



## CV Laure Gonnord

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**Habilitated Tenured Assistant Professor (Maître de Conférences HDR)**  
**Topics : Software Verification, Embedded Systems, High Performance Computing,  
Static Analysis, Compilation.**

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### Highlights

- 2019 : PC member of the CAV'2019 conference.
- 2018 : active participation to the emerging new team, CASH at the LIP laboratory <http://www.ens-lyon.fr/LIP/CASH>.
- 2017 : acceptance (as PI) of the CODAS ANR Project. Habilitation Thesis. Qualification (27th section CNU) for full Professor positions.
- 2015 : acceptance of our paper "Synthesis of ranking functions using extremal counterexamples" to the A\*-ranked PLDI (Programming Languages, Design and Implementation) conference.

### Actual and Former Positions

**Spring 2018**

**Half-year leave (Délégation) Inria.**

**Spring 2017**

**Half-year leave (Délégation) CNRS.**

**since Sept 2013**

**Assistant Professor** *University Lyon 1*. Science Faculty, Computer Science Department. Lab : LIP, CASH Team (since January 2018)

**2009 - 2013**

**Assistant Professor** *University Lille1*. Polytech Engineer School. Computer Science and Embedded System Departments

**2008 - 2009**

**Teaching and research assistant** *University Lyon I* and LIP.

**2007 - 2008**

**Postdoctoral position**, *INSA Lyon*, Lab CITI, ANR Project REVE.

**2003 - 2007**

**PhD In Computer Science** Grenoble University, Synchronous Team, Verimag Lab advisor N. Halbwachs and **teaching position**, *Grenoble University*. PhD : "Abstract acceleration to improve precision of Linear Relation Analysis", defended on October, 27th, 2007.

### Theses

- **PhD thesis** ([T2]) "Accélération Abstraite pour l'amélioration de la précision de l'Analyse des Relations Linéaires", defended on October 2007, 27th, Grenoble University, France.
  - Chair : Mr Yves Ledru (UJF).
  - Reviewers : Mr François Irigoien (Mines Paris) and Mr Philippe Schnoebelen (CNRS, LSV).
  - Examinators : Mr Bertrand Jeannet (INRIA) and Mr Thomas Reps (University of Wisconsin).
  - PhD advisor : Mr Nicolas Halbwachs (CNRS/Verimag).
- **"Habilitation à diriger les recherches"** ([T1]) "Contributions to program analysis : expressivity and scalability". University of Lyon, defended on November 9th, 2017.
  - Jury chair : Mrs Isabelle Guérin-Lassous, Professor (Université Lyon1 Claude Bernard);
  - Reviewers : Mr Paul H J Kelly, Professor (Imperial College London), Mr Antoine Miné, Professor (Université Pierre et Marie Curie, France), and Mr Andreas Podelski, Professor (Freiburg University, Germany).
  - Examinators : Mr Albert Cohen, Senior Research Scientist (Inria Paris) and Mr Sebastian Hack, Professor (Saarland University, Germany).

## Software

- **LustreArray** : A prototype of implementation of the Lustre synchronous language's semantics into Horn Clauses with Arrays (Participation 25%, collaboration with A. Gontier and S. Bagoly and L. Morel). Associated publication :[R3].
- **Vaphor** : A prototype of a static analysis tool that abstract programs with arrays into array-free horn clauses (2k OCaml LoCs) (Participation 40%, collaboration with D. Monniaux) . The tool has been substantially re-engineered by Julien Braine in June 2016. Associated publications [C3, R4].<http://laure.gonnord.org/pro/demopage/vaphor/>
- **Termite** (10% participation) : termination proof tool, in collaboration with G. Radanne, main developer, and D. Monniaux. <https://termite-analyser.github.io/>. Associated publication :[C5].
- **Signal2SMT** : A prototype of a verification tool for the Signal Synchronous language (Participation 80%, collaboration with P. Feautrier and A. Gamatié). Associated publications :[C8, J3]
- **StOP** : A prototype of a modular tool for proving termination (20% participation, collaboration with G. Andrieu and C. Alias). Associated publication :[W4].
- **Aspic** : A static analysis tool that implements accelerated Linear relation Analysis, (20 000 OCaml LoCs) <http://laure.gonnord.org/pro/aspic/aspic.html>. Associated publications :[C13, C10, W5, J2].
- **ReveViewer** : A prototype «proof of concept» for the REVE ANR Project, a remote image viewer and the software architecture around it to deal with resource's constraints (5000 C++ LoCs). Associated publications :[C11, J4].

## Research Activities : conferences, projects

### Conferences

- PC member of **CAV'19**, TAPAS'18, VMCAI'18, NSAD'17, VMCAI'17, WST'14, TAPAS'12.
- PC Jury of the Student Competition at PLDI'17 and CGO'16.
- Co-organisator (with D. Monniaux) of VMCAI'17 in Paris.
- Reviewer of the conferences CAV, VMCAI, STACS, LCTES...
- Keynote speaker : Journées FAC 2018 (Toulouse)[INV1], LOPSTR 2018[INV2] (Frankfurt am Main).
- Invited seminars : Google and SRI (California, June 2015 [INV3]), student seminar at ENSL (2014), ... (<http://laure.gonnord.org/pro/research/seminars.html>).

### Projects

- Participation to the projects System@tic "APRON" and ANR "REVE".
- Coordination of the Lille university BQR Project "ALIL" (languages and analysis for software engineering) in 2011/2012.
- Coordination of the CNRS INS2I Project "HLS-RT" for 2012 and 2013. (16k€ for 2 years) High level synthesis under real-time constraints.
- Partner of the "PROSPIEL" Inria associate team (Brasil-France), in 2015-2017 (20k€ per year, 2 years).
- Principal instigator of the BQR ENS de Lyon Project "SODAS", October 2015-2017 (12k€ for 2 years) High performance programming of complex data structures.
- Principal instigator of the **CODAS** "Young researcher" ANR Project, starting March 2018 (175k€ for 42 months). High performance analysis, scheduling with complex data structures. <http://codas.ens-lyon.fr>.

**Informal collaborations** I also have regular collaborations with David Monniaux (CNRS/Verimag, Grenoble), Fernando Magno Pereira (UFMG, Brasil), Lionel Morel (CEA List, Insa Lyon) and Sebastien Mosser (I3S, Nice).

## Teaching Activities, Student Supervision, PhD Jurys

### Courses

- In 2016-17 and 2017-18, I spent one semester on a temporary Fellowship at the CNRS, then Inria.
- From 2002, I taught to undergraduate and graduate students, from basic programming courses to advanced courses like Program Analysis and Compilation, on average 220 hours per year (except during half-year leaves, 96 hours per year).
- Responsible of the following courses :
  - Undergraduate (mainly L3) : Computer Architecture, Operating Systems, Algorithmics, Data Structures.

- Graduate (M1,M2) : Theoretical Computer Science, Compilation, Compilation and Program Analysis, Compilation and Software Engineering, Program Analysis and Verification, Real-Time.
- Regular participation to internships jurys. In Lille I was responsible of their organisation (last year of the Engineer School Polytech'Lille).

### Student Supervision

- From 2009 I have advised 13 undergraduate internships and 6 master students. The complete list and links to their reports (on HAL) can be found on the webpage <http://laure.gonnord.org/pro/research/internships.html>.
- From sept 2014 to sept 2017 I co-advised (80%, with F. Vivien) the PhD of Maroua Maalej, on designing low cost *static analyses for efficient compilers*. The work led to the publications [C4, C2, J1]. The PhD defense was on 26th Sept 2017.
- From september 2018, I co-advise (70%, with David Monniaux, Verimag) the PhD studies of Julien Braine, on designing *data structures abstractions* for verification.
- From september 2018, I co-advise (70%, with Lionel Morel, CEA Grenoble & Insa de Lyon) the PhD studies of Paul Iannetta, on the *efficient compilation of data structures* for HPC programs.

**PhD Jurys** From 2012, I was in the PhD Jury of 10 students, including 3 as a referee.

- Oct 2012. Examiner of the PhD defense of Peter Schrammel, Université de Grenoble. “Logico-Numerical Verification Methods for Discrete and Hybrid Systems”.
- Dec 2013. Examiner of the PhD defense of Clément Guy, Université de Rennes. “Facilités de typage pour l’ingénierie des langages”.
- July 2014. Reviewer of the PhD manuscript of Chan Ngo, Université de Rennes. “Formal Verification of a Synchronous Dataflow Compiler : from Signal to C”.
- Dec 2016. Examiner of the PhD defense of Nasrine Damouche, Université de Perpignan. “Improving the Numerical Accuracy of Floating-Point Programs with Automatic Code Transformation Methods”
- Dec 2016. Examiner of the PhD defense of Sajith K. Alathingal, Université de Rennes. “Transforming Thread Level Parallelism into Data Level Parallelism with the Dynamic Inter-Thread Vectorization Architecture”
- Dec 2017. Reviewer of the PhD manuscript of T. Rubiano, Université Paris 13. “Implicit computational complexity for compilers”.
- Dec 2017. Examiner of the PhD defense of Maurica Fonenantsoa, Université de la Réunion. “Termination Analysis of Floating-Point Computations”.
- Dec. 2017. Examiner of the PhD defense of J. Lidman, Chalmers, Sweden. “Fault tolerant software systems, fuzzy dataflow analysis”. I also wrote a report on his work.
- Jul. 2018. Examiner of the PhD defense of Hoby Rakotoarivelo "Approche de co-design de noyaux irréguliers sur accélérateurs manycore. Application au cas du remaillage adaptatif pour le calcul intensif.", University of Evry, France.
- Sept. 2018. Reviewer of the PhD manuscript of Vincent Botbol, Sorbonne Université. “Analyse statique de programmes concurrents avec variables numériques”.

## Other activities

### Local and regional activities

- Seminar organisation : co-organisation of the LIP seminar “Langages, Semantics, Compilation”, since <http://perso.ens-lyon.fr/christian.perez/journeelangages>, since 2016. Informal Grenoble Lyon Verif Working Group <http://stator.imag.fr/w/index.php/VerifGroup> since 2017.
- Member of the Labex MILYON teaching commission (since 2016), of finance committee of the Science Faculty (since 2014), finance committee of the LIP (since 2017).
- Elected member of the LIP Lab Council (since 2016) and the “Conseil de fédération Informatique de Lyon” (since 2017).

### National activities

- Co-coordinator of the French Compilation group <http://compilfr.ens-lyon.fr/> since 2010. Cofounder with Fabrice Rastello.
- Together with four other members of the LIP we organised the Summer School in Programming, in June 2018 <https://ejcp2018.sciencesconf.org/>.

- Member of the GDR GPL (<http://gdr-gpl.cnrs.fr/>) and co-leader of the Compilation group. Organisation of work sessions during the National Days since 2011.
- Since 2013, I participated to 6 associate professor and one junior researcher (CR Inria, Spring 2016) selection committees. I also belong to the Grenoble-Alpes' Inria doctorate studies committee since 2014.

## Personal Publications, sorted by type

My **h-index** is **12** according to Google Scholar :

<https://scholar.google.fr/citations?user=DmA3SakAAAAJ&hl=fr>

with a total of 557 citations (381 citations since 2013).

### Phd and Habilitation

- [T1] Laure GONNORD. “Contributions to program analysis : expressivity and scalability”. Habilitation à diriger des recherches. Université Lyon 1 Claude Bernard, nov. 2017. URL : <https://tel.archives-ouvertes.fr/tel-01633065> (cf. p. 1).
- [T2] Laure DANTHONY, GONNORD. “Abstract Acceleration to improve precision in Linear Relation Analysis”. Theses. Université Joseph-Fourier - Grenoble I, oct. 2007. URL : <https://tel.archives-ouvertes.fr/tel-00196899> (cf. p. 1).

### International journal papers

- [J1] Maroua MAALEJ et al. “Combining Range and Inequality Information for Pointer Disambiguation”. In : *Science of Computer Programming (SCP)* (2017). URL : <https://hal.archives-ouvertes.fr/hal-01625402> (cf. p. 3).
- [J2] Laure GONNORD et Peter SCHRAMEL. “Abstract Acceleration in Linear Relation Analysis”. In : *Science of Computer Programming (SCP)* (2014), p. 125-153. URL : <https://hal.archives-ouvertes.fr/hal-00787212> (cf. p. 2).
- [J3] Paul FEAUTRIER, Abdoulaye GAMATIÉ et Laure GONNORD. “Enhancing the Compilation of Synchronous Dataflow Programs with a Combined Numerical-Boolean Abstraction”. In : *CSI Journal of Computing* 1.4 (2012), 8 :86-8 :99. URL : <https://hal.archives-ouvertes.fr/hal-00860785> (cf. p. 2).
- [J4] Laure GONNORD et Jean-Philippe BABAU. “Qinna : a component-based framework for runtime safe resource adaptation of embedded systems”. In : *Scalable Computing : Practice and Experience (SCPE)* 10.3 (sept. 2009), p. 253-264. URL : <https://hal.archives-ouvertes.fr/hal-00670185> (cf. p. 2).
- [J5] Nicolas HALBWACHS, David MERCHAT et Laure GONNORD. “Some ways to reduce the space dimension in polyhedra computations”. In : *Formal Methods in System Design (FMSD)* 29.1 (juil. 2006), p. 79-95. URL : <https://hal.archives-ouvertes.fr/hal-00189633>.

### International Conferences

- [C1] Romain FONTAINE, Laure GONNORD et Lionel MOREL. “Polyhedral Dataflow Programming : a Case Study”. In : *International Symposium on Computer Architecture and High-Performance Computing (SBAC-PAD'18)*. Lyon, France, sept. 2018. URL : <https://hal-cea.archives-ouvertes.fr/cea-01855997>.
- [C2] Maroua MAALEJ et al. “Pointer Disambiguation via Strict Inequalities”. In : *Code Generation and Optimisation (CGO'17)*. Austin, United States, fév. 2017. URL : <https://hal.archives-ouvertes.fr/hal-01387031> (cf. p. 3).
- [C3] David MONNIAUX et Laure GONNORD. “Cell morphing : from array programs to array-free Horn clauses”. In : *23rd Static Analysis Symposium (SAS'16)*. Static Analysis Symposium. Edimbourg, United Kingdom, sept. 2016. URL : <https://hal.archives-ouvertes.fr/hal-01206882> (cf. p. 2).
- [C4] Vitor PAISANTE et al. “Symbolic Range Analysis of Pointers”. In : *International Symposium of Code Generation and Optimization (CGO'16)*. Barcelona, Spain, mar. 2016, p. 791-809. URL : <https://hal.inria.fr/hal-01228928> (cf. p. 3).
- [C5] Laure GONNORD, David MONNIAUX et Gabriel RADANNE. “Synthesis of ranking functions using external counterexamples”. In : *Proceedings of the 2015 ACM International Conference on Programming Languages, Design and Implementation (PLDI'15)*. Portland, Oregon, United States, juin 2015. URL : <https://hal.archives-ouvertes.fr/hal-01144622> (cf. p. 2).
- [C6] Henrique Nazaré Willer SANTOS et al. “Validation of Memory Accesses Through Symbolic Analyses”. In : *Proceedings of the 2014 ACM International Conference on Object Oriented Programming Systems Languages And Applications (OOPSLA'14)*. Portland, Oregon, United States, oct. 2014. URL : <http://hal.inria.fr/hal-01006209>.

- [C7] Benoit COMBEMALE, Laure GONNORD et Vlad RUSU. “A Generic Tool for Tracing Executions Back to a DSMLs Operational Semantics”. In : *Seventh European Conference on Modelling Foundations and Applications (ECMFA'11)*. T. 6698. Lecture Notes in Computer Science. Birmingham, United Kingdom : Springer Verlag, juin 2011, p. 35-51. URL : <https://hal.archives-ouvertes.fr/hal-00593425>.
- [C8] Abdoulaye GAMATIÉ et Laure GONNORD. “Static analysis of synchronous programs in signal for efficient design of multi-clocked embedded systems”. In : *ACM SIGPLAN/SIGBED conference on Languages, compilers, and tools for embedded systems, LCTES 2011*. Chicago, IL, United States, avr. 2011, p. 71-80. URL : <https://hal.inria.fr/inria-00586137> (cf. p. 2).
- [C9] David MONNIAUX et Laure GONNORD. “Using Bounded Model Checking to Focus Fixpoint Iterations”. In : *Proceedings of the 18th International Static Analysis Symposium, SAS'11*. Venice, Italy : Springer, sept. 2011.
- [C10] Christophe ALIAS et al. “Multi-dimensional Rankings, Program Termination, and Complexity Bounds of Flowchart Programs”. In : *Static Analysis Symposium*. Perpignan, France, sept. 2010. URL : <https://hal.inria.fr/inria-00523298> (cf. p. 2).
- [C11] Laure GONNORD et Jean-Philippe BABAU. “Quantity of Resource Properties Expression and Runtime Assurance for Embedded Systems”. In : *The seventh ACS/IEEE International Conference on Computer Systems and Applications (AICCSA'09)*. Rabat, Morocco : IEEE, mai 2009. URL : <https://hal.inria.fr/inria-00349918> (cf. p. 2).
- [C12] Jean-Philippe BABAU et Laure GONNORD. “Runtime resource assurance and adaptation with Qinna framework : a case study”. In : *Real Time Software (RTS'08)*. Poland, oct. 2008, p. 617-624. URL : <https://hal.archives-ouvertes.fr/hal-00801546>.
- [C13] Laure GONNORD et Nicolas HALBWACHS. “Combining Widening and Acceleration in Linear Relation Analysis”. In : *Static Analysis Symposium (SAS'06)*. Seoul, South Korea, août 2006, p. 144-160. URL : <https://hal.archives-ouvertes.fr/hal-00189614> (cf. p. 2).

#### International Workshops

- [W1] Christophe ALIAS, Carsten FUHS et Laure GONNORD. “Estimation of Parallel Complexity with Rewriting Techniques”. In : *Workshop on Termination*. Workshop on Termination (WST'16). Obergurgl, Austria, sept. 2016. URL : <https://hal.archives-ouvertes.fr/hal-01345914>.
- [W2] Raphael Ernani RODRIGUES et al. “Real-world loops are easy to predict : a case study”. English. In : *Workshop on Software Termination (WST'14)*. Wien, Austria, juil. 2014. URL : <http://hal.inria.fr/hal-01006208>.
- [W3] Christophe ALIAS et al. “Rank : a tool to check program termination and computational complexity”. English. In : *Workshop on Constraints in Software Testing Verification and Analysis (CSTVA'13)*. Luxembourg, mar. 2013. URL : <http://hal.archives-ouvertes.fr/hal-00801571>.
- [W4] Guillaume ANDRIEU, Christophe ALIAS et Laure GONNORD. “SToP : Scalable Termination Analysis of (C) Programs (tool presentation)”. In : *International Workshop on Tools for Automatic Program Analysis (TAPAS'12)*. Deauville, France, sept. 2012. URL : <http://hal.inria.fr/hal-00760926> (cf. p. 2).
- [W5] Paul FEAUTRIER et Laure GONNORD. “Accelerated Invariant Generation for C Programs with Aspic and C2fsm”. In : *Tools for Automatic Program Analysis (TAPAS'10)*. Perpignan, France, sept. 2010. URL : <https://hal.inria.fr/inria-00523320> (cf. p. 2).
- [W6] Laure GONNORD, Nicolas HALBWACHS et Pascal RAYMOND. “From Discrete Duration Calculus to Symbolic Automata”. In : *Third International Workshop on Synchronous Languages, Applications, and Programs (SLAP'04)*. T. 153. 4. Barcelona, Spain, mar. 2003, p. 3-18. URL : <https://hal.archives-ouvertes.fr/hal-00198433>.

#### National (french) Conferences

- [FC1] Laure GONNORD et Sébastien MOSSER. “Du code aux modèles, des modèles au code : enseigner les langages dédiés (DSL)”. In : *Conférence en Ingénierie du Logiciel (CIEL'18)*. Grenoble, France, juin 2018. URL : <https://hal.archives-ouvertes.fr/hal-01816239>.



## Invited talks, keynotes

- [INV1] L. GONNORD. *Experiences in designing scalable static analyses*. Invited talk, Journées FAC, Toulouse. Avr. 2018 (cf. p. 2).
- [INV2] L. GONNORD. *Experiences in designing scalable static analyses*. Keynote, LOPSTR Conference, Frankfurt am Main. 2018 (cf. p. 2).
- [INV3] L. GONNORD. *Validation of Memory Accesses Through Symbolic Analyses*. Invited talk, Google, Mountain View, June 2015. 2015 (cf. p. 2).
- [INV4] D. MONNIAUX et al. *Path-focused analysis of numerical transitions*. Invited talk, June 30, SVARM & VERIFY workshop, Manchester, co-located with IJCAR. 2012.

## Research reports, preprints

- [R1] Laure GONNORD, Paul IANNETTA et Lionel MOREL. *Semantic Polyhedral Model for Arrays and Lists*. Research Report RR-9183. Inria Grenoble Rhône-Alpes; UCBL; LIP - ENS Lyon; CEA List, juin 2018, p. 1-28. URL : <https://hal.archives-ouvertes.fr/hal-01815759>.
- [R2] Romain FONTAINE, Lionel MOREL et Laure GONNORD. *Combining dataflow programming and polyhedral optimization, a case study*. Technical Report RT-0490. Inria Rhône-Alpes; CITI - CITI Centre of Innovation in Telecommunications and Integration of services; LIP - ENS Lyon, juil. 2017, p. 40. URL : <https://hal.archives-ouvertes.fr/hal-01572439>.
- [R3] Laure GONNORD, Szabolcs-Martón BAGOLY et Lionel MOREL. *Static Analysis via Horn Encoding from synchronous Dataflow Programs*. Technical Report RT-0492. Université Lyon 1 Claude Bernard, LIP & INSA, CITI, oct. 2017, p. 25. URL : <https://hal.inria.fr/hal-01614637> (cf. p. 2).
- [R4] Julien BRAINE, Laure GONNORD et David MONNIAUX. *Verifying Programs with Arrays and Lists*. Inter-ship report. ENS Lyon, juin 2016. URL : <https://hal.archives-ouvertes.fr/hal-01337140> (cf. p. 2).
- [R5] Maroua MAALEJ et al. *Combining Range and Inequality Information for Pointer Disambiguation*. Research Report RR-9076. ENS Lyon; CNRS; INRIA, déc. 2016. URL : <https://hal.inria.fr/hal-01429777>.
- [R6] David MONNIAUX et Laure GONNORD. *An encoding of array verification problems into array-free Horn clauses*. Research Report. Juil. 2015. URL : <https://hal.archives-ouvertes.fr/hal-01206882>.
- [R7] Maroua MAALEJ et Laure GONNORD. *Do we still need new Alias Analyses?* Research Report RR-8812. Université Lyon Claude Bernard / Laboratoire d'Informatique du Parallélisme, nov. 2015. URL : <https://hal.inria.fr/hal-01228581>.
- [R8] Paul FEAUTRIER, Abdoulaye GAMATIÉ et Laure GONNORD. *Enhancing the Compilation of Synchronous Dataflow Programs with a Combined Numerical-Boolean Abstraction*. Research Report HAL number 780521. Author Version of [FGG12] journal paper. University of Lille et Éns Lyon, jan. 2013. URL : <http://hal.archives-ouvertes.fr/hal-00780521>.
- [R9] Laure GONNORD et Peter SCHRAMMEL. *Abstract acceleration in linear relation analysis (extended version)*. Research report HAL number 787212. Research report version of the [GS14] journal paper. University of Lille et University of Oxford, fév. 2013. URL : <http://hal.archives-ouvertes.fr/hal-00787212>.
- [R10] Christophe ALIAS et al. *Bounding the Computational Complexity of Flowchart Programs with Multi-dimensional Rankings*. Research Report 7235. INRIA, mar. 2010. URL : <https://hal.inria.fr/inria-00464356>.
- [R11] Laure GONNORD et Nicolas HALBWACHS. *Abstract Acceleration to improve precision of Linear Relation Analysis*. Research Report. Verimag, mar. 2010. URL : <http://verimag.imag.fr/>.
- [R12] Vlad RUSU, Laure GONNORD et Benoît COMBEMALE. *Formally Tracing Executions From an Analysis Tool Back to a Domain Specific Modeling Language's Operational Semantics*. Research Report 7423. INRIA, oct. 2010. URL : <https://hal.inria.fr/inria-00526561>.
- [R13] Christophe ALIAS et al. *Program Termination and Worst Time Complexity with Multi-Dimensional Affine Ranking Functions*. Research Report 7037. INRIA, sept. 2009. URL : <https://hal.inria.fr/inria-00434037>.
- [R14] Laure GONNORD et Jean-Philippe BABAU. *Resource management with Qinna framework : the remote viewer case study*. Technical Report 6562. INRIA, juin 2008. URL : <https://hal.inria.fr/inria-00288593>.