

Declarative Languages and Artificial Intelligence
Research Group
Department of Computer Science
KU Leuven
Celestijnenlaan 200A
3001 Heverlee, Belgium

Phone: +32 497 66 34 67
Email: bartbogaerts@gmail.com

Nationality: Belgian
Date of birth: February 6, 1989
Marital status: married



1. Education

- **2011 – 2015.** PhD in Computer Science, KU Leuven, Belgium. Thesis: “Groundedness in logics with a fixpoint semantics”. Advisers: Prof. Dr. Marc Denecker, Prof. Dr. Joost Vennekens, Prof. Dr. Jan Van den Bussche (UHasselt). Joint degree: doctor in engineering: computer science (KU Leuven) and doctor in science: informatics (UHasselt).
Summa Cum Laude with the **congratulations of the examination board** (Only awarded in exceptional circumstances, at most 5% of the doctorates in engineering at KU Leuven).
- **2009 – 2011.** Master of Science in Mathematics, KU Leuven, Belgium (with Honours: **Summa Cum Laude**). Thesis “Unique factorisation in regular local rings”, supervised by Dr. Jan Schepers.
- **2006 – 2009.** Bachelor of Science in Mathematics, KU Leuven, Belgium (with Honours: **Summa Cum Laude**).

2. Employment

- **October 2016 – present.** Postdoctoral Fellow of the Research Foundation – Flanders (FWO) at Department of Computer Science, KU Leuven, Belgium. Supervisor: Prof. Dr. Marc Denecker.
- **September 2015 – August 2016.** Postdoctoral Researcher, Department of Computer Science, Aalto University, Finland. Supervisor: Dr. Tomi Janhunen.
- **June 2015 – August 2015.** Postdoctoral Researcher, Department of Computer Science, KU Leuven, Belgium. Supervisor: Prof. Dr. Marc Denecker.
- **September 2009 – September 2011.** Tutor in mathematics, physics and informatics, Self-employed as secondary activity.

3. Research Interests

- Artificial intelligence, in particular knowledge representation
- Mathematical foundations of declarative programming
- Logics: (extensions of) classical logic, causal logics, temporal logics
- (Abstract) unifying frameworks for knowledge representation languages: approximation fixpoint theory, justification frameworks
- Solving technology: SAT solving, pseudo-boolean solving, constraint programming, answer set programming, logic programming, (mixed) integer programming; methodologies to integrate them

4. Awards and Prizes

- 2016 QBFEval: Prenex CNF: Second place
- 2016 SAT Competition: No Limits: First place
- 2013 SAT Competition: Core Solvers, Sequential, Hard-combinatorial SAT+UNSAT: First place
- 2013 SAT Competition: Core Solvers, Sequential, Hard-combinatorial SAT: Third place

5. Skills

Languages

- Dutch: mother tongue
- English: very good
- French: intermediate

Programming Languages

- C++: good; daily used
- Experienced in many other languages including Java, C#, PHP, Python, Prolog and Haskell; always willing to learn new languages.

Various qualifications

- Animator in youth work
- Head animator in youth work
- Initiator downhill skiing

6. Professional Activities

Invited Talks

- Symmetry Exploitation for Combinatorial Problems, invited talk at KTH Royal Institute of Technology, November 6, 2017, Stockholm.
- Research highlight on SAT-to-SAT and symmetry exploitation, COIN SAB meeting, October 16, 2017, Espoo.
- Propagators and Solvers for the Algebra of Modular Systems, invited talk at International Workshop on Logic and Search (Lash 2016), October 17, 2016, New York City.
- Symmetry in SAT/ASP/CSP: Breaking the Right Symmetries, invited talk at Computational Logic Day 2015 (CL 2015), December 8, 2015, Espoo.
- Lazy Model Expansion: Interleaving Grounding with Search, invited talk at International Workshop on Logic and Search (Lash 2014), July 18, 2014, Vienna.

Summer/Winter School

- **February 2012** Vienna Winter School on Verification.

Research Visits

- **November 2017** Prof. Dr. Jakob Nordström, KTH Royal Institute of Technology, Stockholm, Sweden. Goal: exchange ideas on symmetry in SAT, and techniques for pseudo-Boolean solving.
- **October 2017** Dr. Tomi Janhunen, Aalto University, Espoo, Finland. Goal: COIN-SAB presentation and collaboration on QBF solving with SAT-to-SAT and on lazy grounding in ASP.
- **January 2016** Prof. Dr. Eugenia Ternovska, Simon Fraser University, Vancouver, Canada. Goal: collaboration on extending the algebra of modular systems to modular solvers and propagators.
- **May 2013** Prof. Dr. Torsten Schaub, University of Potsdam, Potsdam, Germany. Goal: exchange of research ideas with respect to answer set solver development.

Editor

- Guest editor of special issue S687 on answer set programming and other computing paradigms of *Annals of Mathematics and Artificial Intelligence (AMAI)* (to appear)

Organisation of Conferences/Workshops

- **ASPOCP 2017**: Program Chair (*Tenth Workshop on Answer Set Programming and Other Computing Paradigms*)
- **ASPOCP 2016**: Program Chair (*Ninth Workshop on Answer Set Programming and Other Computing Paradigms*)

Service on Program Committees

- Conferences: IJCAI 2015, LPNMR 2015, AAAI 2016, IJCAI 2016, PADL 2017, AAAI 2017, LPNMR 2017, IJCAI 2017, AAAI 2018, IJCAI-ECAI 2018, KR 2018, LPNMR 2019
- Workshops: IULP 2015, TAASP 2016, GTTV 2017, PAoASP 2017, POS 2018, ASPOCP 2018, LaSh 2018

Refereeing

- Journals: Theory and Practice of Logic Programming, Annals of Mathematics and Artificial Intelligence, Mathematical Structures in Computer Science
- Conferences: LPNMR 2013, ICLP 2013, JELIA 2014, ICLP 2014, KR 2014, AAAI 2015, KR 2016, JELIA 2016
- Workshops: INAP/WLP 2011, NMR 2014

7. Teaching

Lecturer

- **2016 – now**. *Gegevensbanken (Databases)* (Bachelor's course; 6 ECTS credits; ±160 students).
- **2015 – 2016**. *Discrete Models and Search* (Master's course; 5 ECTS credits; ±30 students).

Teaching Assistant

- **2016 – now.** *Advanced Programming Languages for Artificial Intelligence* (Master’s course). My responsibilities involved creating and grading take-home projects.
- **2016 – 2017.** *Modelling of Complex Systems* (Master’s course). My responsibilities involved creating and grading take-home projects, and occasionally lecturing the course.
- **2011 – 2015.** *Modelling of Complex Systems* (Master’s course). My responsibilities involved teaching the exercise sessions, creating and grading take-home projects, and occasionally lecturing the course.

Supervision of PhD Students

- *Simon Marynissen (cosupervisor)*, ongoing

Supervision of Master Theses

- *Evert Cuylen*, ongoing
- *Jens Claes*: Natural Language processing for Knowledge Representation
- *Neline Van Ginkel*: Oracles in IDP: An implementation for epistemic logic
- *Geert Heyman*: Event Extraction from Text and Translation to Event Calculus
- *Pieter Van Hertum*: Using Presburger Arithmetic to simplify FOBDDs
- *Andries Verreydt*: Dimensions and Units in IDP

8. (Co-)authored Software

- *IDP3* A knowledge-base system for first-order logic that supports various forms of inference to enable declarative problem solving.
- *MinisatID* An extension of the popular SAT-solver Minisat with inductive definitions, aggregates and integer variables.
- *BreakID* A symmetry breaking tool for SAT and ASP.
- *so2grounder* A tool to translate second-order logic theories into specifications for the solver SAT-to-SAT.
- *SmsControl* A Windows phone 8/Windows 10 mobile app to control text-controlled devices.

9. References

- Marc Denecker, *KU Leuven*, Professor, head of the *Knowledge Representation and Reasoning* group
marc.denecker@cs.kuleuven.be
+32 16 32 75 57
- Jan Van den Bussche, *Universiteit Hasselt*, Professor, *Databases & Theoretical Computer Science*
jan.vandenbussche@uhasselt.be
+32 11 26 82 26
- Tomi Janhunen, *Aalto University*, co-leader of the *Computational Logic* group
tomi.janhunen@aalto.fi
+358 50 430 0820
- Thomas Eiter, *Vienna University of Technology*, Professor, head of the *Knowledge Based Systems Group* and of the *Institute of Information Systems*

eiter@kr.tuwien.ac.at
+43 1 58 801 18460

10. Publications

Journal Articles

- [J11] **A Logical Study of Some Common Principles of Inductive Definition** *M. Denecker, B. Bogaerts and J. Vennekens*, (Under Review).
- [J10] **Safe Inductions and Their Applications in Knowledge Representation** *B. Bogaerts, M. Denecker and J. Vennekens*, Artificial Intelligence Volume 259, p. 167-185, 2018.
Impact factor (2016): 4.797
- [J9] **Fixpoint Semantics for Active Integrity Constraints** *B. Bogaerts and L. Cruz-Filipe*, Artificial Intelligence Volume 255, p. 43-70, 2018.
Impact factor (2016): 4.797
- [J8] **On Well-Founded Set-Inductions and Locally Monotone Operators** *B. Bogaerts, J. Vennekens and M. Denecker*, ACM Transactions on Computational Logic Volume 17 Issue 4, p. 27:1-27:32, 2016.
Impact factor (2015): 0.855
- [J7] **Bootstrapping Inference in the IDP Knowledge Base System** *B. Bogaerts, J. Jansen, B. De Cat, G. Janssens, M. Bruynooghe and M. Denecker*, New Generation Computing Volume 34, Number 3, p. 193-220, 2016.
Impact factor (2015): 0.533
- [J6] **Stable-Unstable Semantics: Beyond NP with Normal Logic Programs** *B. Bogaerts, T. Janhunen and S. Tasharrofi*, Theory and Practice of Logic Programming Volume 16, Number 5-6, p. 570-586, 2016.
Impact factor (2015): 0.952
- [J5] **On Local Domain Symmetry for Model Expansion** *J. Devriendt, B. Bogaerts, M. Bruynooghe and M. Denecker*, Theory and Practice of Logic Programming Volume 16, Number 5-6, p. 632-652, 2016.
Impact factor (2015): 0.952
- [J4] **Predicate Logic as a Modeling Language: Modeling and Solving some Machine Learning and Data Mining Problems with IDP3** *M. Bruynooghe, H. Blockeel, B. Bogaerts, B. De Cat, S. De Pooter, J. Jansen, A. Labarre, J. Ramon, M. Denecker and S. Verwer*, Theory and Practice of Logic Programming Volume 15, Number 6, p. 783-817, 2015.
Impact factor (2015): 0.952
- [J3] **Knowledge Compilation of Logic Programs Using Approximation Fixpoint Theory** *B. Bogaerts and G. Van den Broeck*, Theory and Practice of Logic Programming Volume 15, Number 4-5, p. 464-480, 2015.
Impact factor (2015): 0.952
- [J2] **Grounded Fixpoints and Their Applications in Knowledge Representation** *B. Bogaerts, J. Vennekens and M. Denecker*, Artificial Intelligence Volume 224, p. 51-71, 2015.
Impact factor (2015): 3.333

- [J1] **Simulating Dynamic Systems Using Linear Time Calculus Theories** *B. Bogaerts, B. De Cat, J. Jansen, M. Bruynooghe, B. De Cat, J. Vennekens and M. Denecker*, Theory and Practice of Logic Programming Volume 14, Number 4-5, p. 477-492, 2014.
Impact factor (2015): 0.952

Articles in Books

- [B1] **Predicate Logic as a Modelling Language: The IDP System** *B. De Cat, B. Bogaerts, M. Bruynooghe and M. Denecker*, (Chapter to appear in Declarative Logic Programming: Theory, Systems, and Applications).

Conference and Workshop Articles

- [C26] **Exploiting Justifications for Lazy Grounding of Answer Set Programs** *B. Bogaerts and A. Weinzierl*, Proceedings of IJCAI-ECAI, 2018, (Accepted).
Acceptance rate: 20.5%
- [C25] **Symmetric explanation learning: Effective dynamic symmetry handling for SAT** *J. Devriendt, B. Bogaerts and M. Bruynooghe*, Theory and Applications of Satisfiability Testing - SAT 2017, Proceedings, p. 83-100, 2017.
Acceptance rate: 46.1%
- [C24] **Propagators and Solvers for the Algebra of Modular Systems** *B. Bogaerts, E. Ternovska and D. Mitchell*, Proceedings of the 21st International Conference on Logic for Programming Artificial Intelligence and Reasoning (LPAR-21), p. 227-248, 2017.
- [C23] **Safe Inductions: An Algebraic Study** *B. Bogaerts, J. Vennekens and M. Denecker*, Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence (IJCAI), p. 859-865, 2017.
Acceptance rate: 25.9%
- [C22] **Semantics for Active Integrity Constraints Using Approximation Fixpoint Theory** *B. Bogaerts and L. Cruz-Filipe*, Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence (IJCAI), p. 866-872, 2017.
Acceptance rate: 25.9%
- [C21] **SAT-to-SAT in QBFEval 2016** *B. Bogaerts, T. Janhunnen and S. Tasharrofi*, Proceedings of the 4th International Workshop on Quantified Boolean Formulas (QBF 2016), p. 63-70, 2016.
- [C20] **BreakID: Static Symmetry Breaking for ASP** *J. Devriendt and B. Bogaerts*, Proceedings of the ninth workshop on answer set programming and other computing paradigms, p. 25-39, 2016.
- [C19] **Implementing a Relevance Tracker Module** *J. Jansen, B. Bogaerts, J. Devriendt, G. Janssens and M. Denecker*, Proceedings of the ninth workshop on answer set programming and other computing paradigms, p. 77-91, 2016.
- [C18] **A Compositional Framework for Building Typed Higher-Order Logics** *I. Dasseville, M. van der Hallen, B. Bogaerts, G. Janssens and M. Denecker*, Technical communications of ICLP, p. 14.1-14.14, 2016.

- [C17] **Distributed Autoepistemic Logic and its Application to Access Control** *P. Van Hertum, M. Cramer, B. Bogaerts and M. Denecker*, Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence (IJCAI), p. 1286-1292, 2016.
Acceptance rate: 24%
- [C16] **Relevance for SAT(ID)** *J. Jansen, B. Bogaerts, J. Devriendt, G. Janssens and M. Denecker*, Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence (IJCAI), p. 596-602, 2016.
Acceptance rate: 24%
- [C15] **Improved Static Symmetry Breaking for SAT** *J. Devriendt, B. Bogaerts, M. Bruynooghe and M. Denecker*, Theory and Applications of Satisfiability Testing - SAT 2016, Proceedings, p. 104-122, 2016.
Acceptance rate: 44.3%
- [C14] **Declarative Solver Development: Case Studies** *B. Bogaerts, T. Janhunnen and S. Tasharrofi*, Principles of Knowledge Representation and Reasoning: Proceedings (KR), p. 74-83, 2016.
Acceptance rate: 26.9%
- [C13] **Solving QBF Instances With Nested SAT Solvers** *B. Bogaerts, T. Janhunnen and S. Tasharrofi*, Proceedings of the first workshop on Beyond NP, p. 307-313, 2016.
- [C12] **Partial Grounded Fixpoints** *B. Bogaerts, J. Vennekens and M. Denecker*, Proceedings of the twenty-fourth international conference on artificial intelligence (IJCAI), p. 2784-2790, 2015.
Acceptance rate: 28.8%
- [C11] **Grounded Fixpoints** *B. Bogaerts, J. Vennekens and M. Denecker*, Proceedings of the twenty-ninth AAAI conference on artificial intelligence, p. 1453-1459, 2015.
Acceptance rate: 26.6%
- [C10] **Meta-level Representations in the IDP Knowledge Base System: Towards Bootstrapping Inference Engine Development** *B. Bogaerts, J. Jansen, B. De Cat, G. Janssens, M. Bruynooghe and M. Denecker*, Workshop on Logic and Search - LaSh, 2014.
- [C9] **BreakIDGlucose: On The Importance of Row Symmetry in SAT** *J. Devriendt, B. Bogaerts and M. Bruynooghe*, Fourth International Workshop on the Cross-Fertilization Between CSP and SAT (CSPSAT), 1-17, 2014.
- [C8] **Inference in the FO(C) Modelling Language** *B. Bogaerts, J. Vennekens, M. Denecker and J. Van den Bussche*, European Conference on Artificial Intelligence (ECAI), p. 111-116, 2014.
Acceptance rate (long papers): 28%
- [C7] **FO(C) and Related Modelling Paradigms** *B. Bogaerts, J. Vennekens, M. Denecker and J. Van den Bussche*, 15th International Workshop on Non-Monotonic Reasoning, p. 90-96, 2014.
- [C6] **FO(C): A Knowledge Representation Language of Causality** *B. Bogaerts, J. Vennekens, M. Denecker and J. Van den Bussche*, (ICLP'14 technical communication), Theory and Practice of Logic Programming Volume 14, Number (4-5)-Online-Supplement, p. 60-69, 2014.

- [C5] **The Effects of Buying a New Car: An Extension of the IDP Knowledge Base System** *P. Van Her-tum, J. Vennekens, B. Bogaerts, J. Devriendt and M. Denecker*, (ICLP'13 technical communication), Theory and Practice of Logic Programming Volume 13, Number (4-5)-Online-Supplement, 2013.
- [C4] **Model Expansion in the Presence of Function Symbols Using Constraint Programming** *B. De Cat, B. Bogaerts, J. Devriendt and M. Denecker*, IEEE 25th International Conference on Tools with Artificial Intelligence, p. 1068-1075, 2013.
- [C3] **Analyzing Manuscript Traditions Using Constraint-Based Data Mining** *T. Andrews, H. Blockeel, B. Bogaerts, M. Bruynooghe, M. Denecker, S. De Pooter, C. Macé and J. Ramon*, First Workshop on Combining Constraint Solving with Mining and Learning, 2012.
- [C2] **Modeling Machine Learning and Data Mining Problems with FO(.)** *H. Blockeel, B. Bogaerts, M. Bruynooghe, B. De Cat, S. De Pooter, M. Denecker, A. Labarre, J. Ramon and S. Verwer*, Technical Communications of the 28th International Conference on Logic Programming, ICLP 2012, p. 14-25, 2012.
- [C1] **Symmetry Propagation: Improved Dynamic Symmetry Breaking in SAT** *J. Devriendt, B. Bogaerts, C. Mears, B. De Cat and M. Denecker*, IEEE 24th International Conference on Tools with Artificial Intelligence, p. 49-56, 2012.

Thesis

- [T1] **Groundedness in Logics With a Fixpoint Semantics** *B. Bogaerts*, PhD thesis, 2015.

Non-Refereed Publications

- [N1] **MiniSat(ID) for Satisfiability Checking and Constraint Solving** *B. De Cat, B. Bogaerts and M. Denecker*, ALP Newsletter, 2014.