RESEARCH CENTER
Lille - Nord Europe

FIELD

Activity Report 2012

Section Contracts and Grants with Industry

Edition: 2013-04-24

ADAM Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Thales This contract is associated to the CIFRE PhD thesis of Jonathan Labéjof between ADAM and the Thales company. The goal of the project is to study the evolution of heterogeneous service-oriented architectures. We address two problems. First, we study some various forms of support for heterogeneity in service architectures in terms of communication protocols and software component personalities. Second, we propose solutions for systems which are agile and respond smoothly to changes in their execution contexts. Overall, the goal of this project is to propose to design a model for adaptability, a runtime infrastructure and to provide some means by which these two levels can be causally connected and kept consistent.
Participants: Jonathan Labéjof, Philippe Merle, Lionel Seinturier.

France Telecom DigiHome is a contract with France Telecom to study the adaptation of software systems in distributed digital home environments. These environments and their extensions (vehicles, holiday homes, work at home) are now invaded by a multitude of communicating objects dedicated to content management, viewing multiple video streams, or information sharing within a community network. These objects offer services with capacities of configuration and remote administration, and advanced interactions with the end-user or between devices or services. Given the lack of universality of proposals from IT and device companies and the lack of interoperability of these devices and services, it becomes necessary to offer a virtual environment named Extended Digital Home to encompass and unify these proposals and make life easier for the inhabitants. First, we will propose a unified model for integrating devices and services inside and outside the home with a continuum between private and public lives. Second, we will study an energy model to save energy in this extended environment. Overall, the goal of this project will be to propose to design a model for a cloud inside home and to provide some means to reduce the energy using on media devices. First results have been published in [115] and [99]. This contract is complemented by a second one, which is the CIFRE contract associated to Rémi Druilhe PhD thesis.
Participants: Rémi Druilhe, Laurence Duchien, Romain Rouvoy, Lionel Seinturier.

Kaliterre *Web Energy Archive* (WEA) is a project funded by the French Environment and Energy Management Agency (ADEME) to archive the energy consumption of Web sites that are accessible on the Internet. The objective of this project is to constitute an international referential on the evolution of the Web energy consumption. The adopted methodology focuses on the quality of experience and measures the energy consumed by users when they browse a specific website. The benefit of this approach is that it is representative of Internet usages and takes into account the variety of Web browsers and computer architectures. The software solution developed by this project will build on the HTTP Archive project, initiated by Google, and will extend it with consumption measures that will be collected by our PowerAPI library. The objective of this collaboration is to port our solution to the Windows operating system.
Participants: Aurélien Bourdon, Romain Rouvoy.

ATEAMS Project-Team (section vide)

BONSAI Project-Team (section vide)

DART Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Collaboration EADS IW, and Eurocopter

The subject deals with dynamic reconfigurable system design for avionic test applications. It is motivated by the need of methodologies and tools for the design of high-performance applications on dynamic reconfigurable computing systems. A complete methodology takes the reconfigurability of the hardware as an essential design concept and proposes the necessary mechanisms to fully exploit those capabilities at runtime. A set of tools must provide high-quality designs with improved designer productivity, which guarantees consistency with the initial requirements for adaptability and for the final implementation. This methodology allows designers to easily implement a system specification on a platform that includes general purpose processors dynamically combined with multiple accelerators running on an FPGA.

7.2. National Initiatives

7.2.1. ANR

7.2.1.1. ANR Famous

Collaboration with Inria Rhône Aples, Université de Bretagne Sud, Université de Bourgogne, SME SODIUS

FAMOUS project aims at introducing a complete methodology that takes the reconfigurability of the hardware as an essential design concept and proposes the necessary mechanisms to fully exploit those capabilities at runtime. The project covers research in system models, compile time and run time methods, and analysis and verification techniques. These tools will provide high-quality designs with improved designer productivity, while guaranteeing consistency with the initial requirements for adaptability and the final implementation. Thus FAMOUS is a research project with an immediate industrial impact. Actually, it will make reconfigurable systems design easier and faster. The obtained tool in this project is expected to be used by both companies designers and academic researchers, especially for modern applications system specific design as smart camera, image and video processing, FAMOUS tools will be based on well established standards in design community. In fact, modeling will start from very high abstraction level using an extended version of MARTE. Simulation and synthesizable models will be obtained by automatic model to model transformations, using MDE approach. These techniques will contribute to shorten drastically time-to-market. FAMOUS is a basic research project. In fact, most of partners are academic, and its main objective is to explore novel design methodologies and target modern embedded systems architectures. FAMOUS project is funded by french Agence Nationale de la Recherche (ANR). It has also been labeled by Media & Network cluster in 2009. The involved resources reach 408 person-month, from five partners: the public research labs LIFL Inria (Lille), LabSTICC (Lorient), Inria Rhône-Alpes (Grenoble), LE2I University of Bourgogne (Dijon) and the SME company Sodius SAS (Nantes). It has started on December 2009, and it will last 48 months.

7.2.1.2. The ANR Open-People project

Partners: Université de Bretagne Sud (UBS)Lab-STICC, Inria Nancy Grand Est, Inria Lille Nord Europe, Université de Rennes 1 (UR1), Université de Nice Sophia Antipolis (UNSA), THALES Communications (Colombes), InPixal (Rennes)

The Open-PEOPLE (Open Power and Energy Optimization PLatform and Estimator project is a national project funded by the ANR (Agence Nationale de la Recherche), the French National Research Agency. The objective of Open-PEOPLE is to provide a platform for estimating and optimizing the power and energy consumptions. Users will be able to estimate the consumption of an application deployed on a hardware architecture chosen in a set of parametric reference architectures. The components used in the targeted architecture will be chosen in a library of hardware and software components. Some of these components will be parametric (such as reconfigurable processors or ASIP) to further enlarge the design space for exploration. The library will be extensible; users will have the possibility to add new components, according to the evolution of both applications and technology. Open-PEOPLE is definitely an open project. The software platform for conducting estimation and optimization, will be accessible through an Internet portal. This software platform will be coupled to an automated hardware platform for physical measurements. The measurements needed to build models for new components to be added in the library will be remotely controlled through the software platform. A library of benchmarks will be proposed, to help building models for new components and architectures.

7.2.2. Competitivity Clusters

We collaborate with the L2EP (Université de Lille1) inside the research pole MEDEE, especially in the first action: industrialization of Code_CARMEL.

7.2.3. Within Inria

We collaborate with colleagues within Inria with the Triskell team at Inria Rennes-Bretagne Atlantique) on the analysis of DSMLs and on the formal definition of Kermeta.

DOLPHIN Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- EDF (2011-2013): Bilevel mathematical programming and pricing problems.
- EDF (2011-2014): Scheduluing outages of nuclear plants.
- Tasker (2011-2014) : Scheduling of applications in hybrid cloud computing systems.
- Alicante (2010-2013): PhD of Julie Jacques. Knowledge extraction by optimization methods for improving the process of inclusion in clinical trials.
- Genes Diffusion (2010-2013): PhD of Julie Hamon. Analysis of data from high throughput genotyping: cooperation between statistics and combinatorial optimization.
- Strat&Logic (2012-2015): PhD of Sylvain Dufourny. Optimization of economic decisions in a competitive business management simulator.
- Vekia (2012-2015). The goal of the project is to develop an efficient and generic software for employee scheduling in retail.
- BTravel (2011-2015). This project deals with the optimization of group travel plannings.
- NewCo (2011-2012) : Optimisation of client programs in the tourism industry.

FUN Team

6. Bilateral Contracts and Grants with Industry

6.1. Etineo Partnership

Participants: Roudy Dagher, Xu Li, Fadila Khadar, Nathalie Mitton [correspondant].

EtiPOPS will focus on portability and flexibility of GOLIATH on several hardwares and in different environments (indoor and outdoor) through the deployment of different applications such as geolocalization. In order to favor the portability, designed solutions in EtiPOPS will respect on-going communication standards which will allow a greater interoperability between heterogeneous hardwares.

6.2. France Telecom partnership

Participants: Nathalie Mitton, Enrico Natalizio, Tahiry Razafindralambo [correspondant], Dimitris Zorbas.

This collaboration aims to investigate rural networks and to deploy efficiently and dynamically such networks.

6.3. Noolitic partnership

Participants: Roudy Dagher, Nathalie Mitton [correspondant], Roberto Quilez.

This collaboration aims to set up a localization trial for localization of mobile object in a building based on wireless sensor networks. The idea is to deploy some landmarks (fix sensors) in places to be defined and to equip the mobile objects to other sensors. These sensors must be zigbee compliant for portability purposes.

6.4. Traxens partnership

Participants: Natale Guzzo, Nathalie Mitton [correspondant], Tahiry Razafindralambo.

This collaboration aims to set up a full protocol stack for TRAXENS's guideline.

MINT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. I-Lab Idées-3com (2009-2012)

Participants: Clément Moerman, Samuel Degrande, Damien Marchal, Laurent Grisoni [correspondant].

This year, our join research program with the small company Idées-3com is terminating. This program is supported by Inria, with a 3 year young engineer contract. During this join project, we have proposed interaction systems that is based on mobile phone, library for gestural interaction and a new navigation technique for fast and intuitive visiting of 3D virtual world [20].

MODAL Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Arcelor-Mittal

Participants: Christophe Biernacki, Clément Thery.

Subject : *Supervised and semi-supervised classification on large data bases mixing qualitative and quantitative variables*.

Arcelor Mittal faced some quality problems in the steel production which lead to supervised and semi-supervised classification involving (1) a small number of individuals comparing to the numbers of variables, (2) heterogeneous variables, typically categorical and continous variables and (3) potentially highly correlated variables. A PhD CIFRE grant started on May 2011 on this topic.

7.2. Gene Diffusion

Participants: Julien Jacques, Julie Hamon.

Subject : *Data analysis from high throughput technologies: Synergy between statistics and combinatorial optimization.*

With the development of new technologies such as high-throughput genotyping and sequencing, data analysis needs to be improved. Genes Diffusion is specialized in animals studies, for which we can read genomics information on around 800 000 markers and we have more and more subjects. The aim of the PhD is to find new methods combining combinatorial optimization and statistics methods in order to characterize the best subjects according to quantitative criteria. A PhD CIFRE grant started on 2010 and it is a joined work with Clarisse Dhaenens (Inria/DOLPHIN).

7.3. ASEL & CRESGE

Participants: Cristian Preda, Michael Genin.

Subject : *Incidence of lymphoms in Nord-Pas-de-Calais, Annual Estimates and study of the evolution over the period 2001-2005.* It is a contract with ASEL (Association Septentrionale pour l'Etude de Lymphomes) and CRESGE (Centre de Recherches Economiques Sociologiques et de Gestion) from Lille. This project of 6000 euros started on September 1st 2012 and ends on Mai 1st 2013.

MOSTRARE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. QuiXProc: Inria Transfer Project with Innovimax (2010-2012)

Participants: Denis Debarbieux, Joachim Niehren [correspondent], Tom Sebastian.

QuiXProc is an Inria transfer project with Innovimax S.A.R.L in Paris, on the integration of XPath streaming algorithms into XProc, the XML coordination language of the W3C.

7.1.2. Music Story

Participants: Fabien Torre, Mikaela Keller [correspondent], Guillaume Bagan.

The MusicStory project is a transfer project with MusicStory, a company collecting musical metadata from heterogeneous sources. The project entails the design of automated data deduplication and field inference algorithms suited for MusicStory needs.

7.2. Bilateral Grants with Industry

7.2.1. Cifre Xerox (2009-2012)

Participants: Jean-Baptiste Faddoul, Rémi Gilleron, Fabien Torre [correspondent].

Gilleron and Torre continue supervising the PhD thesis (Cifre) of Jean-Baptiste Faddoul together with B. Chidlovski from the Xerox's European Research Center (XRCE).

7.2.2. Cifre Innovimax (2010-2013)

Participants: Tom Sebastian, Joachim Niehren [correspondent].

Niehren continue supervising the PhD thesis (Cifre) of Tom Sebastian on streaming algorithms for XSLT with M. Zergaoui from INNOVIMAX S.A.R.L. in Paris.

7.2.3. Cifre SAP (2011-2014)

Participants: Thomas Ricatte, Gemma Garriga, Rémi Gilleron [correspondent], Marc Tommasi.

Garriga, Gilleron and Tommasi supervise the PhD thesis (Cifre) of Thomas Ricatte together with Yannick Cras from SAP.

NON-A Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Projects

- Project SYSIASS http://www.sysiass.eu/;
  - Subject: Autonomous and Intelligent Healthcare System;
  - Partners: ISEN de Lille, Ecole Centrale de Lille, University of Kent, University of Essex, East Kent Hospitals University NHS Foundation Trust, Groupement Hospitalier de l'Institut Catholique de Lille;
  - Duration: 2010 - 2013;
  - Support: FEDER;
- Project CHASLIM http://chaslim.gforge.inria.fr/;
  - Subject: Sliding mode control;
  - Partners: Inria Grenoble-Rhône Alpes, Inria Lille-Nord Europe, Ecole Centrale de Nantes;
  - Duration: 2011-2014;
  - Support: ANR;
- Project HYCON2 http://www.hycon2.eu/;
  - Subject: Networked control systems;
  - Partners: See http://www.hycon2.eu/?page=5&PHPSESSID=c185e278a6cab0a35c8dea0970c5723d
  - Duration: 2010-2015;
  - Support: FP7;
- Project SENSAS http://sensas.gforge.inria.fr/wiki/doku.php;
  - Subject: Sensor network Applications;
  - Partners: Inria Grenoble-Rhône Alpes, Inria Lille-Nord Europe, Inria Sophia Antipolis-Méditerranée, Inria Nancy-Grand Est;
  - Duration: 2010-2014;
  - Support: ANR;
- Project SLIM
  - Subject: Software library for multi-robots cooperation;
  - Duration: 2012-2014;
  - Support: Inria ADT;
- Project FP7 ERRICS http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=ERRIC&FRM=1&STP=10
  - Subject: ERRIC-Empowering Romanian Research on Intelligent Information Technologies;
  - Partners: UNIVERSITATEA POLITEHNICA DIN BUCURESTI;
  - Duration: 2010-2013;
  - Support: EU FP7 Capacities Programme.

RMOD Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Resilience FUI

Participants: Nicolas Petton [Correspondant], Stéphane Ducasse, Damien Cassou.

Contracting parties: Nexedi, Morphom Alcatel-Lucent Bell Labs, Astrium Geo Information, Wallix, XWiki, Alixen, Alterway, Institut Télécom, Université Paris 13, CEA LIST.

Resilience's goal is to protect private data on the cloud, to reduce spying and data loss in case of natural problems. Resilience propose to develop a decentralized cloud architecture: SafeOS. Safe OS is based on replication of servers. In addition a safe solution for documents should be developed. Sandboxing for Javascript applications should be explored.

There is a plethora of research articles describing the deep semantics of JavaScript. Nevertheless, such articles are often difficult to grasp for readers not familiar with formal semantics. In our first report, we propose a digest of the semantics of JavaScript centered around security concerns. This report proposes an overview of the JavaScript language and the misleading semantic points in its design. The first part of the report describes the main characteristics of the language itself. The second part presents how those characteristics can lead to problems. The document finishes by showing some coding patterns to avoid certain traps and presents some ECMAScript 5 new features.

6.2. Generali Belgium

Participants: Nicolas Anquetil [Correspondant], Stéphane Ducasse, Guillaume Larcheveque, Muhammad Bhatti, Camille Teruel.

Contracting parties:

Synectique our startup company project;

Generali Assurances http://www.generali.be.

RMoD is looking into providing a software solution to Generali Belgium for its software maintenance and reengineering problems. The goal is to support decision making in a software migration project. The partner needs tools for parsing their legacy code (in a specific, not well-known language) and help in identifying dead code or code duplication. This should serve as an essential element of decision support in the partner's software migration project.

The contract is worth 30.000€.

6.3. Pharo Consortium

We launched the Pharo Consortium. Over 25 companies are interested in participating. Inria supports the consortium with one full time engineer starting in 2011.

SEQUEL Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Orange Labs

Participant: Jérémie Mary.

There has been various activities between SEQUEL and Orange Labs.

First, the collaboration around the PhD of Christophe Salperwyck has continued and eventually led to his defense. Second, a CRE has been signed in 2011 to continue our work on web advertising, and more generally, collaborative filtering. On this topic, Sami Naamane has been hired in Fall 2011 as PhD student.

7.2. Effigenie

Participant: Jérémie Mary.

We are currenly working on better prediction of news websites audiences in order to plan some better strategies for marketing services. A prediction module should be produced in 2013.

7.3. Squoring Technology

Participants: Boris Baldassari, Philippe Preux.

Boris Baldassari has been hired by Squoring Technology (Toulouse) as a PhD student in May 2011. He works on the use of machine learning to improve the quality of the software development process. During his first year as a PhD student, Boris investigated the existing norms and measures of quality of software development process. He also dedicated some times to gather some relevant datasets, which are made of either the sequence of source code releases over a multi-years period, or all the versions stored on an svn repository (svn or alike). Information from mailing-lists (bugs, support, ...) may also be part of these datasets. Tools in machine learning capable of dealing with this sort of data have also been investigated. Goals that may be reached in this endeavor have also been precised.

7.4. TBS

Participants: Jérémie Mary, Philippe Preux.

A new project has started on September 2012 in collaboration with the TBS company. The goal is to understand and predict the audiences of some news related websites. These websites tend to present an ergodic frequentation with respect to a context. The main goal is to separate the effect of the context (big events, election, ...) and the impact of the policies of the news websites. This research is done using data from major french media websites and also involves research of tendances on the web (like Google Trends/ Google Flu). Used algorithms mix methods from time series prediction (ARIMA and MARSS models) and some machine learning methods (L1 penalization, SVM).

7.5. Unbalance Corporation

Participant: Rémi Coulom.

Unbalance Corporation (http://www.unbalance.co.jp/) is a Japanese publisher of game software. We have two license agreements with this company, for the games of Go and Hanafuda.

SHACRA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. HelpMeSee and Sensegraphics

The swedish company Sensegraphics and the NGO HelpMeSee have signed for 2 contracts for technology transfer. The contract focus on the design of a simulator to treat cataract surgery using the MSICS (Manual small incision cataract surgery) technique.

7.1.2. Digital Trainers

The company Digital Trainers has signed a two year contract and a two year license with our group for the transfer of our suture simulation technology. The contract aims at improving the simulation by using an adaptive model for the suture thread and continuous constraints for the interaction with the soft tissues. Haptic feedback will also be investigated.

7.1.3. Collin

We have started a collaboration with INSERM - UMR-S 867 (minimal invasive and robotized otological surgery) Faculte´ de Me´decine Paris Diderot Paris 7 and with the company Collin which is developing some activities in the domain of the head and neck (middle ear implants, surgical instruments, surgical navigation, ...). The objective of this project is to obtain a simulation tool applied to the ear surgery for both training and planning of middle ear surgery. Guillaume Kazmitcheff is doing his phD in the context of this collaboration: he is paid by a CIFRE contract with Collin, he is mainly working with the INSERM team but the design of the simulation is done in collaboration with our group and he is enrolled in the university of Lille 1.

SIMPAF Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Numerical homogenization for models of transfer of solutes in porous media

Participants: Antoine Gloria, Zakaria Habibi.

This is a contract (2011-2012) between Inria and ANDRA. The aim of this research is to determine the effective coefficients for models of transfer of solutes in porous media. This is a numerical homogenization problem for a coupled system of convection-diffusion equations. This enters the framework of the numerical simulation for radioactive waste disposal devices.

7.2. Study of the EKINOX model of corrosion

Participants: Claire Chainais, Antoine Gloria.

This is a CNRS Contract (2012-2013) with CEA, Univ Lille1, and Univ B. Pascal. In collaboration with C.Desgranges and F. Lequien (CEA), F. Bouchon (Univ. B. Pascal), A. Gloria and C. Chainais-Hillairet are considering the model EKINOX developed at CEA for the study of the corrosion of Ni-base alloys in PWR primary water. Starting from this numerical model (leading to an explicit in time scheme), they have established a macroscopic model (a system of coupled partial differential equations). Based on this model, the aim is to propose some new numerical methods taking into account correctly the relevant time scales or scales of parameters.

7.3. Numerical methods for the DPCM model

Participants: Claire Chainais, Thomas Gallouët, Antoine Gloria.

This is a contract (2012-2014) between Inria and ANDRA. Some numerical methods have already been developed for the approximation of the DPCM model (corrosion model of an iron based alloy in the nuclear waste repository), see [4]. These methods have been implemented in the code CALIPSO developed at ANDRA. They are devoted to the simulation of the time-dependent model and based on a implicit first order in time and second order in space scheme. For this problem, we want to develop second order in time schemes which remain unconditionally stable. We also want to design new schemes for the direct computation of a steady-state. This should be done during the post-doc of Thomas Gallouët. This is work in collaboration with C. Bataillon (CEA), F. Bouchon (Univ B. Pascal) and J. Fuhrmann (WIAS Berlin).