



RESEARCH CENTER
Nancy - Grand Est

FIELD

Activity Report 2016

Section Contracts and Grants with Industry

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CAMUS Team

8. Bilateral Contracts and Grants with Industry

8.1. Caldera

Vincent Loechner and Cédric Bastoul are involved in a collaboration with the French company Caldera (<http://www.caldera.com>), specialized in software development for wide image processing. The goal of this collaboration is the development of parallel and scalable image processing pipeline for industrial printing. The project started in September 2016 and involves a contract established between the ICube laboratory and the Caldera company. This contract includes the funding of the industrial thesis (CIFRE) of Paul Godard (started in September 2016) on the topic of the collaboration, under the supervision of Vincent Loechner and Cédric Bastoul.

8.2. NANO 2017/PSAIC

The CAMUS team is taking part of the NANO 2017 national research program and its sub-project PSAIC (Performance and Size Auto-tuning thru Iterative Compilation) with the company STMicroelectronics, starting January 2015. Since the release of our automatic speculative parallelization framework Apollo, we have been working on an extension making Apollo usable as a advanced program profiling tool. We are also currently working in extending advanced loop optimization techniques to nonlinear loops using a linear virtual data layout remapping.

CARAMBA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Training and Consulting with HTCS

The training and consulting activities begun in 2012 with the HTCS company have been pursued, and the existing contract has been renewed in identical form.

CARTE Team (section vide)

PESTO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Electronic Voting Systems

Participants: Véronique Cortier, Mathieu Turuani.

Since 2014, a collaboration agreement has been signed between Loria and Scytl, a Spanish company who is proposing solutions for the organization of on-line elections, including legally binding elections, in several countries. In this context, Scytl has signed a contract with the Pesto team as well as the University of Birmingham (David Galindo) to design a formal proof of both verifiability and privacy of the protocol developed by Scytl, for a deployment in Switzerland.

VEGAS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

A two years licence and cooperation agreement was signed on April 1st, 2016 between WATERLOO MAPLE INC., Ontario, Canada (represented by Laurent Bernardin, its Executive Vice President Products and Solutions) and Inria. On the Inria side, this contract involves the teams VEGAS and OURAGAN (Paris), and it is coordinated by Fabrice Rouillier (OURAGAN).

F. Rouillier and VEGAS are the developers of the ISOTOP software for the computation of topology of curves. One objective of the contract is to transfer a version of ISOTOP to WATERLOO MAPLE INC.

VERIDIS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Modeling a Distributed File System

Participant: Stephan Merz.

Our group was contacted by Huawei R&D Silicon Valley for evaluating the suitability of using the TLA⁺ specification language for describing high-level protocols used in Cloud systems. We provided a specification of protocols used in the Ceph file system [53]. We also provided on-site training for Huawei engineers in Chengdu, China.

8.2. Logic for Business

Participant:

The group in Saarbrücken has established a master agreement with L4B (Logic for Business) on the exchange of data and the creation of bilateral research projects. L4B is involved in several consulting projects with the German car industry on product specification strategies, including software.

SPHINX Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

The Ph.D thesis of Boris Caudron is funded through a CIFRE contract with Thalès and a contract with the IECL. The goal of the Ph.D. thesis is to design new coupling techniques between integral equation methods and the finite element method for solving electromagnetic scattering problems. The advisors are Xavier Antoine (Sphinx) and Christophe Geuzaine (University of Liège).

TOSCA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- TOSCA Sophia is involved in a Cifre convention with Koris International. M. Bossy supervises M. Bonelli's Ph.D. thesis.
- M. Deaconu is involved in a bilateral contract with Venathec. She is supervising, with E. Vincent (EPI MULTISPEECH), the Ph.D. thesis of B. Dumortier on the acoustic control of wind farms noise.

7.2. Bilateral Grants with Industry

- Mireille Bossy is the Coordinator of the PEPS from AMIES granted with the SME Seatopic, on the wind downscaling, using finer local topography, for coastal activities.
- Mireille Bossy is the Coordinator of the TER project from the PGMO (FMJH) granted with the SME METIGATE, on the statistical description of coupled regional temperatures.

BIGS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Bilateral Contracts with Industry*

8.1.1.1. *Transgene 1. (2016-2017)*

Participants: A. Gégout-Petit, A. Muller-Gueudin, Y. Shi

Transgene (Euronext: TNG), part of Institut Mérieux, is a publicly traded French biopharmaceutical company focused on discovering and developing targeted immunotherapies for the treatment of cancer and infectious diseases. B. Bastien, head of the biostatistics team appeals to BIGS to select covariates among genomics, proteomics expressions linked to the success of a treatment of the lung cancer. This subject was the purpose of the master thesis of Y. Shi and a paper on the subject is in preparation.

8.1.1.2. *Transgene 2. (2016-2017)*

Participants: T. Bastogne, L. Batista, P. Vallois

Transgene (Euronext: TNG), part of Institut Mérieux, is a publicly traded French biopharmaceutical company focused on discovering and developing targeted immunotherapies for the treatment of cancer and infectious diseases. B. Bastien, head of the biostatistics team appeals to BIGS to model data collected in vivo for growth tumor and to measure the effect of the treatment on the dynamics of the tumor.

8.1.1.3. *SAFRAN Aircraft Engines (2016-2019)*

Participants: R. Azaïs, A. Gégout-Petit, F. Greciet

SAFRAN Aircraft Engines designs and products Aircraft Engines. For the design of pieces, they have to understand mechanism of crack propagation under different conditions. It appeals to BIGS for modeling crack propagation with Piecewise Deterministic Markov Processes (PDMP). It is the subject of F. Greciet PhD, granted by ANRT. F. Greciet presented her work during a Fédération Charles Hermite Journey on November the 23th. She was laureat of "Mathématiques, oxygene du monde numérique" poster challenge [33].

CAPSID Project-Team (section vide)

MIMESIS Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

The team is in close collaborations with:

InSimo is a startup we created in January 2013, after two years of thinking, maturation and incubation. Its founding members were all former team members of the SHACRA team (our previous team). The business model of the company is based on the SOFA platform and its community to transfer state-of-the-art simulation technologies into commercially-supported software components that medical simulator vendors can integrate into their products. The goal is to foster the creation of a new generation of medical simulators, highly realistic, faster to develop, allowing a broader commercial offer and novel uses. We collaborate with InSimo through the RESET ANR project.

In the context of the SOFA Consortium, the team is in close collaborations with:

Altran is a global leader in innovation and high-tech engineering consulting, Altran accompanies supports its clients in the creation and development of their new products and services. At the occasion of Altran internal scientific workshop, several members of the team (Rosalie Plantefève, Bruno Marques Jaime Guevara and Christoph Paulus) presented their work. We collaborate with Altran through the PhD thesis of Rosalie Plantefeve.

Anatoscope is a young start-up company created in 2015 by researchers, engineers and one surgeon. It develops a software solution to automatically build 3D digital avatars based on medical images of patients. The avatars allow biomechanical simulations of the real person.

TruPhysics develops Industry 4.0 software solutions to support manufacturing companies in development and sales processes by using a real-time and high-resolution physics simulation. We provide software that enables developers and engineers to simulate control programs, physical properties, kinematics and behavior of industrial robots, machines and assemblies. We collaborate with TruPhysics through the RASimAs FP7 project.

NEUROSYS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. CertiViBE

Laurent Bougrain is a member of the steering committee of OpenViBE and CertiViBE.

CertiViBE is a medically certifiable core for OpenViBE, the software for Brain Computer Interfaces and Neuroscience research. It is an Inria innovation lab to boost technology transfers from the Inria project-team Hybrid to Mensia Technologies SA (<http://www.mensiatech.com/>).

Founded in 2012, Mensia Technologies is a medical-device spin-off of Inria owning an exclusive worldwide license of the OpenViBE software for commercial applications. So far, OpenViBE has raised a lot of interest in the research community, especially on medical applications. However, OpenViBE being a research software, it does not yet match the requirements of medical devices in terms of stability, performance, documentation, as well as engineering processes in general, slowing down the transfer of OpenViBE-based medical research to industry. Within the CertiViBE project, Inria and Mensia Technologies are putting their task forces and respective expertise together to deliver a certifiable core for the OpenViBE software. While the OpenViBE software will continue to be published as an Open Source software, the project will dramatically facilitate the transfer of the research made with OpenViBE as it will be built on ready-to-certify foundations, following the processes and normative regulation of medical devices development including risk analysis, quality assurance and medical device software development and maintenance.

TONUS Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

We are involved in a common project with the company AxesSim in Strasbourg. The objective is to help for the development of a commercial software devoted to the numerical simulation of electromagnetic phenomena. The applications are directed towards antenna design and electromagnetic compatibility. This project was partly supported by DGA through "RAPID" (*régime d'appui à l'innovation duale*) funds. The CIFRE PhD of Thomas Strub is part of this project. Another CIFRE PhD has started in AxesSim on the same kind of topic in March 2015 (Bruno Weber). The new project is devoted to the use of a runtime system in order to optimize DG solvers applied to electromagnetism. The resulting software will be used for the numerical simulation of connected devices for clothes or medicine. The project is supported by the "Banque Public d'Investissement" (BPI) and coordinated by the Thales company.

COAST Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

6.1.1. Industrial funding Groupe Open (2016–2019)

Groupe Open is a leading french company specialised in digital services and operations. The goal of the project is to propose an industrial composition model for APIs that takes into account the new constraints imposed by this new way to distribute and operate software. It will be based on a formal API contract along with trust and reputation attributes in order to allow consumers to anticipate risks regarding the quality and the safety of services. A PhD student is under recruitment for this project. Coast funding : 237,000 €

6.2. Bilateral Grants with Industry

6.2.1. CIFRE Grant with Bonitasoft

Participants: François Charoy, Samir Youcef, Guillaume Rosinosky.

Bonitasoft is a leading software company in the domain of open source Business Process Management Systems. The objective of this grant is to help Bonitasoft to support effective elastic BPM operation in the Cloud by leveraging the business knowledge, the process models and the execution history of process instances and correlate them with cloud resource consumption. Guillaume Rosinosky has been recruited as a PhD Student to work on this project. We will define models that will be validated based on a detailed analysis of existing use cases that we have started to collect from Bonitasoft and its clients.

MADYNES Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Xilopix (Epinal, France):
 - Pay-per-use contract for the use of Grid'5000
 - Support contract for their use of Grid'5000 (define experimental requirements and plans)

7.2. Bilateral Grants with Industry

- CIFRE, Thales TRT (Paris, France):
 - CIFRE PhD (Florian Greff, supervised by Ye-Qiong Song and Laurent Ciarletta)
 - Dynamic reconfiguration and graceful degradation of distributed real-time applications over mesh networks
- CIFRE, Orange Labs (Issy-Les-Moulineaux, France)
 - CIFRE PhD (Maxime Compastie, supervised by Olivier Festor and Rémi Badonnel)
 - Software-Defined Security for Distributed Cloud Infrastructures
- CIFRE, Orange Labs (Issy-Les-Moulineaux, France)
 - CIFRE PhD (Paul Chaignon, supervised by Olivier Festor and Jérôme François)
 - Monitoring of Software-Define Networks
- CIFRE, Xilopix (Epinal, France):
 - CIFRE PhD (Abdulqawi Saif, supervised by Ye-Qiong Song and Lucas Nussbaum)
 - Open Science for the scalability of a new generation search technology
- CIFRE, Thales (Elancourt, France)
 - CIFRE PhD (Pierre-Olivier Brissaud, supervised by Isabelle Chrisment and Jérôme François)
 - Anomaly detection in encrypted traffic

ALICE Project-Team (section vide)

LARSEN Team (section vide)

MAGRIT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

The partnership with GE Healthcare started in 1993. In the past few years, it bore on the supervision of CIFRE PhD fellows on the topic of using a multi-modal framework and augmented reality in interventional neuroradiology. A new PhD thesis -Charlotte Delmas- started in April 2013 with the aim to perform 3D reconstruction of tools in interventional neuroradiology. Our goal is to help clinical gesture by providing the physician with a better understanding of the relative positions of the tools and of the pathology.

MULTISPEECH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Venathec

Company: **Venathec SAS**

Other partners: **ACOEM Group, GE Intelligent Platforms** (contracted directly with Venathec)

Duration: June 2014 - August 2017

Supported by: Bpifrance

Abstract: The project aims to design a real-time control system for wind farms that will maximize energy production while limiting sound nuisance. This will leverage our know-how on audio source separation and uncertainty modeling and propagation.

ORPAILLEUR Project-Team (section vide)

SEMAGRAMME Project-Team (section vide)