Paul Tarau

Contact information:

Paul Tarau, Ph.D., Professor
Dept. of Computer Science and Engineering, University of North Texas
P.O. Box 311366, Denton, Texas 76203, USA
Phone: +1 (940) 565-2806 and +1 (940) 565-2767 (office)
Fax: +1 (940) 565-2799
E-mail: first_name.last_name@unt.edu
WWW: http://www.cse.unt.edu/~tarau

Education:

- Ph.D. - Computer Science 1990 - Université de Montreal

- M.Sc. - Computer Science 1986 - Université Laval (Quebec)

- B.Sc. - Mathematics 1975 - University of Bucharest

Citizenship

USA+Canada

Positions held:

- Tenured Full Professor at Univ. of North Texas, from Sept 2013

- Tenured Associate Professor at Univ. of North Texas, from Sept 2000

- Tenure Track Associate Professor at Univ. of North Texas, Sept 1998-Aug 2000

- Tenure Track Associate Professor at Louisiana Tech University, from Dec 1997- to Aug 1998

- Tenured Associate Professor 1994-1997 at Univ. of Moncton

- Tenured Assistant Professor 1989-1994 at Univ. of Moncton

- Tenure track teaching position at University of Moncton since 1986-1989

Research

Research Philosophy

I have explored of a fairly wide spectrum of Computer Science research fields. Synergies between them are found and exploited when solving problems in a new field and they have turned out to be useful also when revisiting a familiar one. The following are some of the research fields where my work has resulted in more than **8000** citations, an overall h-index of **26** and a number of high impact publications :

- natural language processing

- logic programming and deep learning

- computational mathematics

- program transformations and implementation of logic programming languages

- agent infrastructures, mobile code, distributed programming models, NLP-enabled knowledge-based chat agents

- compiler writing, runtime systems, memory management

While aware of the status of being a "visitor", a large majority of my research papers are attempts to "paradigm shifting" rather than "paradigm consolidation" - i.e. they are typically high-risk/high reward exploratory research work. For instance, the highest ranked paper that I have co-authored is [1], currently (Jul. 2022) at more than **5000** citations. It has started a fast growing new research field - Graph based Methods for Natural Language Processing with a few thousand papers and a series of 8 "TextGraphs" workshops on the subject.

Sometime my research interest is a sharp departure from everything I have worked previously. For instance, most of my papers published between 2009 and 2013 are focussed on modeling foundational aspects of finite mathematics driven by an effort to provide a unified theory of fundamental data types through executable shared axiomatizations and bijective data transformations. While sometime my research focus is theoretical in nature, I am a strong believer in fully replicable research. Literate programming – a complete executable specification of the concepts discussed – is a distinctive feature of these 17 papers allowing readers to easily test their technical correctness and reuse their content. Two recent NSF grants and the acceptance of the 20+ papers at competitive international conferences seem to validate this entirely new research direction.

Currently Active Research Threads

- Graph-based Natural Language Processing and Deep learning

- Declarative Modeling of Finite Mathematics (Computations with Trees, Hereditarily Finite Sets and Functions, Bijective Data Type Transformations, Efficient Gödel numberings, Ranking/Unranking functions, Self-delimiting codes)

- Design and Implementation of Declarative Programming Languages

- Scala, Java and Prolog based Agent Infrastructures

- Compilers, Run-time Systems and Automatic Memory Management

- Exact Circuit Synthesis Algorithms

Publications

- **Refereed Journal papers:** [2] [3] [4] [5] [6] [7] [8, 9] [10, 11] [12] [13, 14, 15] [16, 17] [18, 19, 20, 21]

- **Refereed International Conferences and Workshops:**

  2022 [22, 23, 24] **2021** [25, 26, 27] **2020** [28, 29] **2019** [30, 31, 32] **2018** [33, 34, 35, 36] **2017** [37, 38, 39, 40]

  2016 [41, 42, 43, 44, 45, 46] **2015:** [47, 48, 49, 50, 51, 52] **2014:** [53, 54, 55, 56, 57, 58, 59, 60] **2013:** [61, 62, 63] **2012:** [64, 65, 66, 67, 68] **2011:** [69, 70, 71, 72, 73, 74, 75, 76] **2010:** [77, 78, 79, 80, 81, 82] **2009:** [83, 83, 84, 85, 86, 87], **2008:** [88, 89, 90, 91, 92, 93] **2007 and before:** [94, 95], [96, 97, 98, 99, 100] [101, 102, 103, 104, 105, 106, 1, 107, 108, 109] [110, 111, 112, 113, 114] [115] [116], [117, 118, 119, 120, 121, 122] [123, 124, 125, 126, 127] [128, 129, 130, 131, 132] [133, 134, 135, 136, 137, 138, 139, 140, 141] [142, 143, 144, 145, 146] [147, 148, 149, 150, 151, 152, 153, 154, 155, 156] [157, 158, 159, 160, 161, 162, 163] [164] [165, 166, 167, 168, 169, 170] [171] [172, 173, 174] [175] [176]

- Refereed National Conferences and Workshops: [177, 178, 179]

- Other refereed publications: [130, 180, 181, 182, 183, 184, 185]

- PhD Thesis: [186]

- Invited talks: SYNASC'2012 invited talk [187], INAP'96 Keynote Speech: [188] ILPS'97 Advanced Tutorial: [189], WWW6 LP'97 [190], JICSLP'98 Implementation of (C)LP Languages Workshop T[191] JELIA'98 Invited Talk [192] AGP'99 Invited Talk

- Other publications: [193, 194, 195, 196, 197][198, 199, 200, 201, 202, 203, 204, 205] [206, 207, 208, 209, 210, 211, 212] [213, 190, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229]

- Proceedings Edited [230, 231, 232, 233, 234, 235]

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[2] Paul Tarau. Abductive Reasoning in Intuitionistic Propositional Logic via Theorem Synthesis. *Theory and Practice of Logic Programming*, 22(5):693–707, 2022.

[3] Paul Tarau and Eduardo Blanco. Interactive Text Graph Mining with a Prolog-Based Dialog Engine. *Theory Pract. Log. Program.*, 21(2):244–263, 2021.

[4] Paul Tarau. Deriving Efficient Sequential and Parallel Generators for Closed Simply-Typed Lambda Terms and Normal Forms. *Fundam. Informaticae*, 177(3-4):385–415, 2020.

[5] Maciej Bendkowski, Katarzyna Grygiel, and Paul Tarau. Random generation of closed simply typed λ-terms: A synergy between logic programming and Boltzmann samplers. *TPLP*, 18(1):97–119, 2018.

[6] P. Tarau. Arithmetic and boolean operations on recursively run-length compressed natural numbers. *Scientific Annals of Computer Science*, 24(2):287–323, 2014.

[7] Paul Tarau. Towards a generic view of primality through multiset decompositions of natural numbers. *Theoretical Computer Science*, 537(0):105 – 124, 2014. Theoretical Aspects of Computing (ICTAC 2011).

[8] Paul Tarau. Compact Serialization of Prolog Terms (with Catalan Skeletons, Cantor Tupling and Gödel Numberings) . *Theory and Practice of Logic Programming*, 13(4-5):847–861, 2013.

[9] David Haraburda and Paul Tarau. Binary trees as a computational framework. *Computer Languages, Systems & Structures*, 39(4):163 – 181, 2013.

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[12] Paul Tarau and Veronica Dahl. High-Level Networking with Mobile Code and First Order AND-Continuations. *Theory and Practice of Logic Programming*, 1(3):359–380, May 2001. Cambridge University Press.

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[17] Veronica Dahl and Paul Tarau. From Assumptions to Meaning. *Canadian Artificial Intelligence*, (42), April 1998.

[18] P. Tarau, K. De Bosschere, and Bart Demoen. On Delphi Lemmas And other Memoing Techniques For Deterministic Logic Programs. *Journal of Logic Programming*, 30(2):145–163, February 1997.

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[230] K. Sagonas and P. Tarau, editors. *Proceedings of IDL'99*, Paris, France, September 1999.

[231] P. Van Roy and P. Tarau, editors. *Proceedings of DIPLCL'99*, Las Cruces, NM, November 1999.

[232] Paul Tarau, Koen De Bosschere, and Manuel Hermenegildo, editors. *Proceedings of the 2nd International Workshop on Logic Programming Tools for INTERNET Applications*, ICLP'97, Leuven, July 1997.

[233] Paul Tarau, Andrew Davison, Koen De Bosschere, and Manuel Hermenegildo, editors. *Proceedings of the 1st Workshop on Logic Programming Tools for INTERNET Applications*, JICSLP'96, Bonn, September 1996.

[234] K. De Bosschere, B. Demoen, and P. Tarau, editors. *Proceedings of the ILPS'94 Post-Conference workshop on Implementation Techniques for Logic Programming Languages*, Ithaca, NY, November 1994.

[235] K. De Bosschere, J.M. Jacquet, and P. Tarau, editors. *Proceedings of the ICLP'93 Post-Conference Workshop on Blackboard-Based Logic Programming*, Budapest, Hungary, June 1993.

Patents

- **US Patent No. 7,809,548** *Graph-based Ranking Algorithm for Text Processing* (with Dr. Rada Mihalcea and University of North Texas)

Research Publication Impact

Here are, as shown in July 2022, **8000** total citations from the Google Scholar database) the impact indicators of my past research papers (a total of **181** peer-reviewed publications).

- **h-index 26**

- **i10-index** 77

Research Grants

- **SHF:Small:Arithmetic Algorithms and Applications of Hereditarily Binary Numbers, NSF Research Grant 1423324 2014-2017**
  (http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1423324) $253,161 , **PI**

- **A Framework for Bijective Data Transformations, NSF Research Grant 1018172 2010-2013**
  (http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1018172) $97,500 , **PI**

- **Graph Algorithms for Text Disambiguation, Summarization and Entailment, with Dr. Rada Mihalcea, 2006-2007 Texas ARP Grant, $99,000 co-PI**

- Prolog based Internet Data-mining: NovuWeb Inc. Research Grant, 2000, $7,500/1 year

- UNT Research Grant (with Dr. A. Mikler) 2000 - $3,500/1 year

- Radiance Group Research Grant 1998 (at Louisiana Tech, US), $7000/1 year

- NSERC RESEARCH GRANT 1998-2002 (Canada) CA$72,000/4 years - discontinued due to move to US -

- NSERC RESEARCH GRANT 1994-1998 (Canada) CA$50,000/4 years

- NSERC EQUIPMENT GRANT 1992-1993 (Canada)

- NSERC OPERATING GRANT 1991-1994 (Canada)

- BC Innovative Funds Proposal "Computing Science Teaching and Training Using WWW" with Dr. Veronica Dahl and Dr. Jiawei Han from SFU: 1995-1996

- CLTI Moncton: 1996-1997 - CA$30,000 with Dr. Veronica Dahl from Simon Fraser University, CLTI + APECA with industrial partner E-COM

- Univ. Moncton FESR GRANT GRANT 1991-1994,1994-1997,1998-2000 (Canada) - discontinued due to move to US -

- KU Leuven visiting researcher grant: 1994 (Canada)

- IRISA+Univ. de Rennes visiting researcher grant: 1994

Invited talks:

- Invited Talk at PADL'2018,SYNASC'2012, `http://synasc12.info.uvt.ro/invited-speakers/paul-tarau-1`

- Invited Talk at IICS'2001, Germany (Innovative Internet Computing Systems)

- Invited Talk at 2000 International Summer School in Computational Logic Acquafredda di Maratea (Basilicata, Italy) September 3-8, 2000

- Invited Talk at AGP'99, Italy (international conference in the field of Logic Programming)

- Invited Tutorial at Logic Programming Summer School'99, Univ. of New Mexico

- Keynote Speech at INAP'96, Japan

- Invited Tutorial at ILPS'97, USA

- Invited Talk at JICLSP'98, Implementation of LP Workshop, UK

- Invited Talk at JELIA'98, Germany

- Invited conferences at MITRE Corporation (1999), Oregon Graduate Institute (1999), Simon Fraser University (1998)

Recent Conference Presentations

In the last 5 years I was *the presenter* of the following **26 papers**:

- **2012:** [64]

- **2011:** [73, 71, 70, 69, 74, 75, 76]

- **2010:** [77],[78],[79],[80],[81],[82]

- **in 2009:** [83], [84], [86], [85], [87]

- **in 2008:** [89] [88], [90], [91, 92, 93]

- **in 2007:** [94]

Teaching

Teaching philosophy

I value independent, creative thinking, and the ability to apply learnings to new situations. My teaching emphasizes *operational knowledge*: the ability to *do* things, to solve problems, by combining rigorous logic with induction and experiment. I tend to evaluate students in a way that strongly discourages recitation of passively memorized or superficially understood concepts.

While making sure that all students understand fundamental concepts and learn the most important practical skills, I put special emphasis on letting exceptional students fly as high as they can.

One of the main dangers in rapidly evolving domains, like computer science, is fast depreciation of knowledge. I tend to fight this by adapting my courses to cover key technological changes.

Finally, I think about teaching and research as activities which interoperate and stimulate each other.

Graduate Supervision:

Recent Graduate Supervision:

- **3 PhD** students : David Haraburda (co-authored one joint paper he presented at SAC'12, NSF supported), Fahmida Hamid (supported by the department and NSF grant, graduated) and Karen Mazidi (graduaated)

- **3 MSc** thesis students (graduated)

  - 1 Msc thesis student graduated (2011): David Haraburda
  - 1 MSc thesis student graduated (2010): Bharat Dandala
  - 1 MSc thesis student graduated (2009): Chris Gaconnet

- member of **17 PhD** thesis committees: Kino Coursey graduated 2009, Samer Hassan (graduated 2011), Hakan Ceylan (graduated 2011), Cameron Palmer, Dhanyu Amarasinghe, Ravi Sinha, Michael Mohler (graduated 2012), Geng Zheng, Jorge Reyes-Silveyra, Carmen Banea, Chee Wee Leong, Tomislav Janjusic, Oleg Garitselov (graduated 2012), Oleg Kolgushev, Thiraphat Meesumrarn, Abdullah Saudagar, Himanshu Dutta)

- member of **2 MSc** thesis committees (Brett Thompson, 2009 and Christian Loza, 2009)

- individual work with several PhD and MSc students (directed study, projects)

Other Graduate Supervision Since Joining UNT:

I have supervised the following students graduating with MSc. thesis with whom I co-authored papers in peer-reviewed conferences and workshops:

- David Haraburda

- Devender Gollapally

- Anima Gupta

- David Hurt

- Satyam Tyagi

- Qinan Zhou

as well as the following MSc. thesis students: V.G. Balamuru, P. Gupta, S. Kandaswamy, K. Valveti, G. Sun.

A *post-doctoral visitor* of mine at UNT, A. J. Garcia, is now professor at Universidad Nacional del Sur, Argentina.

Courses taught recently

Codes higher that 5000 indicate graduate courses.

- Fall 2017: CSCE 5430 Software Engineering

- Spring 2017: CSCE 5450 Programming Languages

- Fall 2016: CSCE 4430 Programming Languages CSCE 5400 Automata Theory

- Spring 2015: CSCE 3030 Parallel Programming CSCE 4430 Programming Languages

- Fall 2014. CSCE 5160 Parallel Processing and Algorithms CSCE 5450 Programming Languages

- Spring 2014: CSCE 2100 Computing Foundations I CSCE 5450 Programming Languages

- Fall 2013: CSCE 5290/4930 Natural Language Processing, CSCE 5150-2 Analysis of Algorithms, CSCE 6933 Logic and Knowledge Processing in Computer Science

- Spring 2013 CSCE 4430 Programming Languages CSCE 4444 Software Engineering

- Maymester 2012: CSCE 4930/CSCE 5933 Advanced Object Oriented and Functional Programming in Scala

- Spring 2012: CSCE 4430 Programming Languages, CSCE 5430 Topics in Software Engineering

- Fall 2011 CSCE 5420: Software Development CSCE 6933 Topics in Computational Mathematics

- Spring 2011 CSCE 5170: Graph Theory CSCE 4430: Programming Languages

- Fall 2010 CSCE 6933: Topics in Computational Mathematics CSCE CSCE 5450: Programming Languages

- Spring 2010 CSCE 3600: Principles of System Programming CSCE 5430: Topics in Software Engineering

- Fall 2009 CSCE 4430/5450: Programming Languages CSCE 5420: Software Development

- Spring 2009 CSCE 4430/5450: Programming Languages CSCE 5430: Topics in Software Engineering

- Fall 2008 CSCE 4430/5450: Programming Languages CSCE 5420: Software Development

- Spring 2008 CSCE 4430/5450: Programming Languages CSCE 5430: Topics in Software Engineering

- Fall 2007: CSCE 4430/5450: Programming Languages CSCE 5420: Software Development

- Spring 2006: CSCE 5210: Artificial Intelligence CSCE 5450: Programming Languages

- Fall 2005: CSCE 5450: Programming Languages CSCE 4430: Programming Languages

- Spring 2005: CSCI 5410: Artificial Intelligence CSCI 4300: Survey of Computer Languages

- Fall 2004: CSCI 4410: Introduction to Artificial Intelligence CSCI 4250: Survey of Computer Languages

- Spring 2004: CSCI 5410: - Artificial Intelligence CSCI 3400: - Data Structures

- Fall 2003: CSCI 6330: Advanced Topics in Software Agents CSCI 4250: Survey of Computer Languages

- Spring 2003: CSCI 5250: - Programming Languages CSCI 5540: - Operating Systems

- Fall 2002: CSCI 4250 Survey of Computer Languages, CSCI 5250 Programming Languages,

- Spring 2002: CSCI 5530 Topics in Software Engineering CSCI 5550 Compiler Design

- Fall 2001: CSCI 4250 Survey of Computer Languages, CSCI 5250 Programming Languages,

- Spring 2001: CSCI 5530 Topics in Software Engineering CSCI 5550 Compiler Design

- Fall 2000: CSCI 4250 Survey of Computer Languages, CSCI 5250 Programming Languages,

- Spring 2000: CSCI 5530 Topics in Software Engineering CSCI 6330 Advanced Internet Programming

- Fall 1999: CSCI 4250 Survey of Computer Languages, CSCI 5250 Programming Languages

- Spring 1999: CSCI 5530 Topics in Software Engineering, CSCI 6330 Intelligent Mobile Agents

- Fall 1998: CSCI 4250 Survey of Computer Languages, CSCI 5250 Programming Languages.

Partly due to my divers research interests accumulated over the years, I am able to cover the topics of about 80-90 percent of undergraduate and graduate courses and ready to teach any of them on a few days notice.

Service

Recent Program Committees and Grant Panels:

- ICLP'2018 program co-chair

- ICLP?2017, PADL?2018, PADL?2017, PADL?2016, LATA?15, ICLP?2014,TextGraphs?13, LOP-STR?13, ACM SAC?13

- CICLOPS'12, GPCE'12, TextGraphs-7, FLOPS'2012, ACM SAC'12/CM, PPDP'11, DSL'11, CICLOPS'11

- CICLOPS'09, SAC'08, ICLP'07, CICLOPS'07, SAC'06, ICLP'04, PADL'04, CICLOPS'04, INAP'04, SONA'04, PADL'03, ICLP'07

- PADL'02, PPDP'2000, CL2000, PADL'2000, JFPLC'2000, ESAW'2000

- COCL'99, MAS'99, IDL'99, DIPLCLP'99, PADL'2000, JFPLC'2000

- JICSLP'98, JFPL'98, ICLP'1997, IWLPTIA'1997

- JICSLP'1996, ICLP'1995, LOPSTR'1995, JFPL'96

- 2003 NSF Panelist

- 1998-2001: serving a 3-year term on the Canadian NSERC Computer Science grant committee

Journal Refereeing

- Theory and Practice of Logic Programming,

- Journal of Logic Programming,

- Journal of LISP and Symbolic Computation,

- Journal of Computer Languages,

- TOPLAS

- Journal of Computer Mathematics

- Journal of Experimental and Theoretical Artificial Intelligence

Workshops (co)-organized

- CICLOPS'09 (Pasadena, CA)

- IDL'99 (Paris)

- DIPLCPL'99 (Las Cruces, NM)

- ICLP'97 Leuven: Second International Workshop on Logic Programming Tools for Internet Applications,

- CP'97 Workshop on Constraint Reasoning on the Internet

- JICSLP'96 Bonn: First Workshop on Logic Programming Tools for Internet Applications

- ILPS'95 Ithaca: Implementation of Logic Programming Languages Workshop

- ICLP'94 Budapest: Blackboard Based Logic Programming Workshop

University of North Texas Committee Service

- CENG Faculty Council chair 2009-2011

- CSE Personnel Affairs Committee - co-chair in 2008-2009

- CS Undergraduate Committee

- CS Graduate Committee

- CS Library Contact

- CS Chair Search Committee

- CS Search Committee

Other Professional Service

As an example of professional service to a neighboring University, I am currently serving on the Computer Science Advisory Board at UT Dallas.

Professional Organizations

ACM, Association of Logic Programming

Other experience and skills

Software development

Please follow links from `http://www.cs.unt.edu/~tarau` for current versions.

- Styla – an open source Prolog interpreter supporting Actor programming in Scala and Akka, available from `http://code.google.com/p/styla/`

- Jinni – a high performance Java based Prolog compiler 1997-2004

- BinProlog – a Multi-Threaded Prolog Compiler 1990-2006
  (about 50 000 lines of Prolog and C-code)

- WordNet Prolog based Voice-Enabled Conversational Agent

- PocketJinni Prolog system for Java-enabled PDAs and Wireless Phones

- Kernel Prolog: Lightweight Prolog Interpreter and Compiler developed in an Object Oriented Style, available from `http://code.google.com/p/kernel-prolog/`

- The jProlog experimental Prolog-to-Java translator (joint work with Bart Demoen from K.U. of Leuven, Belgium)

Programming Languages

- Procedural and Object Oriented: Python, Java, Swift, Julia, Scala, C, `C#`,C++, Ruby, Objective-C

- Logic and Relational: Prolog, Mercury, OWL, RDF, SQL

- Functional: Haskell, Coq, ML, Scheme, Lisp, Miranda

- Scripting: OS X, Linux and Windows shell programming, Tcl/Tk

- Legacy: Pascal, Fortran, Cobol, Basic, APL

- Internet: XML, HTML, VRML, JavaScript

Operating environments:

- Expert knowledge of UNIX (OS X and Linux) and Windows administration, networking, LANs, WANs

- Extensive knowledge of Unix and Windows software and hardware, communications, networking, socket programming etc.

- Practical knowledge of Android development with Eclipse and iPhone/iPad apps with Xcode

Natural Languages:

- fluently speaking: English, French, Hungarian, Romanian

- reading ability in: German, Italian, Spanish