



RESEARCH CENTER
Rennes - Bretagne-Atlantique

FIELD

Activity Report 2012

Section highlights of the Team

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ALF Project-Team

2.2. Highlights of the Year

- André Seznec has received the **first Intel Research Impact Medal** for "His exemplary work on high-performance computer micro-architectures, branch prediction, and cache architecture, have been of tremendous benefit to Intel, the industry, and the academic community as a whole.". (See <http://www.intel.es/content/www/us/en/education/university/university-research-award.html>).
- André Seznec has been elevated as an IEEE Fellow "for contributions to design of branch predictors and cache memory for processor architectures".

CAIRN Project-Team

2.2. Highlights of the Year

- Olivier Berder defended its "Habilitation à Diriger des Recherches (HDR)" thesis in 2012.

CELTIQUE Project-Team (section vide)

ESPRESSO Project-Team

2.4. Highlights of the Year

Polarsys is an Industry Working Group focusing on open source tools for the development of embedded systems. Polychrony was used to define the Tool Quality Assurance Plan of the Polarsys platform according to the DO-178B and DO-178C certification standards. Polychrony has been integrated in the experimental Polarsys platform.

Jean-Pierre Talpin received the ACM/IEEE LICS Test of Time Award for his paper “A type and effect discipline”, with his co-author Pierre Jouvelot.

S4 Project-Team (section vide)

TASC Project-Team

2.2. Highlights of the Year

1. The **IBEX** library has been entirely re-factored from scratch to provide a more clean and easy-to-use interface as well as a more powerful engine and made available in December 2012 on multiple platforms (Linux, MacOS, Windows). Global optimization and system solving front-end algorithms have been tested on more than 500 benchmarks.
2. Significant advance on learning constraints models for highly structured problems was done in 2012. The system [19] is based on the global constraint catalog, providing the library of constraints that can be used in modeling, and the Constraint Seeker tool, which finds a ranked list of matching constraints given one or more sample call patterns. Surprisingly, the **system** often finds usable models even when working with a single, positive example.

VERTECS Project-Team

2.2. Highlights of the Year

The article [6] entitled Probabilistic omega-automata and co-authored by Nathalie Bertrand, together with Christel Baier and Marcus Grösser from TU Dresden, has been published in the Journal of the ACM. This article extends a paper published in 2008 in the proceedings of FoSSaCS, which received the EATCS best paper award, and already had a strong impact in the verification community.

ASPI Project-Team (section vide)

I4S Team

2.2. Highlights of the Year

- + Prize : M. Döhler has received the Foundation of Rennes 1st Prize 2012 for his PhD.
- + The team was given the privilege to organize the next joint EWSHM and PHM conference in 2014 in Nantes together with IFSTTAR and Nantes University.

IPSO Project-Team

2.3. Highlights of the Year

- The team is part of the newly accepted Labex “Lebesgues Center” (see <http://www.lebesgue.fr/>).
The Lebesgue Center (Foundations, Interactions, Application and Training) has been selected as an excellence cluster in February 2012. The Center proposes to build a highly attractive and efficient Research Center and Graduate School in Western France that will coordinate the research in geometry, analysis, statistics and probabilities with strong interdisciplinary links to the socio-economic environment and its applications.
Coordinators : Vũ Ngọc San (Irmarr, Rennes 1) together with Arnaud Debussche (Irmarr, ENS Cachan, IPSO), Christoph Sorger and Laurent Guillopé (LMJL, Nantes).
- Two members of the team, Florian Méhats and Mohammed Lemou, published a paper in “*Inventiones Mathematicae*” (see [31])
- Erwan Faou published the book [34] in the series “Zurich Lectures in Advanced Mathematics. Zürich: European Mathematical Society (EMS)”.
- Arnaud Debussche has launched with Boris Rozovskii a new journal entitled “*Stochastic Partial Differential Equations: Analysis and Computations*”, edited by Springer.

DYLISS Team

2.1. Highlights of the Year

- François Coste was the co-chair of the French conference in bioinformatics (JOBIM) which was organized in Rennes in July 2012.
- Matthias Gallé, a former PhD in the team, won the accessit thesis prize from AFIA. This work followed by F. Coste has been achieved in the framework of a cooperation with Universidad Nacional de Cordoba, thanks to a MinCYT-Inria program [14].
- Santiago Videla won a best paper award at the conference CMSB [19] ¹. This work implies a cooperation with EBI (UK) together with universities of Heidelberg, Potsdam and Padova.

BEST PAPERS AWARDS :

[19] **CMSB - 10th Computational Methods in Systems Biology 2012.** S. VIDELA, C. GUZIOLOWSKI, F. EDUATI, S. THIELE, N. GRABE, J. SAEZ-RODRIGUEZ, A. SIEGEL.

¹<http://sites.brunel.ac.uk/cmsb2012>

FLUMINANCE Project-Team (section vide)

GENSCALE Team

2.2. Highlights of the Year

- GenScale organized **JOBIM 2012**, the French conference on computational biology which gathered 375 participants in Rennes. [[web site: http://jobim2012.inria.fr/](http://jobim2012.inria.fr/)].
- GenScale and CWI proposed the first web server for comparison of protein structure alignments (**CSA**). [[web site: http://csa.project.cwi.nl](http://csa.project.cwi.nl)]
- KLAST software released by Korilog. KLAST is an improved version of the PLAST technology developed by GenScale for bank-to-bank sequence similarity search. [[Korilog promotion](#)]

SAGE Project-Team

2.2. Highlights of the Year

The results of the year are focused on numerical models and simulations for flow in porous fractured media. For this subject only, the team published three papers in journals, gave an invited plenary talk and two invited talks in minisymposia. Societal and economical issues concern environment and energy, such as groundwater resources, prevention and remediation of pollution, geothermy, etc.

SERPICO Team (section vide)

VISAGES Project-Team

2.2. Highlights of the Year

Aymeric Stamm received the Magna Cum Laude Merit Award from the ISMRM organisation for [42] .

BEST PAPERS AWARDS :

[42] **Proc. Intl. Soc. Mag. Reson. Med.**. A. STAMM, P. PEREZ, C. BARILLOT.

ACES Project-Team

2.2. Highlights of the Year

Aces designed and developed several applications based on the coupled objects (see section 3.3). Our results have been recognized: the paper that presents the principle of "pervasive integrity checking" has received a best paper award in ANT 2011. And a part of Ubi-check software has been demonstrated at IEEE Percom 2012, and has received the Best Demo Award [7].

ASAP Project-Team

2.3. Highlights of the Year

- **Best Paper Award PODC 2012** ACM Symposium on Principles of Distributed Computing (G. Giakkoupis and P. Woelfel, *On the time and space complexity of randomized test-and-set*).
- **Chair of the ACM Software System Award committee** (A.-M. Kermarrec)
- **ERC Proof of Concept Grant** (A.-M. Kermarrec)

ASCOLA Project-Team

2.2. Highlights of the Year

This year we have produced three major scientific results. Concerning the foundations of programming, we have extending the Calculus of Construction, the type theory underlying the Coq theorem prover by new logical principles that haven't been tractable before [22], see Sec. 6.1 . We have also extended the A Calculus, the currently most comprehensive foundational calculus for AspectJ-like and history-based aspect models, by a non-deterministic semantics and have provided a type soundness proof that is close to standard mathematical reasoning and automated using Coq [12], see Sec. 6.2 . In the domain of efficient Cloud infrastructures, we have proposed DVMS, a fully-distributed and autonomous system for VM scheduling, that includes one of the currently most highly-scalable scheduling algorithm [13], see Sec. 6.3 .

ASCOLA is part of the new EU FP7 IP project A4Cloud on Accountability for the Cloud, a project with 13 industrial and academic partners, see Sec. 8.2 .

Finally, ASCOLA members have organized the Grid'5000 international winter school at École de Mines de Nantes, which brought together seventy, mostly European, PhD students and senior researchers, see Sec. 9.1 .

ATLANMOD Team

2.3. Highlights of the Year

- Jordi Cabot has successfully defended his HdR. Title of the habilitation thesis: *MDE 2.0.: pragmatic model verification and other stories*
- Publication of the book *Model-Driven Software Engineering in Practice* (Morgan and Claypool) co-authored by Jordi Cabot. See also the popularization section.

CIDRE Project-Team (section vide)

DIONYSOS Project-Team

2.2. Highlights of the Year

We had two best paper awards in 2012, one on video delivery techniques (see 5.4 and the project VIPEER 7.2.3), and the other one on QoE for Femto cells (see 5.1).

BEST PAPERS AWARDS :

[73] **International Conference on Network of the Future**. L. ZHE, K. SBAL, Y. HADJADJ-AOUL, A. GRAVEY, D. ALLIEZ, J. GARNIER, G. MADEC, G. SIMON, K. D. SINGH.

[71] **IEEE International Conference on Communication (ICC)**. T. TALEB, A. KSENTINI.

DISTRIBCOM Project-Team (section vide)

KERDATA Project-Team

2.2. Highlights of the Year

- The KerData project-team has been officially created on July 1st 2012 as a Joint Project-Team with ENS Cachan/Brittany and INSA Rennes, for a 4-year term.
- Alexandru Costan, a former Post-Doc fellow at the KerData project-team, has been hired on a permanent position at INSA. Alexandru got his PhD in Valentin Cristea's NCIT group at Polytechnic University of Bucharest (Romania), our partner in the *DataCloud@work* Inria Associate Team.
- The KerData project-team organized the 7th Workshop of the Inria-Illinois Joint Laboratory on Petascale Computing, June 13-15, 2012 <http://jointlab.ncsa.illinois.edu/events/workshop7/>.
- After successful experiments with up to 9000 cores on the Kraken Cray XT5 machine (NICS) in 2011, Damaris scaled up to 16000 cores on Oak Ridge's leadership supercomputer Titan (now first in the Top500), providing in-situ analysis to the CM1 tornado simulation.

MYRIADS Project-Team

2.5. Highlights of the Year

- Support for research and innovation Inria Award received in June 2012 by David Margery, Grid'5000 technical director, hosted in Myriads team;
- ASF (ACM SIGOPS de France) Best PhD thesis in system for Anne-Cécile Orgerie who has joined Myriads team in October 2012 (PhD advised by Laurent Lefèvre and Isabelle Guérin-Lassous at ENS de Lyon and defended in September 2011) ;
- Best Paper finalist at CloudCom 2012 (paper presenting the results of the work of the Master internship of Armel Esnault, co-advised by Eugen Feller and Christine Morin);
- Highly successful second annual review by the European Commission of the Contrail project, coordinated by Christine Morin, assisted by Roberto Cascella, technical manager.

TRISKELL Project-Team

2.2. Highlights of the Year

The evaluation seminar has been the main event for the team in 2012. We believe it is a highlight, since we have been evaluated on all our results and activities on the 2008 - 2012 period, and the feedback from the reviewers panel is very positive. They have emphasized the high quality of our results and also encouraged to pursue our perspectives of software engineering for open systems.

DREAM Project-Team (section vide)

LAGADIC Project-Team

2.2. Highlights of the Year

- Marie Babel and Alexandre Krupa have defended their HdR in June 2012 [10] and December 2012 [13] respectively.
- Our paper [38] related to visual servoing based on dense ultrasound images (see Section 6.4.1) has been selected as one of the three finalists for the Best Oral Presentation in the Hamlyn Symposium on Medical Robotics'2012.

METISS Project-Team

2.2. Highlights of the Year

The 2nd Prize of the Rennes 1 Foundation was given to Ngoc Duong for his PhD co-supervised by Emmanuel Vincent and Rémi Gribonval.

For his contributions to the field, Emmanuel Vincent was awarded the 2012 SPIE ICA Unsupervised Learning Pioneer Award and gave a keynote at the SPIE DSS conference [49].

Emmanuel Vincent defended his Habilitation à Diriger des Recherches [31].

Reaching the end of its maximum lifespan, the Metiss project-team terminated at the end of the year 2012 and led to the creation of a new project-team Panama, headed by Rémi Gribonval.

MIMETIC Team

2.2. Highlights of the Year

- Franck Multon co-organized (with Pr. Qunsheng Peng) the 3rd sino-French symposium on computer graphics and virtual reality in QingDao, China, June 18-21 2012 in coordination with the 17th National Chinese Conference on CAD&CG and the Ninth National Conference on Intelligent CAD and Digital Entertainment
- Organization of the 5th international conference on Motion in Games in Rennes, France, November 15-17, 2012. <http://mig2012.inria.fr/>.
- HDR defense of Benoit Bideau entitled "Biomécanique du mouvement et interactions sportives", Nov 19th, 2012.

SIROCCO Project-Team

2.6. Highlights of the Year

- The paper “Hybrid template and block matching algorithm for image intra prediction” by Safa Cherigui, Christine Guillemot, Dominique Thoreau, Philippe Guillotel and Patrick Perez has received one of the three best student paper awards at IEEE-ICASSP, Kyoto, March 2012 [21].
- The paper “Map-aided locally linear embedding methods for image prediction” by Safa Cherigui, Christine Guillemot, Dominique Thoreau, Philippe Guillotel and Patrick Perez has been among the 11 finalists (out of 500 student papers) for the best student paper award at IEEE Intl. Conf. on Image Processing, ICIP, Oct. 2012.

TEXMEX Project-Team

2.2. Highlights of the Year

- The project-team has participated to three tasks in the MediaEval'2012 evaluation campaign. We have obtained the best results for the Placing Task in the run without external data.
- We have obtained top results the ETAPE named entities evaluation campaign. Our system was rank first, significantly outperforming the concurrent submitted systems.

VR4I Team

2.2. Highlights of the Year

2.2.1. *Best paper award*

The paper "Combining Brain-Computer Interfaces and Haptics: Detecting Mental Workload to Adapt Haptic Assistance" [22] has obtained the best paper award at Eurohaptics 2012

2.2.2. *Honorable mention*

The paper "Efficient Collision Detection for Brittle Fracture" [23] has obtained the honorable mention at Symposium on Computer Animation (SCA-2012)

2.2.3. *Inauguration of Immersia*

The Immersia platform has been officially inaugurated the 20th of June 2012, by Bertrand Braunschweig, Inria Rennes, Bretagne Atlantique director, Claude Labit, vice-president of the Rennes 1 University scientific council, Antoine Petit, Inria deputy managing director, with Jean Le Traon, research and technology regional deputy director, Bernard Pouliquen, vice-president of the regional council, Clotilde Tascon-Mennetrier, vice-president of the general council, and Daniel Delaveau, Mayor of Rennes and president of Rennes Metropole. The platform is currently extended with the installation of the two lateral screens, improving the sensation of immersion in the VR applications.