

# Marcelo André Barbosa de Sousa

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## Industrial Employment

### *SonarSource SA, Geneva*

Scientist/Research Engineer, February 2018 – June 2019  
*Principal designer of generic information flow security analysis.*  
*Principal designer of DSLs for language-agnostic static analysis.*

### *DiffBlue, Oxford*

Research Engineer Consultant, February 2016–2017  
*Dynamic analysis of concurrent programs based on partial order reductions.*

### *Google Inc., Mountain View*

Software Engineer Intern, Vijay D'Silva, Domagoj Babic, August 2015– December 2015.  
*One order of magnitude speed-up of call graph construction for Android applications.*

### *Microsoft Research Cambridge*

Research Intern, Isil Dillig, Byron Cook, September 2013– November 2013.  
*Designed program consolidation, a program optimisation to scale massively parallel applications.*  
*Implemented a prototype of program consolidation in the context of queries written in C# LINQ.*

### *MarketPsych Data*

Haskell Consultant, Richard L. Peterson, January 2012– September 2013.  
*Implementation of the Thomson Reuters MarketPsych Indices.*

### *CERN - European Organization for Nuclear Research*

Summer Student, Fons Rademakers, July– September 2011.  
*ROOT I/O Plugins for Amazon S3 and Google Storage.*

### *IBM Toronto Laboratories*

Co-op XLC Front-End, Jeffrey Heath, March–September 2010.  
*Software engineering and research in the XLC Front-end – part of the IBM XL Compiler organization.*

## Programming Languages

Haskell: Developed several static analysers and DSLs (github profile) - industrial experience at MarketPsych Data

C++: Industrial experience at Google, IBM and CERN

Java: Industrial experience at SonarSource

Go: Industrial experience at SonarSource

## Academic Experience

### *Merton College, Oxford*

Undergraduate Tutor

*Imperative Programming I*, Hilary Term 2015.

*Object Oriented Programming*, Michaelmas Term 2014.

*Imperative Programming II*, Hilary Term 2014, Hilary Term 2015.

### *St John's College, Oxford*

Undergraduate Tutor

*Imperative Programming II*, Trinity Term 2015.

### *Worcester College, Oxford*

Undergraduate Tutor

*Compilers*, Trinity Term 2015.

### *University of Oxford, Department of Computer Science*

Teaching Assistant, MSc in Software Engineering

*Robust Programming*, July 2015.

*eXtensible Markup Language*, March 2015.

Class Tutor

*Software Verification*, Hilary Term 2015.

*Computer-Aided Formal Verification*, Michaelmas Term 2014.

*Object Oriented Programming*, Michaelmas Term 2014.

*Principles of Programming Languages*, Michaelmas Term 2014.

Practicals Demonstrator

*Imperative Programming I*, Hilary Term 2014.

*Boğaziçi Üniversitesi, Department of Computer Engineering of the Faculty of Engineering*

Research Assistant, Alper Şen, February 2012 – October 2012.  
*Formal Verification of Concurrent Software*

*Universiteit van Amsterdam, Intelligent Systems Lab Amsterdam, Informatics Institute*

Research Assistant, Maarten de Rijke, Valentin Jijkoun, October– 2009.  
*Sentimental Analysis for Philips User Generated Content*

*Universidade do Minho, Physics Center, Physics Department*

Junior Researcher, Ricardo Mendes Ribeiro, October 2008 - 2009.  
*Implementation of parallel software for solid state physics simulations*

## Education

DPhil. Computer Science, University of Oxford, United Kingdom.

*Duration:* January 2013 - 2018

*Advisors:* Prof. Daniel Kroening, and Prof. Luke Ong

*Dissertation*

*Title:* Abstractions and Independence

*Examiners:* Prof. Marta Kwiatkowska and Prof. Parosh Aziz Abdulla

MSc. Computing Science, Universiteit Utrecht, The Netherlands.

*Duration:* September 2009 - August 2012

*Advisors:* dr. Wishnu Prasetya and Prof. Alper Şen

*Thesis*

*Title:* A Framework for Formal Verification of Concurrent Software

*Examiners:* Prof. Doaitse Swierstra and Prof. Alper Şen

*Final GPA:* 4.0/4.0

*Erasmus:* MSc. Computer Engineering, Boğaziçi Üniversitesi, Turkey.

BSc. Informatics Engineering, Universidade do Minho, Portugal.

*Duration:* September 2006 - July 2009

*Thesis*

*Title:* Determining readability levels in text analysis for content quality

*Examiners:* Prof. Maarten de Rijke

*ECTS Grade:* A

*Erasmus:* MSc. Computer Science, Universiteit van Amsterdam, The Netherlands.

## Research

### *Students*

Sarah Sallinger (co-supervised with Prof. Viktor Kuncak)

*Scalable declarative static analysis*

MSc. Computer Science, EPFL, 2019 (expected)

Quentin Jaquier (co-supervised with Prof. Viktor Kuncak and Dinesh Bolkensteyn)

*Belief-style checkers over universal abstract syntax trees*

MSc. Computer Science, EPFL, 2019 (expected)

Alberto Sadde (co-supervised with Prof. Daniel Kroening)

*Consolidation of Haskell Programs: Semantic Fusion of maps, filters and folds*

MSc. Computer Science, University of Oxford, 2016

### *Peer-Reviewed Publications*

Marcelo Sousa, Isil Dillig, Shuvendu Lahiri

*Verified Three-way Program Merge*

Object-Oriented Programming, Systems, Languages And Applications, November 2018.

Huyen T. T. Nguyen, Cesar Rodriguez, Marcelo Sousa, Camille Coti, Laure Petrucci

*Quasi-Optimal Partial Order Reduction*

Computer Aided Verification, July 2018.

Marcelo Sousa, Cesar Rodriguez, Vijay D'Silva, Daniel Kroening

*Abstract Interpretation with Unfoldings*

Computer Aided Verification, July 2017.

Vijay D'Silva, Marcelo Sousa, Daniel Kroening

*Independence Abstractions and Models of Concurrency*

Verification, Model Checking, and Abstract Interpretation, January 2017.

Vijay D'Silva, Marcelo Sousa

*Complete Abstractions and Subclassical Modal Logics*

Verification, Model Checking, and Abstract Interpretation, January 2017.

Marcelo Sousa, Isil Dillig

*Cartesian Hoare Logic for Verifying k-Safety Properties*

Programming Language Design and Implementation, June 2016.

Cesar Rodriguez, Marcelo Sousa, Subodh Sharma, Daniel Kroening

*Unfolding-based Partial Order Reduction (Best Paper Award)*

International Conference on Concurrency Theory, September 2015.

Marcelo Sousa, Isil Dillig, Dimitrios Vytionitis, Thomas Dillig, Christos Gkantsidis

*Consolidation of Queries with User-Defined Functions*

Programming Language Design and Implementation, June 2014.

Marcelo Sousa, Alper Sen

*LLVMVF: A Generic Approach for Verification of Multicore Software*

Journal of Electronic Testing: Theory and Applications, September 2013.

Marcelo Sousa, Alper Sen

*Generation of TLM Testbenches Using Mutation Testing*

International Conference on Hardware/Software Codesign and System Synthesis, October 2012.

## *Scientific Software*

SafeMerge: Verification of Conflict Freedom in Program Merges (2018).

APOET: Abstract Interpreter with Unfoldings (2017).

DESCARTES: Cartesian Hoare Logic Verifier for Java (2015).

POET: Partial Order Execution Tools (2015).

LLVMVF: LLVM Verification Framework for Concurrent Software (2012).

Amazon S3 and Google Storage Plugins for ROOT (CERN) (2011).

Readability for Dutch, A tool for readability analysis of Dutch texts (2009).

Deposition, A Fortran MPI program for generic thin films deposition simulation, with Ricardo Mendes Ribeiro (2009).

## *Research Visits*

Dagstuhl Seminar on Program Equivalence, April 2018.

Seminar on Automata, Logic and Games, IMS Singapore, September 2016.

Cesar Rodriguez, Paris 13, France, March 2016.

Isil Dillig, University of Texas at Austin, USA, May 2015.

## Professional Activities

PC Member: CAV 2019, CAVAEC 2016.

External Reviewer: TOPLAS, CAV 2018, POPL 2018, FMCAD 2016, ISSTA 2016, CAV 2015, VMCAI 2015, ESOP 2014, FMCAD 2014, ICCD 2014, ICECCS 2014, VMCAI 2014, VSTTE 2014, ICCD 2013.

Organizer: ICFP Contest 2014.

## Honors and Awards

Google PhD Fellowship in Programming Languages and Software Engineering, 2016.

Best Paper Award at CONCUR, September 2015.

One Year Grant to Innovative Entrepreneurs, IAPMEI Portugal, September 2013-2014.

Featured IBM DB2 Student Ambassador, April 2009.

FCT (Portuguese Foundation for Science and Technology) Computational Physics Scholarship, October 2008-2009.

Third Prize – National contest organized by Fundação da Juventude (Portuguese Youth Foundation) in Traffic Collision, January 2009.