Activity Report 2011

Section highlights of the Team

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ACES Project-Team (section vide)
ADAM Project-Team

2.2. Highlights

- Daniel Romero’s Ph.D thesis [12], [17] has shown that Feedback Control Loops (FCLs) can be ubiquitous and enable the integration of context information between heterogeneous entities, which is necessary in order to adapt applications according to the current environmental conditions. The decision making of the Ubiquitous FCLs is based on constraint programming techniques in order to select a new target configuration of the application regarding dimensions such as Quality of Service (QoS), reconfiguration cost and resource consumption.

- Carlos Parra’s Ph.D. thesis [11] extends software product lines as Dynamic Software Product Lines (DSPL) by providing mechanisms to adapt products at runtime. We have characterized two processes of product derivation: design weaving and runtime weaving. Design weaving aims at building a single product from a selection of variants, it also features a set of algorithms that guarantee the correctness of the products being derived as detailed in [69]. Runtime weaving aims at adapting a product being executed by changing its configuration in terms of selected variants. Both processes use the same variability and aspect models which enables developers to have a unified representation of the software adaptation [16]. For the implementation, design weaving is based on model transformations and code generation, runtime weaving is based on the dynamic platform FraSCAti to execute reconfigurations during the execution of products.
AMAZONES Team (section vide)
2.2. Highlights

During this year, while we have been pursuing our research on advanced service-oriented architectures and related middleware solutions for next generation networking environments, we have made initial progress in research on several new subjects, called for by the ongoing drastic evolution of the networking environment:

- Dynamic interoperability among networked systems towards making them eternal, by way of on-the-fly generation of connectors based on adequate system models. This research is part of a major European collaborative project within the Future and Emerging Technology program of the EC FP7-ICT (§ 6.2, § 7.1.1).
- The use of Models@run.time to extend the applicability of models and abstractions to the runtime environment, arising from our anticipation that Models@run.time will play an integral role in the management of extremely distributed systems. We are exploring the use of Models@run.time to tackle the crucial problem of uncertainty in extremely distributed systems that are aware of their own requirements, as well as to support the runtime synthesis of software that will be part of the executing system (§ 6.2).
- Interaction paradigm abstractions and service oriented middleware for choreographies in the ultra-large scale future Internet. This research is also part of a major European collaborative project within the Software and Service Architectures and Infrastructures programme of the EC FP7-ICT (§ 6.4, § 7.1.2).
- System-level support for mobile social applications, by way of a middleware architecture that involves research in the areas of semantic models for social data, mobile distributed storage, a novel policy framework for access control, and efficient, predictive data-replication on resource-constrained devices, among others (§ 6.6).

Along with the above research, we completed the transfer of technology of our middleware technology for mobile handheld devices:

- The AMBIENTIC spin-off (http://www.ambientic.com/) was launched in early 2011. AMBIENTIC leverages the ARLES middleware technology that has been developed over the last 10 years for supporting the development of mobile collaborative services. AMBIENTIC specifically develops innovative mobile distributed services on top of the iBICOOP middleware that allows for seamless interaction and content sharing in today’s multi-* networks. The AMBIENTIC project is winner of the Concours national d’aide à la création d’entreprises de technologies innovantes award (http://www.enseignementsup-recherche.gouv.fr/pid20162/concours-national-d-aide-a-la-creation-d-entreprises-innovantes.html) in the Emergence category in 2009 and in the Création category in 2010.

In addition to the above, we co-organized a successful summer school on Formal Methods for Eternal Networked Software Systems, in the “SFM: International School on Formal Methods for the Design of Computer, Communication and Software Systems” series at Bertinoro, Italy. It covered topics such as connecting eternal software systems, formal foundations for connectors, dynamic connector synthesis, interaction behavior monitoring and learning, and dependability assurance of connected systems. We also co-organized FOME: Future of Middleware event at the 12th ACM/IFIP/USENIX International Middleware Conference in Lisbon, Portugal, which brought together a number of invited leading researchers in the field selected to offer comprehensive coverage of the key issues to be tackled in the near future in the area of Middleware research, such as: right abstractions for the development of future distributed systems; how to achieve interoperability and openness; and how to ensure dependability and security in the face of extremely large scale and heterogeneity in future distributed systems.
ASAP Project-Team

2.3. Highlights

1. **A.-M. Kermarrec** received the Monpetit Award from the French Academy of Science in 2011.

2. **D. Imbs** received the best student paper award with [38], see below.

**BEST PAPER AWARD:**
[38] *Proc. 13th Int’l Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS’11).*
D. IMBS, M. RAYNAL.
2.2. Highlights

This year the ASCOLA team has produced several particularly notable results in the academic realm as well as concerning the transfer of academic results to industry.

We have contributed several first-rate results on new programming language features. We have shown, in particular, how to define the Java security model using aspects [21], how to integrate Object-Oriented programming, Event-Based Programming and Aspect-Oriented Programming [24], and have extended results on the preservation of formal properties in the presence of aspects [17] (see Sec. 6.1 for details).

Based on ASCOLA’s results on virtual machine management (developed under the lead of Jean-Marc Menaud), the start-up EasyVirt was founded in July 2011. EasyVirt develops and distributes software solutions for the management and optimization of data centers in active cooperation with the ASCOLA team (see Sec. 7.1 ).
ATLANMOD Team

2.3. Highlights

- Team consolidation after the change of the team leader. The level of activity of the team has not been affected by the process.

- New projects and technology transfer actions that guarantee the funding for the immediate future and offer new insights on interesting industrial problems.

- Opening of new research lines with the integration of new PhD Students. In particular, we would like to mention a new line on the use of models to improve the security of information systems in collaboration with F. Cuppens (Télécom Bretagne).

- Very good ratio of number of published papers per faculty member of the team.

- International team. AtlantMod has members from eight different nationalities. All these different research backgrounds are definitely a plus for the team.
CIDRE Project-Team (section vide)
2.2. Highlights

- During the period 2006-2011, the Focus members have had 6 papers in the prestigious conference IEEE Symposium on Logic in Computer Science (LICS).
- Fabrizio Montesi won the Confindustria/CINI italian national prize for one of the best six Master’s Theses in Information and Communication Technologies, with the thesis "Jolie: a service-oriented programming language". The contest receives applications from all areas related to ICT, from engineering to computer science.
INDES Project-Team (section vide)
MYRIADS Team

2.5. Highlights

- Pierre Riteau won one of the three Best Poster Awards in the PhD Forum of the IPDPS 2011 conference.
OASIS Project-Team

2.2. Highlights


BEST PAPER AWARD:
PHOENIX Project-Team

2.2. Highlights

- Launching of a research activity on digital cognitive assistance (two associate members in cognitive science, starting of a PhD thesis and an ADT, national and international collaborations)
- Technology transfer action for DiaSuiteBox (CSATT support, demonstrations and showcases, starting of partnerships)
- Three PhDs defended in 2011 (Damien Cassou, Henner Jakob and Julien Mercadal)
- Organization of the International IFIP Working Conference on Domain-Specific Languages (DSL 2011) and the meeting of the Working Group IFIP 2.11 in Bordeaux
POPS Project-Team (section vide)
REGAL Project-Team (section vide)
RMOD Project-Team

2.4. Highlights

- Four versions of Moose (our open-source reengineering platform) were released (4.2-4.5) (http://www.moosetechnology.org/).
- Veronica Uquillas-Gomez received the 2011 MoVES Most Promising Young Research Award during this year’s MoVES Annual Event. MoVES (Modelling, Verification and Evolution of Software) is part of an Interuniversity Attraction Poles Programme funded by the Belgian State, Belgian Science Policy.
- Pharo 1.2 and 1.3 were released (http://www.pharo-project.org) with an accompanying book [36] (http://www.pharobyexample.org) translated in french and spanish. A japanese translation is under way.
- Damien Pollet’s first peer-reviewed publication, co-authored during his masters in the Triskell group, has received the Ten Years Most Influential Paper Award at the Models 2011 conference in Wellington, NZ.
- Stéphane Ducasse got Distinguished Visiting Fellowship of the Royal Academy of Engineering.
- Fuel, a fast binary serializer, won the first prize at this year ESUG Innovation Technology Awards.
- RMoD organized the CEA-EDF-Inria "Deep into Smalltalk" school in March. The school had over 40 participants and is available on Youtube (over 27 hours of tutorials).
- RMoD participated to the organization of the ESUG conference at Edinburg in August (150 participants).
SARDES Project-Team (section vide)
2.2. Highlights

- Hien Thi Thu Truong, Claudia Lavinia Ignat, Mohamed Rafik Bouguelia from the SCORE team and Pascal Molli, Professor at the University of Nantes, received the Best Paper Award at the CollaborateCom 2011 conference.
- Olivier Perrin has been promoted to the rank Professor at the University of Nancy 2.
- François Charoy has spent six month as visiting academic at SAP Research Australia as well as at the NICTA (National ICT Australia Ltd).
- Three PhD have been successfully defended in the SCORE team in 2011[1], [3], [2].

Best Paper Award:
TRISKELL Project-Team

2.2. Highlights

- Gerson Sunyé, Damien Pollet, Yves Le Traon and Jean-Marc Jézéquel received the Most Influential Paper Award of MODELS 2011, the 14th International Conference on Model Driven Engineering Languages and Systems. Their paper entitled "Refactoring UML Models", being published at the Models conference in 2001, has been selected as one of two papers to receive this award of a most influential paper after ten years [57].

- The Diva European project has been a real success as stated by the assessment of the final review: Excellent progress (the project has fully achieved its objectives and technical goals for the period and has even exceeded expectations).
2.2. Highlights

- ANR has granted the project SONGS (Simulation Of Next Generation Systems) with an attribution of 1.8 million euro. This project follows the project USS-SimGrid (Ultra Scalable Simulation with SimGrid). Martin Quinson is the national coordinator of both project. This acceptation confirms our leading position on the domain of experimental methodologies, and will open the door to future new collaborations. Without being direct members, IBM research and the CERN are associated to this project.

- Sébastien Badia and Lucas Nussbaum received the Best Poster award at Rencontres France Grilles for their work on the deployment of gLite on Grid’5000 [21]. This work is a demonstration of our mastering and our leadership role on the Grid’5000 testbed. It opens a path for further collaboration with the Production Grids community around experimentation on their software stack.
CEPAGE Project-Team

2.3. Highlights

- The members of CEPAGE have been involved in the following program committees: IPDPS 2011 (Vice-Chair, Algorithm Track), PODC 2011 (General Chair), SIROCCO 2011 (Co-chair), EuroPar 2011 (Local Chair, P2P Track), STACS 2011, ESA 2011, FOMC 2011, ADHOC-NOW 2011, IWOCA 2011, IC3 2011, RENPAR 2011, ISCIS 2011, DISC 2011.

- Nicolas Hanusse has become Directeur de Recherche at CNRS. (Ralf Klasing became Directeur de Recherche in 2010 and Cyril Gavoille became junior member of the Institut Universitaire de France in 2009).

- Adrian Kosowski has become a member of the junior chapter of the Polish Academy of Sciences for the term of office 2012–2016.
2.2. Highlights

- Mathias Jacquelin, best poster award, IPDPS 2011 PhD forum.
- In 2011, we designed and developed the SpeQuloS middleware, which is dedicated to provide Quality of Service to Best-Effort Distributed Computing Infrastructure. SpeQuloS runs now in production at IN2P3/University Paris XI and is being deployed on the European Desktop Grid Infrastructure. Simon Delamare won the best presentation award at the Grid’5000 Spring school.
2.2. Highlights

**BEST PAPER AWARD:**

HIEPACS Project-Team

2.2. Highlights

- With the Inria GRAND-LARGE Project-Team, we are involved in the G8 project entitled “Enabling Climate Simulation at Extreme Scale” (https://wiki.engr.illinois.edu/display/G8/G8+ESC++Enabling+Climate+Simulations+at+Extreme+Scale) which also involves research groups from Europe, Japan and North America.

- With University of Tennessee (ICL) and University of Colorado at Denver an associated team has been initiated, which name is MORSE (http://www.inria.fr/en/teams/morse). The goal of Matrices Over Runtime Systems at Exascale (MORSE) project is to design dense and sparse linear algebra methods that achieve the fastest possible time to an accurate solution on large-scale multicore systems with GPU accelerators, using all the processing power that future high end systems can make available. To develop software that will perform well on petascale and exascale systems with thousands of nodes and millions of cores, several daunting challenges have to be overcome, both by the numerical linear algebra and the runtime system communities. By designing a research framework for describing linear algebra algorithms at a high level of abstraction, the MORSE team will enable the strong collaboration between research groups in linear algebra and run-time systems needed to develop methods and libraries that fully benefit from the potential of future large-scale machines. The first outcome of this associated team is the release of the MAGMA package (http://icl.cs.utk.edu/magma/).

- The thesis of Mathieu Chanaud (in collaboration with CEA/CESTA) has led to the design and the parallel implementation of an hybrid solver combining a parallel sparse direct solver and full multigrid cycles. A 1.3 billion unknown sparse linear system, arising from the discretization of the 3D Maxwell equations on a fully unstructured mesh, has been solved very efficiently on the CEA/DAM TERA100 supercomputer.
2.2. Highlights

Gilles Kahn/SPECIF PhD Thesis Award 2011. Bogdan Niclae, former PhD student in the KerData Team (defense on November 30, 2010) won the 2nd Prize at the 2011 Gilles Kahn/SPECIF PhD Thesis Award for his thesis entitled BlobSeer: Towards efficient data storage management for large-scale, distributed systems.

ACM Student Research Competition at ICS 2011. Matthieu Dorier, Master intern at KerData in Summer 2011 (and now a PhD student there), was awarded the 2nd Prize at the ACM Student Research Competition organized in the framework of the ICS 2011 Conference (http://ics-conference.org/, Tucson, Arizona, May 2011), for his poster entitled Damaris - Using Dedicated I/O Cores for Scalable Post-petascale HPC Simulations [16].

MESCAL Project-Team

2.3. Highlights

- Brigitte Plateau was nominated “Chevalier de la légion d’honneur” for her remarkable scientific contributions and her dedication to the influence of Grenoble in the scientific community.
- Derrick Kondo was the recipient of a Google award in 2011 for his work on the prediction of idleness in data-centers.
- Bruno Gaujal, Gaël Gorgo and Jean-Marc Vincent received the best paper award at the ASMTA conference (see Section 6.1 for a detailed account of their contribution).
- The software RTaW-Pegase has received the "Best Tool Demo Award" at the workshop "RTSS@work" at the RTSS conference. This tool is being developed by RTaW, a Start-up company of Inria Lorraine with consulting contributions by Bruno Gaujal.

Best Paper Award:
2.2. Highlights

- Denis Trystram received the Google Research Award for his contributions within Moais on efficient management of distributed resources and multicriteria scheduling on emerging parallel platforms.
2.2. Highlights

- The hwloc software 5.2 is used for node topology discovery and process binding by the most popular MPI implementations, including MPICH2 and OPEN MPI and all their derivatives such as Intel MPI.
- The StarPU software 5.7 is used for dynamic scheduling by the state-of-the-art dense linear algebra library, Magma v1.1 http://icl.cs.utk.edu/magma/.
- Euro-Par is a major conference in parallel and distributed computing. It has been organized in Bordeaux from August 29 to September 2, 2011. It has featured 16 topics, 25 sessions and 12 workshops. 271 papers have been submitted and 81 papers have been accepted (29.9%). Moreover 3 invited lectures have been given. 330 persons registered at either the conference or the workshops. The website is http://europar2011.bordeaux.inria.fr/. The conference chairs were Emmanuel Jeannot, Raymond Namyst and Jean Roman. The institutions involved in the organization were INRIA, the LaBRI, the CNRS and others.
DIONYSOS Project-Team (section vide)
2.2. Highlights

The Laboratoire d’Excellence (Labex) CominLabs was selected as the only Labex in France in the area of software for the first Labex competition held in 2010 (Labex are Excellence Centers within the framework of Investissements d’Avenir; 100 have been selected in all disciplines). CominLabs gathers ten labs from Bretagne and Nantes in the sector of telecommunications and information systems, with an overall amount of 500 researchers (“équivalents chercheurs”) and a funding of 14M Euros for a duration of 10 years; 1.4M Euros was provided for the first year. Albert Benveniste is the Scientific Director of CominLabs.
DNET Team

2.2. Highlights

2.2.1. HiKoB

Guillaume Chelius is a founder of the HiKoB company, created the 4th of July 2011, an innovative startup in the field of sensor networking and embedded communicating measure. HiKoB employs 3 persons by the end of 2011.

2.2.2. Fellows

DNET conducts theoretical and experimental research on social networks. In order to gain a better understanding of their structure and the dynamics of information diffusion on such networks, and validate the notion of cohesion of a group of nodes (‘friends in the Facebook language) we launched Fellows an experimentation on Facebook. We introduce a novel way to automatically generate groups of friends, using only the information on “who knows who” within a user’s Facebook friends. By analyzing her/him Facebook connections, we are able to compute several groups/communities of friends. The user is able to create instantly corresponding Friend Lists on Facebook, and therefore have a better control on the diffusion of his/her publications.

2.2.3. Equipex FIT (Futur Internet of Things)

FIT is one of 52 winning projects in the Equipex research grant program. It will set up a competitive and innovative experimental facility that brings France to the forefront of Future Internet research. FIT benefits from 5.8€ million grant from the French government Running from 22.02.11 – 31.12.2019. The main ambition is to create a first-class facility to promote experimentally driven research and to facilitate the emergence of the Internet of the future. FIT is a joint project between UPMC, CNRS, INRIA, Telecom, LSIIT. It will be composed of distributed facility, heterogeneous devices, complementary components and be made of a Network Operations Center, a Cognitive Radio Testbed, several Embedded Communication Objects Testbed that will upgrade and extend the existing SensLAB sites and several Wireless OneLab Testbed.

BEST PAPERS AWARDS:
2.2. Highlights

The paper [22] was awarded as a best article in the 25th Int. Symp. on Distributed Computing (DISC 2011).
HIPECOM Project-Team

2.2. Highlights

1. **Organization of MobiHoc 2011.** The Twelfth ACM International Symposium on Mobile Ad Hoc Networking. The HIPECOM project contributed to the great success of this international conference held in Paris in May 2011. Philippe Jacquet served as General Chair, Christine Anocq as Local Arrangement Co-chair, Thomas Clausen as Finance Co-chair, Paul Muhlethaler, Anis Laouiti and Pascale Minet as Workshop Co-chairs, Emmanuel Baccelli as Registration Chair, Cédric Adjih as Web Chair.

2. **Contribution to the OCARI shows.** Pascale Minet, Cédric Adjih, Ichra Amdouni and Ridha Soua were active contributors as well as LIMOS, TELIT and EDF to the two OCARI shows organized by EDF. The first one in September was given for EDF executives. The second one in December was larger. Invited people came from government agencies and industries. The goal was to prove the feasibility of an OCARI wireless sensor network in industrial environments, focusing on time constrained traffic and energy efficiency.

3. **Habilitation à Diriger des recherches.** Aline Carneiro Viana got her HDR entitled *Putting data delivery into context: Design and evaluation of adaptive networking support for successful communication in wireless self-organizing networks* from UPMC-Sorbonne University on the 14th December 2011.
MADYNES Project-Team (section vide)
MAESTRO Project-Team

2.2. Highlights

- Patent with ALCATEL-LUCENT BELL LABS on “Stacking cells for seamless mobility management of high speed users in small cells networks” [87].
- One new grant from Orange Labs on “Quality of Service and Quality of Experience” (July 2010 – June 2011) (see Section 6.3).
- A research contract with the Flowxy startup on the joint optimization of compression and transmission activities of a data backup system (September 2010 – September 2011) (see Section 6.5).
- The Institute of Electrical and Electronics Engineers (IEEE) awarded Eitan Altman the title of IEEE Fellow (Class of 2010) for contributions to analysis, optimization, and control of telecommunication networks.

BEST PAPER AWARD:
[52] 7th International Conference on Network and Service Management (CNSM 2011). R. COMBES, Z. ALTMAN, E. ALTMAN.
MASCOTTE Project-Team (section vide)
2.2. Highlights

- Our work on “tracking Skype users mobility” received a lot of media attention this year (tens of articles in Le Monde, The New York Times, Slashdot, The Register, and more generally in international technical and general audience press...). This work has been published in IMC 2011[46].

- Our work on “usernames uniqueness and traceability” has been published in PETS 2011 [47], one of the most prestigious conference in the area of Computer Privacy, and has been awarded the Andreas Pfitzmann award for the best contribution. It also received a lot of media attention.

- Our LDPC-Staircase codes have been included this year as the primary AL-FEC (Application Layer Forward Erasure Correction code) solution for ISDB-Tmm (Integrated Services Digital Broadcasting, Terrestrial Mobile Multimedia), a Japanese standard for digital television (DTV) and digital radio. The commercial launch of ISDB-Tmm will happen in mid 2012. This success has been made possible, on the one hand, by major efforts in terms of standardization within IETF and on the other hand, by our efforts in terms of design and evaluation of two efficient software codecs of LDPC-Staircase codes. The fact that LDPC-Staircase codes have been preferred to a major AL-FEC competitor for the ISDB-Tmm standard, is the recognition of their intrinsic qualities and of an appropriate balance between several technical and non technical criteria. See new results section for more details.

- We participate to The FIT project, one of 52 winning projects from the first wave of the French Ministry of Higher Education and Research’s “Équipements d’Excellence” (Equipex) research grant programme. This 8-year project started in 2011 and will benefit from a 5.8 million euro grant from the French government. Its aims is to develop an experimental facility, a federated and competitive infrastructure with international visibility and a broad panel of customers. In the context of this project, are building a federated wireless testbed platform. See also http://fit-equipex.fr/.
RAP Project-Team (section vide)
RESO Project-Team

2.2. Highlights

- Three PhD students from RESO defended their work in 2011: Fabienne Anhalt (July 2011), Guilherme Koslovski (July 2011) and Anne-Cécile Orgerie (Sept. 2011).
- RESO was granted 2 new projects in 2011:
  - ANR Fetuses (start Jan 1, 2012)
  - FSN Magellan (kick-off December 2011, start February 2012)
2.2. Highlights

CorTex Equipex FIT: cognitive radio testbed

FIT (Futur Internet of Things) is one of 52 winning projects in the Equipex research grant program. It will set up a competitive and innovative experimental facility that brings France to the forefront of Future Internet research. FIT is a joint project between UPMC, CNRS, INRIA, Telecom, LSIIT. It will be composed of distributed facility, heterogeneous devices, complementary components and be made of a Network Operations Center, a Cognitive Radio Testbed, several Embedded Communication Objects Testbed that will upgrade and extend the existing SensLAB sites and several Wireless OneLab Testbed. Swing leads the deployment of the Cognitive Radio Testbed located at INSA Lyon, which will offer a multi-hops PHY layer level testbed for testing cooperative communications, cognitive radio and software radio architectures.

wiplan: Indoor wireless networks planning

Swing has been developing an original Indoor propagation simulation tool for 10 years. This propagation engine is extended to more complex environments within the iPLAN European project in cooperation with University of Bedfordshire, University of Sheffield and Ranplan Ltd (UK) to develop a premium Indoor wireless networks planning tool. During the coming year, this propagation engine will be connected to NS-3 in the framework of the ADT Mobsim.

TAPASCologne project: vehicular mobility dataset

Swing has generated a large-scale urban vehicular mobility dataset, built on data made available the Institute of Transportation Systems at the German Aerospace Center (ITS-DLR). The synthetic mobility trace faithfully reproduce car traffic in the city of Cologne, Germany, covering a region of 400 square kilometers for a period of 24 hours, comprising more than 700,000 individual car trips. The dataset is a significant step forward in the simulation of vehicular mobility for network research and practitioners.

\[\text{http://sdr-fit.project.citi-lab.fr/}\]
\[\text{http://wiplan.citi.insa-lyon.fr/}\]
\[\text{http://kolntrace.project.citi-lab.fr/}\]
2.2. Highlights

- The collaboration of TREC and the Wireless Foundations Center of UC Berkeley became part of the inria@siliconvalley program.
- The paper “Impact of Clustering on Diffusions and Contagions in Random Networks” [33] got the best paper award of NetGCOOP 2011: International conference on NETwork Games, COntrol and OPtimization.