Christophe JOUBERT

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EDUCATION

Degrees

2002-onwards	**Ph.D., Computer Science** Advisors: Hubert Garavel and Radu Mateescu Thesis: Massively parallel on-the-fly verification of finite-state systems	Institut National Polytechnique de Grenoble
2001-2002	**Research Master, Computer Science** with honours Advisors: Hubert Garavel and Radu Mateescu Master thesis: Massively parallel generation of very large transition systems	Université Joseph Fourier, Grenoble
2000-2001	**Research Bachelor, Computer Science** with Dean's honours	University of California, Santa Barbara
1999-2000	**Licence, Computer Science** with distinction "Très Bien"	Université Joseph Fourier, Grenoble

Skills

Computer Science	*Operating systems*: Unix (Linux, solaris), Windows, Nachos (teaching OS) *Specification languages*: Lotos, Lustre, B, UML, Esterel, Argos, Aslan, Astral *Programming languages*: imperative (C/C++, Java, Ada, Pascal), logical (Prolog), functional (Caml, Scheme), relational (Sql), assembly (Sparc, 68000, Mips, Jasmin), descriptive (LaTeX, Html), script (perl, awk, sed, grep) *Compilers*: Lex -Yacc, JLex - JavaCup - Jasmin *Network*: sockets, TCP/IP, MPI
Languages	French (native), english (fluent), spanish (read, spoken), german (school level, 7 years)

Research Experience

10/02-onwards *Ph.D. student*	**Institut National de Recherche en Informatique et en Automatique (INRIA), Rhône-Alpes research unit, VASY project** – *Grenoble (France).* *Funding*: Research ministry grant *Advisors*: Hubert Garavel (director) and Radu Mateescu (scientific advisor) *Research domain*: Formal verification methods *Title*: Massively parallel on-the-fly verification of finite-state systems *Keywords*: Boolean equation systems, distributed memory algorithm, on-the-fly verification, equivalence checking, partial order reduction, model checking, test case generation *Abstract*: The verification of concurrent finite-state systems is confronted in practice with the state explosion problem (prohibitive size of the underlying state spaces), which occurs for realistic systems containing many parallel processes and complex data structures. Various techniques for fighting against state explosion have been proposed, such as on-the-fly verification, partial order reduction, and distributed verification. However, practical experience has shown that none of these techniques alone is always sufficient to handle large-scale systems. In this thesis, we propose a combination of these techniques in order to scale up their capabilities. Our approach is based upon Boolean Equation Systems (BESs), which provide an elegant intermediate representation for verification problems defined on Labeled Transition Systems (LTSs) such as equivalence checking, τ-confluence reduction, model checking of alternation-free μ-calculus and test-case generation. We propose DSolve [3], a new algorithm for distributed on-the-fly resolution of BESs, and employ it as computing engine for four on-the-fly verification tools developed within the Cadp toolbox using the Open/Cæsar environment: the Bisimulator equivalence checker [5, 2], the Tau_Confluence reductor [1], the Evaluator model checker, and the Extractor test-case generator. Experimental measures performed on clusters of machines show quasi-linear speedups and a good scalability of the distributed versions of these tools w.r.t. their sequential counterparts.
06/02-09/02 *Visiting Scientist*	**Department of Computer Science, Universiteit Twente, FMT group** – *Enschede (Holland).* *Funding*: Isère department grant *Advisors*: Ed Brinksma (director) and Holger Hermanns (scientific advisor) *Research domain*: Formal verification methods *Title*: A set of performance and dependability analysis components for CADP *Keywords*: Performance evaluation, functional verification, state space, steady state and transient analysis, on-the-fly elimination of non-determinism for stochastic systems
10/01-06/02 *Master student*	**Institut National de Recherche en Informatique et en Automatique (INRIA), Rhône-Alpes research unit, VASY project** – *Grenoble (France).* *Funding*: Rhône-Alpes region grant *Advisors*: Hubert Garavel (director) and Radu Mateescu (scientific advisor) *Research domain*: Formal methods *Title*: Massively parallel generation of very large transition systems *Keywords*: State space, on-the-fly generation, distributed algorithm, partitioned LTS
04/01-07/01 *Bachelor student*	**Department of Computer Science, University of California** – *Santa Barbara (USA).* with Tevfik Bultan, on shape analysis: a static computation of program memory configuration topology
11/99-07/00 *Licence student*	**Institut d'Informatique et de Mathématiques Appliquées de Grenoble (IMAG), LEIBNIZ laboratory, MAGMA project** – *Grenoble (France).* with Yves Demazeau and Christof Baeijs, on communication model for multi-agent systems

Publications

Refereed International Journal Papers

[1] Christophe Joubert and Radu Mateescu. Distributed On-the-Fly Equivalence Checking and τ-Confluence Reduction. *Formal Methods in System Design*, Submitted, 2006.

Refereed International Conference Papers

[2] Damien Bergamini, Nicolas Descoubes, Christophe Joubert, and Radu Mateescu. BISIMULATOR: A Modular Tool for On-the-Fly Equivalence Checking. In Nicolas Halbwachs and Lenore Zuck, editors, *Proceedings of the 11th International Conference on Tools and Algorithms for the Construction and Analysis of Systems TACAS'2005 (Edinburgh, Scotland)*, volume 3440 of *Lecture Notes in Computer Science*, pages 581–585. Springer Verlag, April 2005.

[3] Christophe Joubert and Radu Mateescu. Distributed Local Resolution of Boolean Equation Systems. In *Proceedings of the 13th Euromicro Conference on Parallel, Distributed and Network based Processing, PDP'05 (Lugano, Switzerland)*, 2005.

[4] Holger Hermanns and Christophe Joubert. A Set of Performance and Dependability Analysis Components for CADP. In Hubert Garavel and John Hatcliff, editors, *Proceedings of the 9th International Conference on Tools and Algorithms for the Construction and Analysis of Systems TACAS'2003 (Warsaw, Poland)*, volume 2619 of *Lecture Notes in Computer Science*, pages 425–430. Springer Verlag, April 2003.

Refereed International Workshop Papers

[5] Christophe Joubert and Radu Mateescu. Distributed On-the-Fly Equivalence Checking. In Lubos Brim and Martin Leucker, editors, *Proceedings of the 3rd International Workshop on Parallel and Distributed Methods in Verification PDMC'2004 (London, UK)*, Electronic Notes in Theoretical Computer Science, 2004.

[6] Christophe Joubert. Distributed Model Checking: From Abstract Algorithms to Concrete Implementations. In Lubos Brim and Orna Grumberg, editors, *Proceedings of the 2nd International Workshop on Parallel and Distributed Model Checking PDMC'2003 (Boulder, Colorado, USA)*, volume 89 of *Electronic Notes in Theoretical Computer Science*. Elsevier, 2003.

Master thesis

[7] Christophe Joubert. *Techniques et outils pour la construction massivement parallèle de systèmes de transitions*. DEA, Institut National Polytechnique de Grenoble et Université Joseph Fourier, Grenoble, June 2002.

Professional Activities

International Journal Reviewer

International Journal on Software Tools for Technology Transfer (STTT'2005)

International Workshop Reviewer

International Workshop on Formal Methods for Industrial Critical Systems (FMICS'2004), International Workshop on Parallel and Distributed Methods in VerifiCation (PDMC'2004), Workshop on Parallel and Distributed Model Checking (PDMC'2002)

Professional Organizations

ERCIM Working Group on Formal Methods for Industrial Critical Systems (FMICS)

Teaching Experience

2004-2005 *First college degree*	**Imperative algorithmic and programming** – *Department of Computer Science, Université Joseph Fourier, Grenoble (France)*. Action language, iterative and recursive composition, table, set, sequence, queue, heap, linked sequence, C programming
2003-2004 *Bachelor degree*	**Hardware and software architecture** – *Department of Computer Science, Université Joseph Fourier, Grenoble (France)*. Information coding (Boole algebra and automata), processor architecture, machine language, hardware architecture (combinatorial and sequential circuits)
2003-2004 *First college degree*	**Euclidean geometry, analysis and introduction to linear algebra** – *Department of Computer Science, Université Joseph Fourier, Grenoble (France)*. Complex numbers, n^{th} root, plane and space geometry (vectorial, affine, euclidean), linear algebra, differential equations, limited development
2002-2003 *First college degree*	**Functional programming** – *Department of Computer Science, Université Joseph Fourier, Grenoble (France)*. Value and type, functional composition, top-down analysis, information structure, type constructor, recursive definition of type and function, higher order function, Caml programming
2000-2001 *Bachelor degree*	**Computer architecture** – *Department of Computer Science, University of California, Santa Barbara (USA)*. Design process, performance and cost analysis, computer arithmetic, controller and data path design, input/output systems, interrupts and exceptions, pipelining and parallelism, Mips and 68000 programming