jaarbeurs, Utrecht, November 1995. <ftp://ftp.diku.dk/diku/semantics/papers/D-246.ps>
- [50] Kristoffer Høgsbro Rose. Combinatory reduction systems with explicit substitution. In B. Möller, editor, *HOA '95—Second International Workshop on Higher-Order Algebra, Logic*

and Term Rewriting. Universität-GH Paderborn, September 1995. <ftp://ftp.diku.dk/diku/semantics/papers/D-247.ps>

- [51] Kristoffer Høgsbro Rose. How to typeset pretty diagram arrows with \TeX —design decisions used in \Xypic . In Jiří Zlatuška, editor, *Euro \TeX '92—Proceedings of the 7th European \TeX Conference*, pages 183–190, Prague, Czechoslovakia, September 1992. Czechoslovak \TeX Users Group.
- [52] Kristoffer Høgsbro Rose. Explicit cyclic substitutions. In M. Rusinowitch and J.-L. Rémy, editors, *CTRS '92—3rd International Workshop on Conditional Term Rewriting Systems*, number 656 in *Lecture Notes in Computer Science*, pages 36–50, Pont-a-Mousson, France, July 1992. Springer-Verlag.
- [53] Tine Ditmar Andersen and Kristoffer Høgsbro Holm. *WordPerfect som værktøj*. Borgen/Data. Borgen, Copenhagen, Denmark, 1987. (182pp).