



**H A D A S**  
HETEROGENEOUS AUTONOMOUS DISTRIBUTED DATA SERVICES



# HADAS Activity Report

(June 2005 - June 2009)

**Contact: Christine Collet**

**[hadass@imag.fr](mailto:hadass@imag.fr)**

**<http://hadass.imag.fr>**



**Web site:** <http://hadas.imag.fr>

**Parent Organizations:** CNRS, Grenoble INP, Université Grenoble 1, Université Grenoble 2

## Contents

<b>1</b>	<b>General presentation</b>	<b>1</b>
<b>2</b>	<b>Team Composition</b>	<b>3</b>
<b>3</b>	<b>Research Themes</b>	<b>5</b>
3.1	Accessing data in large-scale systems . . . . .	5
3.2	Composing data services on the fly . . . . .	7
3.3	Reasoning on data semantics . . . . .	8
<b>4</b>	<b>Application domains and social, economic or interdisciplinary impact</b>	<b>10</b>
<b>5</b>	<b>Contracts and grants</b>	<b>10</b>
5.1	External contracts and grants (Industry, European, National) . . . . .	10
5.2	Research Networks (European, National, Regional, Local) . . . . .	12
5.3	Internal Funding . . . . .	12
<b>6</b>	<b>Principal International collaborations</b>	<b>13</b>
<b>7</b>	<b>Visibility, Scientific and Public Prominence</b>	<b>13</b>
7.1	Contribution to the Scientific Community . . . . .	13
7.2	Prizes and Awards . . . . .	16
7.3	Public Dissemination . . . . .	16
<b>8</b>	<b>Educational Activities</b>	<b>17</b>
<b>9</b>	<b>Industrialization, patents and technology transfer</b>	<b>18</b>
<b>10</b>	<b>Self-Assessment</b>	<b>18</b>
<b>11</b>	<b>Perspectives for the research team</b>	<b>19</b>
<b>12</b>	<b>Publications</b>	<b>20</b>

## 1 General presentation

### Scientific and Technological Project

The HADAS group has been known for years for its work on database systems. It has contributed in the following areas: relational data models, snapshots and their semantics, active and temporal databases and object-oriented database systems. The advent of the web and middleware infrastructures in the early 1990s has profoundly changed the nature of research in databases. The general evolution of our research during the last four years has been to revisit data management components and to exploit service-based approach for designing adaptable data management systems. Modern database systems are not anymore centralized data storage systems but data management services largely distributed and deployed over different types of computing environments (grids, peer-to-peer networks, sensor networks, ambient and ubiquitous environments). Semantics is at the heart of this research as it is used at all levels of the process of designing or composing data services for handling autonomy, dynamic behavior and heterogeneity of both users and data sources. Research activity on semantics has been reinforced in the group with the arrival of Marie-Christine Rousset in 2005, and of Alexandre Termier in 2007. The current activities of the group are centered on the following themes:

- Accessing data in large-scale systems: a first aspect concerns query optimization in distributed and dynamic systems ; a second aspect deals with mining large amounts of data to extract patterns of interest.

- Composing data services in a dynamic way: we investigate models, algorithms and tools for coordinating services with non functional properties (contracts) and for providing access to heterogeneous data coming from services
- Reasoning on data semantics: we investigate different models and algorithms for querying data (or ressources) through possibly heterogeneous and distributed ontologies.

We have participated to the WebContent platform for managing distributed repositories of XML and Semantic Web data. This work bridges the gap between data management and (web) services into a data management platform. Our contribution is the design of a caching service and a support for composing services. We are also involved in other ANR projects on service composition for hybrid query processing, handling uncertainty and trust in peer-to-peer data management system, context management for software adaptation, machine-learning-based query optimization and novel data mining algorithms able to fully exploit the parallelism of multicore machines. Results of our research have direct impact on applications dealing with huge amounts of data and resources largely distributed in pervasive environments, such as data spaces, e-science, hardware, software and firmware observation, autonomic systems, and the Semantic Web.

**Resumé** L'équipe HADAS est connue depuis plusieurs années pour son travail sur les systèmes de gestion de base de données. Elle a contribué par ses recherches dans les secteurs suivants : modèles de données relationnels, les photographies instantanées et leur sémantique, bases de données actives et temporelles, ainsi que dans les systèmes de gestion de bases de données orientés-objet. L'apparition des infrastructures du Web et des intergiciels au début des années 90 a profondément changé la nature de la recherche dans les bases de données. L'évolution générale de notre recherche pendant les quatre dernières années a été de revisiter les composants de gestion de données et d'exploiter les approches à base de services pour concevoir les systèmes de gestion de données adaptables. Les systèmes de gestion de base de données modernes ne sont pas des systèmes centralisés de stockage de données mais des services de gestion de données largement distribués et déployés sur différents types d'environnements de calcul (grilles, réseaux pair-à-pair, réseaux de capteurs, environnements ubiquitaires). La sémantique est au coeur de cette recherche car présente à tous les niveaux du processus de conception et composition des services pour la gestion de l'autonomie, la dynamique du comportement et l'hétérogénéité des utilisateurs (applications) et sources de données. L'activité de recherche sur la sémantique des données a été renforcée dans l'équipe avec l'arrivée de Marie-Christine Rousset en 2005, et d'Alexandre Termier en 2007.

Les activités courantes du groupe sont organisées selon les thèmes suivants :

- Accès aux données à grande échelle : un premier aspect concerne l'optimisation de requêtes dans les systèmes répartis et dynamiques ; un second aspect concerne la fouille de grands volumes de données pour en extraire des patrons fréquents.
- Composition dynamique de services : nous étudions des modèles, algorithmes et outils pour coordonner des services avec des propriétés non fonctionnelles (contrats) et pour permettre l'accès aux données hétérogènes produites par des services.
- Raisonnement sur la sémantique des données : nous étudions différents modèles et algorithmes pour interroger des données (ou ressources) au travers d'ontologies hétérogènes et distribuées.

Nous avons participé à la plate-forme WebContent pour la gestion d'entrepôts de données XML et de données sémantiques du Web. Ce travail rapproche les fonctions de gestion de données et de services (Web) dans une plate-forme de gestion de données. Notre contribution est la conception d'un service de caches et d'un support pour la composition de services. Nous sommes également impliqués dans d'autres projets de l'ANR sur la composition de services pour le traitement de requêtes hybrides, sur la manipulation de l'incertitude et de la confiance dans les systèmes de gestion de données pair-à-pair, sur la gestion de contextes pour l'adaptation de logiciels, sur l'optimisation de requêtes basée sur l'apprentissage, ainsi que sur des algorithmes de fouille de données capables d'exploiter le parallélisme des machines multi-coeurs. Les résultats de notre recherche ont des impacts dans des applications traitant de gros volumes de données et de ressources largement distribuées dans les environnements ambiants, tels que les espaces de données, l'e-Science, l'observation des systèmes, et le Web sémantique.

## Team History (Optional)

The Hadas group was formed in october 2005 as a new team for the LIG laboratory. It actually follows the STORM team, directed by M. Adiba until 1996. Over the years, the group proposed an evolution of the scientific vision of a database management systems as a semantic-based infrastructure for managing ubiquitous and heterogeneous data and services.

## 2 Team Composition

<i>Permanent Researchers</i>				
Name	First name	Function	Institution	Arrival date
Bobineau	Christophe	Associate Professor	Grenoble INP	Sep 2003
Collet	Christine	Full Professor	Grenoble INP	Sep 1999
Jouanot	Fabrice	Associate Professor	UJF	Sep 2003
Rousset	Marie-christine	Full Professor	UJF	Sep 2005
Termier	Alexandre	Associate Professor	UJF	Sep 2007
Vargas-solar	Genoveva	Research Scientist	CNRS	Jan 2002

<i>Post-docs, engineers and visitors</i>				
Name	First name	Function and % of time	Institution	Arrival date
Ibrahim	Noha	post-doc 100 %	Grenoble INP, projet OPTIMACS	Sep 2009

<i>Doctoral Students</i>				
Name	University	Supervisors	Funding (sources and dates)	Date of first registration
Benyelloul A.	UJF	Rousset M.-C., Jouanot F.	ANR Continuum Jan 09 - Jan 12	Jan 2009
Cuevas-Vicentín V.	Grenoble INP	Collet Ch., Vargas-Solar G.	ANR WebContent Jan 07 - June 09	Jan 2007
Espinosa-Oviedo J.	Grenoble INP	Collet Ch., Vargas-Solar G.	Mexican Grant Feb 09 - Feb 12	Feb 2009
Negrevergne B.	UJF	Rousset M.-C., Termier A.	MENRT Sep 08 - Sep 11	Sep 2008
Othman Abdallah M.	Grenoble INP	Collet Ch., Vargas-Solar G.	MENRT Sep 09 - Sep 12	Oct 2009
Portilla-Flores A.	Grenoble INP	Collet Ch., Vargas-Solar G.	Mexican Grant Jan 06 - Jan 2010	Jan 2006
Tournaire R.	UJF	Rousset M.-C., Petit J.-M.	Territorial grant Sep 07 - Sep 10	Sep 2007
Martinez-Medina L.	Grenoble INP	Collet Ch., Bobineau Ch.	ANR UBIQUEST Sep 09 - Sep 12	Jan 2010
Carlos Manuel Lopez Enriquez	Grenoble INP	Collet Ch., Vargas-Solar G.	ANR OPTIMACS Jan 09 - Dec 12	Jan 2010

### Past team members

<i>Past Members Oct. 2005-Oct. 2009</i>						
Name	First name	Position	Employer	Arrival date	Departure date	Current position
Adiba	Michel	Full Professor	UJF	Sep 1979	Dec 2006	Retired
Adiba	Michel	Full Professor (EMERITE)	UJF	Jan 2007	Sep 2008	Retired
Labbe	Cyril	Associate Professor	UJF	Sep 2001	Sep 2008	Associate Professor
Roncancio	Claudia	Associate Professor	Grenoble INP	Sep 1995	Sep 2008	Associate Professor

<i>Past Doctoral students</i>					
Name	Date of first registration	Date of departure	University	Supervisor	Current position
Bruno G.	Oct 2002	Apr 2006	Grenoble INP	Christine Collet, Genoveva Vargas-Solar	Engineer
D'Orazio L.	Oct 2003	Oct 2007	Grenoble INP	Claudia Roncancio, Cyril Labbé	Associate Professor
Gurgen L.	Oct 2003	Sep 2007	Grenoble INP	Claudia Roncancio, Cyril Labbé	Post Doctoral position
Hanh T.	Dec 2004	June 2009	Grenoble INP	Christine Collet, Genoveva Vargas-Solar	Associate Professor

Jayaprakash N.	Oct 2003	Aug 2008	Grenoble INP	Christine Collet, Thierry Coupaye	Engineer
Mourad A.	Oct 2001	June 2005	Grenoble INP	Christine Collet, Alexandre Lefebvre	Research Engineer
Nguyen G.	Oct 2005	Dec 2008	UJF	Marie-Christine Rousset, Philippe Chatalic	Engineer
Tandabany S.	Jan 2007	Nov 2009	UJF	Marie-Christine Rousset, Yuzuru Tanaka	Post Doctoral position
Vu T.T.	Oct 2000	Feb 2005	Grenoble INP	Christine Collet	Associate Professor
Vu T.H.G.	Mar 2003	Nov 2008	Grenoble INP	Christine Collet, Genoveva Vargas-Solar	Associate Professor

*Past post-doctoral researchers, engineers and visitors*

Name	First name	Function	Date of arrival	Date of departure	Home Institution (if appropriate)
Perez-Olmos	Carloz	Engineer (70%)	Mar 2008	Jul 2008	Grenoble INP
Soriano-Saura	Antonio	Engineer (70%)	Mar 2008	Jul 2008	Grenoble INP
Valentin	Olivier	Expert engineer (100%)	Sep 2006	Sep 2007	Grenoble INP
Prada Rojas	Carlos	Expert engineer	July 08	dec 08	Grenoble INP
Aguiar Tapia	German Othon	Engineer	Jan 08	July 08	CONACYT

*Past Master students*

Name	Date of first registration	Date of departure	University	Supervisor	Current position
Mohamed Othman Abdallah	Oct 2006	June 2007	Grenoble INP	Christine Collet, Christophe Bobineau	PhD student at Grenoble INP
Martinez-Medina Lourdes	Sep 2008	Aug 2009	UDLA	Christophe Bobineau, José-Luis Zechinelli-Martini	PhD student Grenoble INP
Javier A. Espinosa Oviedo	Sep 2007	Aug 2008	UDLA	Genoveva Vargas-Solar, José-Luis Zechinelli-Martini	PhD student Grenoble INP
Carlos Manuel Lopez Enriquez	Jul 2008	Oct 2008	UDLA	Genoveva Vargas-Solar, Ofelia Cervantes Villagomez	PhD student Grenoble INP
Benjamin Nègrevergne	Feb 2008	July 2008	UJF	Alexandre Termier, Jean-François Méhaut	PhD Student UJF
Mohammed Naf- feaa	April 2006	Aug 2006	UJF	Fabrice Jouanot	
Fatma Onay	Feb 2008	Sept 2008	UJF	Claudia Roncancio, Fabrice Jouanot	
Jérôme Reybert	May 2008	Sept 2008	UJF	Alexandre Termier, Jean-François Méhaut	M2R
Yin Tiantian	Jul 2007	Dec 2007	CASIA (China)	Christophe Bobineau	Engineer
Rémi Tournaire	Feb 2007	July 2007	Grenoble INP	Marie-Christine Rousset	PhD Student UJF

**Evolution of the team:**

Alexandre Termier, associate professor, joined the team in october 2007. His research aera is the mining of closed frequent patterns in data exhibiting a graph structure. His main works are on the special case where the data are trees or DAGs (directed acyclic graphs). He has developed new methods for mining closed frequent tree patterns, implemented in the Dryade and DryadeParent algorithms. This method has been used to mine gene networks. Arriving in the group, Alexandre Termier decided to ameliorate his proposed method to design novel data mining algorithms able to fully exploit the parallelism of

the newcoming generation of multicore machines. As we will see this new kind architecture motivates some of our research perspectives.

Claudia Roncancio and Cyril Labbé left the team in August 2008. They joined the SIGMA team on September 1st. Their past works in the group related to location queries in DHT P2P systems, distributed semantic caching in grid middleware and transactional properties when administrating heterogeneous sensor networks. This rapport presents their works when they were present in the group. Publications refer these works.

## 3 Research Themes

### 3.1 Accessing data in large-scale systems

**List of participants:** Ch. Collet (Professor), M.-Ch. Rousset (Professor), Ch. Bobineau (Associate Professor), F. Jouanot (Associate Professor), C. Labbé (Associate Professor) until august 2008, C. Roncancio (Associate Professor) until august 2008, A. Termier (Associate Professor), Laurent d’Orazio (PhD 2003-2007), Levent Gurgen (PhD 2003-2007), Benjamen Négrevergne (PhD 2008- )

#### Scientific issues and positioning of the team:

Accessing data concerns several dimensions of large scale systems: number of resources, data volume and data complexity. Current large scale systems in number of resources include grids, peer-to-peer networks, sensor networks, ambient and ubiquitous environments. The most popular method to access data within these systems in a convenient and efficient way is still to consider declarative queries that are optimized based on system characteristics. Due to the strong dynamicity of these systems, classical distributed query evaluation techniques are not applicable.

Having a global view of the system is not possible: pertinent data sources cannot be *a priori* known and useful metadata for query evaluation are not always available. In addition, the evaluation strategy for a query has to dynamically adapt to fluctuating conditions and to users with different needs. For example, some may want to maximize performance while others may need to minimize energy consumption. The HADAS group focuses on new approaches for query evaluation efficiency w.r.t. application needs running on large-scale systems following our precedent works on adaptive query processing [38].

Data mining is another way to access large quantities of data, by extracting interesting patterns from them. Such patterns provide meaningful abstractions of raw data, which are thus less numerous and more appropriate for data analysis. The group works on pattern mining in complex data such as sequences, trees or graphs, which are found in many applications in chemistry (e.g. graphs representing molecules) or in bioinformatics (e.g. gene regulation networks).

#### Key references:

- [59] M. del Pilar Villamil, C. Roncancio, and C. Labbé. Range queries in massively distributed data. In *International Workshop on Grid and Peer-to-Peer Computing Impacts on Large Scale Heterogeneous Distributed Database Systems (DEXA’06)*, pages 255-260, Krakow, Poland, sep 2006.
- [53] L. Gürgen, C. Labbé, C. Roncancio, and V. Olive. SStraM: A model for representing sensor data and sensor queries. In *International Conference on Intelligent Systems And Computing: Theory And Applications (ISYC’06)*, jul 2006.
- [39] L. D’Orazio, F. Jouanot, Y. Denneulin, C. Labbé, C. Roncancio, and O. Valentin. Distributed semantic caching in grid middleware. In *International Conference on Database and Expert Systems Applications (DEXA07)*, Lecture Notes in Computer Science 4653 Springer 2007, pages 162171, Regensburg, Germany, sep 2007.
- [38] Bobineau Christophe, Collet Christine and Tuyet-Trinh Vu (2008), A strategy to develop adaptive and interactive query brokers. In *12th International Symposium on Database Engineering & Applications (IDEAS’08)*: 237-247.
- [3] A. Termier, M.-C. Rousset, M. Sebag, K. Ohara, T. Washio, and H. Motoda. DryadeParent, an efficient and robust closed attribute tree mining algorithm. *Transactions on Knowledge and Data Engineering (TKDE)*, 20(3):300-320, mar 2008.
- [12] M. Bauderon, C. Bobineau, S. Grumbach, A. Henry, X. Qi, W. Qu, K. Suo, F. Wang, and Z. Wu. Netquest: An abstract model for pervasive applications. In *Seventh IEEE International Conference on Pervasive Computing (Pervasive 2009)*, Nara, Japan, may 2009. LNCS.

## Major results:

### Efficient query evaluation

**PinS** is a localization service for peer-to-peer systems enabling efficient complex querying, including inequalities and range queries. PinS is based on many classical techniques revised to match with P2P requirements: distributed indexing techniques using multiple distributed hash tables (DHT), models for evaluating queries, caches and query materialization. PinS has been developed by Maria del Pilar Villamil during her PhD work [141], defended in 2006. The obtained results are the following:

- Evaluation models have been validated by a theoretical analysis of performance [112];
- The scalability of PinS has been experimentally demonstrated by deploying it on around 1300 peers over Grid'5000 [59].

This work has been supported by the University of the Andes in Bogota (Colombia).

**ACS (Adaptable Cache Service)** is a system-level service providing adaptable query and data caches. The idea is to have local and temporary spaces for storing queries and/or answers in order to improve query evaluation performance and data persistency. These caches can be deployed at application or middleware levels. The main contribution of ACS is the possible cooperation of both query and data caches, either co-localized or not. The obtained results are the following:

- A software framework facilitating the development of cache service for various applications has been proposed in the PhD thesis of Laurent d'Orazio, defended in December 2007 [138, 103].
- A prototype implementing this framework has been experimentally validated for the management of bioinformatics data on Grid'5000 [96].

**SStreaM** is a model for managing sensor networks. In this model, a sensor network is viewed as a distributed and service-oriented architecture in which the data processing tasks are split over several levels in the architecture. Data management features are defined as generic services for hiding sensor heterogeneity. This work has been realized in collaboration with France Telecom R & D within the PhD of Levent Gürgen, defended in December 2007 [139, 53]. It has been experimentally validated in 2008 by the developpement of a prototype called SStreaMWare [22].

### Data mining

Data mining is the automatic extraction of unknown and potentially interesting information from large quantities of data. One of the major fields of data mining consists in discovering patterns occurring frequently (i.e. more than a given threshold) in data. The data can either be unstructured data (sets of items like supermarket transactions for example) or data having a sequence, tree or graph structure (graph structured molecules for example). Frequent pattern mining is a computation-intensive application: it needs a lot of memory to handle large volumes of data, and it needs a lot of computation time (hours, days, even weeks).

During his 2 years post-doctorate in Japan, A. Termier designed two new data-mining algorithms: DryadeParent for mining tree data [74, 3] and DigDag for mining directed acyclic graphs [46]. He applied his algorithms to a bioinformatics problem (gene networks inference).

Since his arrival in Grenoble, A.Termier initiated a collaboration between the HADAS team and the MESCAL team (J.-F. Méhaut) on parallel pattern mining algorithms, in particular through the co-supervision of the PhD thesis of B. Négrevergne, started in Oct. 2008.

## Perspectives:

### Efficient query evaluation in highly dynamic environments

We plan to extend our works on efficient query evaluation in two main directions:

- *Machine-learning-based adaptive query evaluation.* In distributed environments where metadata are lacking, classical query evaluation techniques cannot be applied. We propose machine learning techniques exploiting measures taken during previous query executions to improve performance of future query evaluations (case-based reasoning).
- *Data and network management in dynamic ad-hoc networks.* In distributed environments, queries have to be decomposed into subqueries that have to be evaluated on different nodes of the network. In dynamic environments, there is no knowledge about data distribution (localization and volumes). We propose to combine network and data management by viewing the whole network as a dynamic distributed database system. This work has been started in collaboration with the LIAMA in China, and promising results have been already obtained [12].

These two directions will be explored in the setting of the ANR Blanc 2009 project UBIQUEST and in a collaboration with CEA-LETI. Two PhDs will start on these topics.

### **Parallel pattern mining on multi-core architectures.**

The focus will be on designing and deploying parallel pattern mining algorithms on multicore processors. The starting DAMOCLES project (supported by the MSTIC pole of UJF) will investigate “Data Mining for On Chip Low Energy Systems”. This project involves HADAS and MESCAL teams of LIG and the machine architecture team of the TIMA laboratory in Grenoble (F. Petrot, SLS team). Parallel data mining is a promising and challenging topic on which we will reinforce our collaboration with Japanese groups that are world leaders in data-mining on structured data.

## **3.2 Composing data services on the fly**

**List of participants:** Ch. Bobineau (associate PR), Ch. Collet (PR), G. Vargas-Solar (CR1), Javier Alfonso Espinosa-Oviedo (PhD 2009 - , co-direction France - Mexico), Nagapraveen Jayaprakash (PhD 2003-2008), Alberto Portilla-Flores (PhD 2005- 2009 co-direction, France - Mexico), Hanh Tan (PhD 2005-2009), Victor Cuesvas-Vicentín (PhD 2006 - ), Thi-Huong-Giang Vu (PhD 2005- 2008)

**Scientific issues and positioning of the team:** Composing services exported by different organisations is a key issue when building large scale and data-intensive applications/systems. It is becoming more crucial when considering services within ubiquitous infrastructures made of heterogeneous devices, servers, applications connected with heterogeneous systems. Composition requires to take into account the characteristics of these eco-systems (e.g., memory and computing, and network capabilities). The composition process uses this knowledge or semantics to dynamically discover and coordinate (ubiquitous) services, and then to adapt the coordination process depending on the availability and change of services. Another important challenge is to consider non functional aspects and QoS (quality of service) criteria such as availability, reliability, and temporal constraints that are crucial when composing data services in a dynamic way. In the group, we investigate models, algorithms and tools for:

- merging data and control flows for describing service coordination ;
- processing (accessing and integrating) heterogeneous data coming from services in a discrete and continuous way;
- reliable and adaptive data services composition;
- dealing with autonomic services and systems.

### **Key references:**

- [84] K. Belhajjame, G. Vargas-Solar, and C. Collet. Intégration de services : une analyse structurée. *Ingénierie des Systèmes d'Information*, 3(10):91-110, 2005.
- [60] T.-H.-G. Vu, C. Collet, and G. Vargas-Solar. Defining and modelling secure service-based systems. In *On the Move to Meaningful Internet Systems 2006: CoopIS, DOA, GADA, and ODBASE*, pages 391-407, Montpellier, France, 2006. Springer-Verlag Berlin Heidelberg.
- [57] A. Portilla, C. Collet, and G. Vargas-Solar. Towards a transactional services coordination model. In *Proceedings of the Tenth International Database Engineering and Applications Symposium (IDEAS 2006)*, pages 319320, Delhi, India, dec 2006. IEEE Computer Society.
- [42] A. Portilla, G. Vargas-Solar, Ch. Collet, J.-L. Zechinelli-Martini, L. Garca-Bauelos. J. Filipe, J. Cordeiro. A flexible model for providing transactional behavior to service coordination in an orthogonal way. *Proceedings of the Third International Conference on Web Information Systems and Technologies: Internet Technology (WEBIST)*, Barcelona, Spain, mar 2007.
- [28] J. Nagapraveen, T. Coupaye, Ch. Collet, P.-Ch. David Flexible Reactive Capabilities in Component-Based Autonomic Systems In 5th IEEE Workshop on Engineering of Autonomic and Autonomous Systems (EASe 2008), Belfast, Northern Ireland, March 2008. IEEE.
- [20] V. Cuevas-Vicentín, G. Vargas-Solar, and C. Collet. Web services orchestration in the webcontent semantic web framework. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC08)*, pages 271282. IEEE Press, 2008.
- [2] A. Portilla, G. Vargas-Solar, C. Collet, J. L. Zechinelli-Martini, and L. García-Bañuelos. Contract based behavior model for services coordination. *Lecture Notes in Business Information Processing*, 8:109-123, 2008.



## Major results:

**PYROS for services orchestration using workflows**[76] allowing: (i) a fine control on services execution for managing efficiently their dependencies; and (ii) personalized communication protocol between services and orchestration. PYROS was developed to support the WebContent Semantic Web Framework (WebContent project) to provide a scalable and robust platform for the development of semantic content management applications for diverse domains. Our contribution [20] lies in providing the necessary infrastructure to effectively and efficiently coordinate the services and data sources, thus facilitating the rapid development of flexible and reliable applications between them.

**C-Model: A Contract model** for associating non functional properties (expressed as constraints) with services coordination execution states. This model has been used for addressing:

- atomicity properties, in the PhD work of Alberto Portilla Flores (estimated termination date: september 2009) [35, 56]. The PhD is done under a co-advising framework with Universidad Autonoma de Tlaxcala and Universidad de las Américas Puebla - Mexico.
- security for the activities of a coordination; data exchanged by services; and methods' calls done on services. This work has been done in the dissertation of Thi-Huong-Giang Vu defended in December 2008 [137, 62]. We have developed ROSE [47] to synchronize the evaluation of contracts with the execution of services' coordination (on top of the BONITA coordination engine).

**Rekha**, a Fractal-based, flexible and dynamic autonomic infrastructure that uses active rules as decision-making mechanisms to integrate autonomic behaviour in component-based systems. It has been done in the N. Jayaprakash (2003-2008) PhD work [111] – in cooperation with T. Coupaye of France Télécom. This work also provides a flexible rule execution model for autonomic and heterogeneous component based systems. Rekha allows to: (i) personalize the construction of rule based systems; and (ii) dynamically modify rules and their semantics. It provides building blocks of a component library for the construction of reactive mechanisms of general autonomic component based systems. This has been used for adding autonomic adaptability in service coordination.

**SEBAS** for a dynamic modification of a coordination. It is based on ontologies, equivalence relationships between services (simple and composite) and strategies for replacing services by others through adaptability contracts. Contracts specify recovery actions when exceptions (e.g. change demands) are detected within a coordination control flow. Event and reactions services are used for supporting the execution of an adaptable coordination. This work has been done in the PhD project of Tan Hanh (2005-2009) [34, 94, 105].

## Perspectives:

We plan to extend our work on reliable and autonomic data services composition in three directions:

- Providing reliability to services composition: we will define a language for specifying non functional properties of services' coordinations. In particular, it will be used for programming recovery actions with associated execution strategies for synchronizing recovery with the execution of the coordination. The semantics of the language will be formally described and its properties will be studied and demonstrated (ECOS-ANUIES ORCHESTRA project, Javier-Alfonso Espinosa-Oviedo PhD [21]).
- Service-based query processing: we will investigate new query processing techniques that tackle at the same time classic, mobile and continuous queries by composing data services providers that are (push/pull, static or nomad) providers (OPTIMACS ANR project, PhD). At the opposite we will investigate how to use declarative queries expressions in integrating and composing services available in dynamic environments (e-CLOUDSS and redSHINE projects). This work is done in coordination with the research works on efficient query evaluation (see above, section 3.1).
- Event flow management: research on events and rules will continue as a base for the autonomic management of views for data spaces and services clouds. It will address event management through a flexible approach that enables programmers to build their own event composition/synthetisis and management functions.

## 3.3 Reasoning on data semantics

**List of participants:** F. Jouanot (Associate Professor), M.-Ch. Rousset (Professor), A. Termier (Associate Professor), G. Vargas-Solar (CR1), Ch. Collet (Professor), G.-H. Nguyen (PhD 2005-2008), R. Tournaire (PhD 2007- ), S. Tandabany (PhD 2007-), G. Bruno (PhD 2002-2006), S.-E. Kramdi (PhD 2009- ),

### Scientific issues and positioning of the team:

The web has deeply changed the vision of modern data management systems and has forced to revisit the problem of querying data which are distributed, possibly heterogeneous and ill or semi-structured. This revolution is going to get amplified with the miniaturization of storage devices connected to the network. This opens new possibilities and raises new challenges for integrating heterogeneous decentralized and context-sensitive data.

Reasoning on context and data semantics is one of the keys for attacking in a principled way those challenges. The positioning of the group is to investigate the different algorithmic issues for the scalability of querying data through possibly heterogeneous and distributed ontologies.

### Key references:

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### Major results:

**ADEMS: a knowledge-based service for configuring intelligent data mediators.** We have designed and implemented in the ADEMS service [49] a novel approach for providing access to heterogeneous and distributed sources through interconnected knowledge-based mediators. Each mediator has its own ontology acting as an integration schema over a set of resources, and provides a possible access point to a large set of queries. Mappings between ontologies establish semantic correspondences between mediators. Ontologies and mappings are expressed in a description logic, the associated reasoning services of which are used to perform semantic reformulation of queries between mediators. This work was developed in the PhD work of G. Bruno (2002-2006) [140] and has been applied for the integration of astronomical and biological data on top of grid architectures [4, 41].

**SomeWhere: a semantic peer-to-peer infrastructure.** SomeWhere is a peer-to-peer infrastructure jointly developed by the LRI (IASI/Gemo team) and the LIG (HADAS group) for deploying shared resources which are semantically described using personalized and light-weight ontologies. In SomeWhere, each peer organizes its data w.r.t. its own ontology, and declares mappings between its ontology and the ontologies of some of its acquaintances. We have obtained the following results:

- The scalability of the deployment of SomeWhere up to thousands of peers has been experimentally proven [7].
- The deployment on top of SomeWhere of the first P2P semantic system based on RDFS [5]<sup>1</sup> has been shown possible based on an appropriate encoding of RDFS in propositional logic.
- The reliability of answers provided by a semantic peer-to-peer network has been considered both from a logical and a probabilistic perspective in the setting of the G.-H. Nguyen’s PhD work (2005-2008). A fully decentralized algorithm for reasoning in presence of inconsistencies [50] guarantees to return only *well-founded* answers. We have proposed a probabilistic model to handle trust in a P2P setting [29].

**CMF: a Context Manager Framework for data services.** CMF is a framework for adding context awareness capability to adaptable data services. Context managers are defined by specializing the following aspects : acquisition of environmental data, transformation and interpretation of data, identification of relevant situations. The context is

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<sup>1</sup>RDFS is the first standard for the Semantic Web recommended by the W3C.

represented as a workflow of components that depicts data transformation from sensed raw data to reliable and useful contextual information. Relevant context states, that require service adaptation, are defined as a catalog of situations. For reasoning on contextual information, we adopt similarity evaluation for comparing situations with context state. This produces events intended to drive service adaptation.

We have experimented CMF on a critical service: query caching on a grid environment [26]. We have considered the example an adaptable cache with semantic and cooperative capabilities [39]. Efficiency has been proven in this dynamic environment: bandwidth changes, node overload, cache appearing and disappearing.

### **Perspectives:**

We plan to extend our work on data semantics in two main directions:

- Models and algorithms for reasoning on the distributed semantics of Web data. In particular, we will investigate models for handling uncertainty and trust in peer-to-peer data management systems (Dataring project, S. Kramdi's PhD), and algorithms for automatic discovery of probabilistic mappings between taxonomies of classes (R. Tournaire's PhD).
- Models and algorithms for handling semantic and contextual descriptions of devices or services. In particular, we will investigate the problem of automatic discovery and composition of services based on the semantic description of their functionalities and of the context in which the devices supporting them are deployed (CONTINUUM project, A. Benyelloul's PhD).

## **4 Application domains and social, economic or interdisciplinary impact**

Results of our research have direct impact on applications dealing with huge amounts of data and resources in pervasive environments. They include traditional enterprise applications such as mining logs, web applications but also "e-science" applications (in astronomy, biology, earth science, etc.). Environments we consider are wireless sensor networks (e.g. natural environment surveillance, industrial process monitoring), peer-to-peer data sharing, application deployment and maintenance for telecommunication operators. Application domains for data mining in structured data include: chemistry (e.g. molecule graphs), bioinformatics (e.g. gene or protein interaction networks), offline or online event logs mining.

## **5 Contracts and grants**

### **5.1 External contracts and grants (Industry, European, National)**

**GEDEON** (Data management on GRID, ACI, program Masse de Données - 2004-2007), 5 partners, (<http://www-lsr.imag.fr/Gedeon/>), 91 000 €. Coordinator: UJF-LIG, Scientific lead in LIG: C. Roncancio. The objective of the project was to merge file management functions and database functions to get an hybrid system. The project developed tools for managing consistency of data and metadata, and replication of data for providing high efficiency in accessing data.

**MEDIAGRID** (MEDIAGRID, a mediation framework for a transparent access to data sources, ACI, program GRID - 2002-2005), 3 partners (LIG, PRISM, LaMI), (<http://www-lsr.imag.fr/mediagrid/>), 122260 €. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: Ch. Collet. The MEDIAGRID project addressed the development of a mediation framework for a transparent access to data sources. It was driven by three complementary research topics: (i) making unspecified sources integration easier ; the goal is to provide tools for helping data integration of a huge number of data sources; (ii) providing evaluation and optimization techniques for local expressions ; the goal is to provide algorithms, tools and models for making the "best" local expressions choice, authorizing partial results and dynamic local expressions refining; and (iii) Validating the two main components of the framework - the integrator/generator and the evaluator - in a biological domain application as in this domain needs in terms of biological data sources integration and transparency of data access are very important.

**CRE** ( Contrat de Recherche Externalisée CRE Num. 46135615, France Télécom R&D (2005-2008) 193467 € on the topic Event management and composition framework . Coordinator: Grenoble INP-LIG, Scientific lead in LIG: Ch. Collet. The objective is to contribute to the specification and implementation of event managers. Event based systems are particularly well adapted for programming large scale distributed applications because they enable asynchronous and anonymous communication to support interoperation and collaboration among autonomous and heterogeneous components. Events generated by producers such as wireless sensors and RFID readers are not significant enough for

consumers. They must be filtered, combined or aggregated to produce more meaningful information. This project proposes an approach for composing events by querying distributed histories according to different strategies. The research is organised in three research lines: (i) definition of an event composition mechanism; (ii) specification of an event composition framework based on the Fractal model and its implementation. The approach was implemented on top of the middleware composite probes. The architecture of a probe was extended with components able to mediate events composition and aggregation.

**Webcontent** (RNNTL, The semantic web framework-2006-2009), 10 partners(CEA LIST, EADS DCS, Thales Research & Technology, France Telecom R & D, ADRIA Développement, Soredab SAS, Exalead, New Phenix, Xyleme, INRIA-GEMO, INRA, INRIA-Mostrare, LIP6, PRISM, INRIA-InSitu, LIG, LIMSI-CNRS, GRIMM, EXMO, PSY-CO), (<http://www.webcontent-project.org/>), 83300 €. Coordinator: CEA, Scientific lead in LIG: Ch. Collet and M.-C. Rousset. The WebContent project is creating a software platform to accommodate the tools necessary to efficiently exploit and extend the future of the Internet: the Semantic Web. The first targeted domain is the watch, a subpart of intelligence dedicated to warn the decider on the occurrence of an event or the evolution of a situation. It joins several Open Source tools to create the core of a Service Oriented Application and it defines the interface of several services that are available through several partners, either freely or through commercial licences. These services then exchange data in a formalized manner.

**OPTIMACS** : (ANR, program ARPEGE 2008-2011), 3 partners (LIG, LAMIH, LIRIS), (<http://optimacs.imag.fr>), 227 128 €. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: G. Vargas-Solar. OPTIMACS (SERVICE COMPOSITION BASED FRAMEWORK FOR OPTIMIZING QUERIES) combines hybrid query processing and services composition, addressing services composition and query processing including adaptive hybrid query optimization according to QoS criteria. OPTIMACS is an original research project that will lead to results with an important expected impact on “modern data and services intensive systems” deployed on networks of heterogeneous devices, the so called ecosystem or dataspace.

**DATARING** (ANR, Programme Réseaux du futur et services 2008-2011), 3 partners (<http://www.lina.univ-nantes.fr/projets/DataRing/>). 130 549 €. Coordinator: INRIA Nantes, Scientific lead in LIG: M.-C. Rousset. The DataRing project addresses the problem of P2P data sharing for online communities, by offering a high-level network ring across distributed data source owners. Users may be in high numbers and interested in different kinds of collaboration and sharing their knowledge, ideas, experiences, etc. Data sources can be in high numbers, fairly autonomous, i.e. locally owned and controlled, and highly heterogeneous with different semantics and structures. What we need then is new, decentralized data management techniques that scale up while addressing the autonomy, dynamic behavior and heterogeneity of both users and data sources.

**CONTINUUM** (ANR, Programme Réseaux du futur et services 2008-2011), 7 partners (I3S, LIG, SUEZ ENVIRONNEMENT, LYONNAISE DES EAUX, GEMALTO, LUDOTIC, MOBILEGOV), (<http://continuum.unice.fr>), 279 652 €. Coordinator: University of Nice, Scientific lead in LIG: F. Jouanot and M.-C. Rousset. CONTINUUM (CONTINUE DE SERVICE EN INFORMATIQUE UBIQUITAIRE ET MOBILE) addresses the problem of service continuity within the long-term vision of ambient intelligence. A core problem is to achieve software adaptation to a variety of resources in dynamic and heterogeneous environments with an appropriate balance between system autonomy and human control. Three key scientific issues will be addressed: context management and awareness, semantic heterogeneity, and human control versus system autonomy. The professions related to water management is used as a business application domain.

**UBIQUEST** (ANR, Programme BLANC 2009-2012), 3 partners (LIG, CITI, LIAMA), 149 099 €. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: Ch. Bobineau and Ch. Collet. UBIQUEST(Ubiquitous Quest: declarative approach for integrated network and data management in wireless multi-hop networks) aims at integrating network and data management in dynamic ad-hoc networks. this integration will be done by giving a distributed database view of the whole network. Each node stores network and application data in a local database. Messages between nodes are queries or answers. The objective of this integration is the rapid development and deployment of applications and network protocols.

**TRANSCAP** (ANR, Programme Jeunes Chercheurs 2007-2011), The project deals with transactional properties of management of continuous data in sensor networks or set-top box networks. The HADAS team has been involved in this project in 2008 (39300 €) . The project is now managed by the SIGMA group.

## 5.2 Research Networks (European, National, Regional, Local)

**CONE:** (CEE, programme Asia Link) - 2004-2006. 5 partners

The European project ASIA-LINK CONE is a teaching and research network involving Hanoi University of Technology (Viet Nam), Institut de Technologie du Cambodge (Cambodia), National University of Laos (Laos), Politecnico di Torino (Italy) and Grenoble Institute of Technology (France). The CONE project aims to set up an academic collaborative network using multimedia information and systems, specialised for exchange, sharing out, and management of multimedia and multilingual data for education.

**E-CLOUDS:** (BUILDING E-GOVERNEMENT CLOUDS USING DISTRIBUTED SEMANTIC SERVICES, Microsoft, 2007-2011, LACCIR, <http://e-cloudss.imag.fr>), 5 partners (CNRS LIG-LAFMIA, Fundacion Universidad de las Américas, Puebla, Mexique, Universidad de la Republica de Uruguay, Uruguay, Universidade Federal do Rio Grande do Norte), 50,000 USD. Coordinator: J.L. Zechinelli Martini, LAFMIA, Scientific lead in LIG: G. Vargas-Solar). The objective of E-CLOUDSS is to propose an infrastructure for mashing up reliable semantic services for building e-government clouds. Mashups represent a new wave for building Web applications. E-CLOUDSS addresses the management (definition and enforcing at execution time) of non functional properties associated to services' coordination for building reliable mashups. Effective ways to perform virtual executions is one of the main subjects of study of E-CLOUDSS.

**WebIntelligence:** (Cluster Régional "Informatique, Signal, Logiciels embarqués" - 2006-2009). The project aims at organizing research on web intelligence in Rhone-Alpes.

**DELFO:** (LAFMI project on Fault tolerant in embedded systems(CAN networks in automobile), 2004-2005) , 3 partners (LIG, Universidad de las Americas, Puebla (<http://www.udlap.mx>) and National Laboratory on Applied Informatics LANIA (<http://www.lania.mx>)). Internships for senior and junior researchers granted for 20 000 €. Coordinated in France by G. Vargas-Solar and in Mexico by J.L. Zechinelli-Martini, UDLAP. The objective of DELFO was to develop a fault tolerance mechanism for embedded systems. The key elements of the project were: (i) modelling and implementation of reactive fault tolerance strategies; (ii) the definition of fault tolerant CAN network; and (iii) the validation of the results on top of an adaptive component oriented middleware and its use for specifying a virtual fault tolerant car.

**ORCHESTRA:** (ORCHESTRATION TRANSACTIONNELLE DE SERVICES, Program: ECOS-ANUIES 2007-2011), 3 partners (Grenoble INP, Universidad Autonoma de Tlaxcala, Fundacion UNiversidad de las Américas, Puebla, Mexique). Missions for Professors (Ch. Collet in 2007 and 2008, and G. Vargas in 2009) and PhD students. The objective of ORCHESTRA is to propose an infrastructure pour building transactional, secure and evolutive service-based applications. The key elements of the project are: (i) the definition of a framework (general solution) of technical services for managing the security, transactional properties and evolution of business services ; and (ii) implementation of the framework an its validation in the development of service-based applications: production chains.

## 5.3 Internal Funding

**GEDEON:** (Gestion de données sur les grilles: systèmes de fichiers et technologie base de données pour la gestion de données à grande échelle, BQR Grenoble INP, 2004 - 2006). 20 000 €. - one PHD grant. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: C. Roncancio ).

The project aims at designing an adaptable caching service that may cooperate with other services for efficiently managing and accessing data in large-scale applications (using for example grid computing infrastructure).

**OREAU:** (Optimisation de Requêtes dans les Environnements Ambiants et Ubiquitaires, BQR Grenoble INP, 2007). 5000 €. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: Ch. Bobineau. . .). The OREAU project concerns ubiquitous and ambient environments that contain a large volume of data to be efficiently accessed. The characteristics of such environments (dynamicity, lack of global knowledge, physical constraints of devices) invalidate classical optimization techniques. This project aims at solving these problems by developing new adaptive optimization techniques exploiting machine learning methods. Collaborations with the LIAMA (China) have been developed with this help.

**RED-SHINE:** (RELIABLY AND SEMANTICALLY INTEGRATING WEB INFORMATION BY MASHING UP DATA SERVICES, BQR Grenoble INP, 2009). 2 partners (LIG, LAFMIA-UMI 3175) (<http://lafmia.weebly.com/>), 20 000€-one PhD grant and 4 months for inviting professors. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: G. Vargas-Solar).

The objective of RED-SHINE is to propose an infrastructure for mashing up services using semantics and thereby integrating information from the Web. RED-SHINE will redefine and extend OQLiST for declaratively defining reliable semantic mashups. RED-SHINE addresses the management (definition and enforcing at execution time) of non

functional properties (NF-P) associated to services' coordination for building reliable mashups. The objective of our work will be to propose a language for orthogonally expressing NF-P and ensuring strategies, and to specify execution strategies for adding NF-P to mashups.

**DAMOCLES:** (MSTIQ project, 2009). 2 partners (LIG, TIMA), 15 000 €- one year postdoc. Coordinator: Grenoble INP-LIG, Scientific lead in LIG: A. Termier).

DAMOCLES (DATA Mining for On Chip Low Energy Systems) aims at developing data mining algorithms for analysing memory accesses in System-on-Chip processors, in order to optimise data placement and thus reduce energy consumption.

## 6 Principal International collaborations

**China:** joint developments and publications. Ch. Bobineau has started collaboration with S. Grumbach, from the LIAMA laboratory, since April 2007. LIAMA is a joint laboratory between French research institutions and the Institute of Automation of the Chinese Academy of Science, Beijing. We are working on the combination of network and data management in dynamic ad-hoc networks. This collaboration has led to the realization of a prototype permitting the declarative network management and to a joint publication [12]. LIG-HADAS is leading a 2009 ANR Blanc project (UBIQUEST) on this topic where LIAMA is one of the participants. A Master student from the Chinese Academy of Science has come for a long stay at LIG-HADAS from July to December 2007.

### Japon

**Hokkaido University:** M.-C. Rousset co-supervised the thesis of Sattisvar Tandabany with Pr. Yuzuru Tanaka (Hokkaido University) on "Peer to peer composition of resources for the Semantic Web". The PhD student spent 11 months in the Meme Media Laboratory managed by Pr. Tanaka in the context of the College Doctoral Franco-Japonais.

**Osaka University:** A. Termier collaborates with Pr. Takashi Washio of I.S.I.R., Osaka University on graph mining algorithms. A. Termier participated with T. Washio to a Japanese contract with Fujitsu and Japan Airlines.

**NII:** A. Termier also collaborates informally way with Takeaki Uno from NII, Tokyo on the parallelisation of Pr. Uno's "LCM" algorithm. This collaboration will be formalized with the PhD student B. Négrevergne (co-supervised by M.-C. Rousset and A. Termier) going to Japan for three months (June-August 2009) in the team of Pr. Uno.

**Mexique:** the group has a long tradition in developing cooperations between the Mexican and French governments in TICS for 20 years. M. Adiba created the French Mexican Laboratory of Informatics (LAFMI) in 2002. From 2004 - 2006 G. Vargas-Solar was member of the committee for projects evaluation of the LAFMI. Then, since 2008, G. Vargas-Solar is deputy director of the French Mexican Laboratory in Informatics and Automatic Control (LAFMIA, UMI 371) an international unit of the CNRS. The cooperation of HADAS with Mexico has led to scientific results (publications and prototypes) and to the education of graduate students through co-advising contracts and the organisation of thematic schools. These activities include the participation of Ch. Collet and Ch. Bobineau. Some of the current projects with Mexico are done in cooperation with the new lab LAFMIA. The cooperation with Mexico includes the most important private and public institutions of that country: three major public research centres CINVESTAV, CICESE, INAOE, private centres like LANIA; and important universities like UDLAP, UATx, ITESM. The main topics of the cooperation with Mexico in HADAS are services based infrastructures for managing distributed data with reliability. This collaboration has been formalized with 3 PhD students A. Portila, V. Cuevas and J. Espinosa-Oviedo.

**Vietnam:** we have developed relations with the MICA laboratory in Hanoi (3 doctors formed) and participate to the Asian projects. In the context of the ASIA-LINK CONE project Ch. Bobineau spent three weeks in MICA/ IPH Hanoi giving lectures on Advanced Database Management to students and teachers/researchers from all members of the project, and participating in the deployment of the distributed database servers supporting this project. Ch. Collet spend one week in Hanoi for lectures and research tutorials. Another stay is planned for 2009.

## 7 Visibility, Scientific and Public Prominence

### 7.1 Contribution to the Scientific Community

- *VP adjointe recherche groupe Grenoble INP:* Ch. Collet (April 2007- )
- *Membre élu du conseil scientifique - Grenoble INP:* Ch. Collet (2002-2007)

- *Chargée de mission Pôle Information et Communication / vice-présidence recherche INPG*: Ch. Collet (2001-2008)
- *Membre élue du conseil de l'ENSIMAG*: Ch. Collet(2001-2008). Vice-présidente du conseil de 2003 à 2007.
- *presidence of the Ubimob conference 2008*: Ch. Collet
- *presidence of the programme and organization committees of the EDBT school 2009*: Ch. Collet, G. Vargas
- *membre du Conseil Scientifique du Département STII (membre nommée, septembre 2006)*: M.-C. Rousset
- *membre nommé du Conseil Scientifique du Département STII du CNRS*: M.-C. Rousset
- *Membre élu de la CSE de l'UJF , section 27 (2006-2008)*: M.-C. Rousset
- *Membre de 2 Comités de Sélection de l'UJF , section 27*: M.-C. Rousset
- *Chargée de Mission pour les Relations Internationales auprès du Collège Doctoral de l'UJF*: M.-C. Rousset
- *Chargée de Mission auprès du LIG pour la prospective scientifique*: M.-C. Rousset
- *Chargée de Mission auprès du LIG pour le budget*: Ch Collet (2006-avril 2007)
- *Chargée de Mission auprès du LIG pour Europe*: M. Adiba (2007-2009)
- *Membre du jury du prix de thèse Gilles Kahn 2007 et 2008 (prix décerné par Specif et patronné par l'Académie des Sciences)*: M.-C. Rousset
- *Membre du jury du prix de thèse décerné par l'AFIA, 2009*: M.-C. Rousset
- *Elected president of the Mexican Society of Computer Science 2007-2009*: G. Vargas-Solar
- *Deputy director of the UMI French Mexican Laboratory of Computer Science (LAFMIA, UMI 3571)*: G. Vargas-Solar
- *Membre élu de la CSE de Grenoble INP, sections 25, 26 et 27 (2004-2008)*: Ch. Bobineau
- *Membre nommé de la CSE de l'Université de Valenciennes et du Haut Cambrasis, section 27 (2005-2008)*: Ch. Bobineau
- *Membre externe du Comité de Sélection de l'INSA Lyon, section 27 (2009)*: Ch. Bobineau, M.-C. Rousset

### **Management of Scientific Organisations**

- *Member of the Extended Database Technology(EDBT) endowment*: Ch. Collet (2004 - ) in charge of the school programming
- *Member of the IJCAI-09 advisory committee*: M.-C. Rousset
- *French coordinator of the joint French-Mexican Laboratory in Computer Science LAFMI* : M. Adiba(2002-2006). G. Vargas(2007-)

### **Administration of Professional Societies**

#### **Editorial Boards**

- *Systèmes d'information pair-à-pair, Ingénierie des systèmes d'information, 2007, 12(3)*, B. Defude et C. Roncancio
- *PVLDB, publication of the Very Large Database Endowment*: Ch. Collet (2008- )
- *DKE Journal*: Ch. Collet (2000-)
- *Computacion y sistemas*, G. Vargas-Solar, since 2002.
- *e-Gnosis, electronic journal*, G. Vargas-Solar, since 2004.
- *ICDIM Journal special issue*, G. Vargas-Solar, since 2005.
- *KER Journal special issue*, G. Vargas-Solar, since 2007.
- *ActaPress Journal*, G. Vargas-Solar, since 2008.
- *Interstices*: M.-C. Rousset.
- *ACM Transactions on Internet Technology (TOIT)*: M.-C. Rousset, until 2005.
- *AI Communications*: M.-C. Rousset.
- *Communications of the ACM* : M.-C. Rousset, since 2009.

### **Organisation of Conferences and Workshops**

- *Fourth French-Mexican School on Distributed Systems*, July, Grenoble, France, 2005: G. Vargas-Solar
- *Deuxièmes Journées Francophones: Mobilité et Ubiquité*, Grenoble, juin 2005: Cl. Roncancio and Labbé
- *Topic 5 Parallel and Distributed Databases. Euro-Par 2007-293*: Marta Patiño-Martínez, G. Vargas-Solar, Elena Baralis, Bettina Kemme
- *Proceedings of the French Mexican Schools on Distributed Systems*: G. Vargas-Solar, 2004, 2005, 2006.
- *First International Workshop on Data and Services Management in Mobile Environments (DS2ME'08)* in conjunction with the 24th International Conference on Data Engineering (ICDE'08) DS2ME 2008, Ch. Collet, T. Delot and G. Vargas-Solar
- *Extended Data Base Technology (EDBT) school 2009*, Ch. Collet, T. Delot and G. Vargas-Solar

## Program committee members

- *American Conference on Artificial Intelligence (AAAI)*, M.-C. Rousset, 2006.
- *International Conference on Cooperative Information Systems (CooPIS)*, M.-C. Rousset, 2005.
- *European Conference on Artificial Intelligence (ECAI)*, M.-C. Rousset, 2008.
- *International Conference on Knowledge Engineering and Knowledge Management (EKAW)*, M.-C. Rousset, 2006, 2008.
- *European Semantic Web Conference (ESWC)*, M.-C. Rousset, 2006, 2008, 2009.
- *International Joint Conference on Artificial Intelligence (IJCAI)*, M.-C. Rousset, 2007, 2007, 2009.
- *Workshop on Information Integration on the Web (IIWeb)*, M.-C. Rousset, 2006.
- *International Symposium on Methodologies for Intelligent Systems (ISMIS)*, M.-C. Rousset, 2005, 2006.
- *International Semantic Web Conference (ISWC)*, M.-C. Rousset, 2005, 2007.
- *International Conference on the Principles of Knowledge Representation and Reasoning (KR)*, M.-C. Rousset, 2006.
- *ACM Conference on Principles of Database Systems (PODS)*, M.-C. Rousset, 2005.
- *Symposium on Abstraction, Reformulation and Approximation (SARA)*, M.-C. Rousset, 2005.
- *Very Large Data Bases Conference (VLDB)*, Ch. Collet, 2005, 2006, 2007
- *International Conference on Distributed Computing Systems*, Ch. Collet, 2007, 2009
- *Extended Data Base Technologies (EDBT)*, Ch. Collet, 2006, 2008, 2009
- *Web Information Systems Engineering (WISE)*, Ch. Collet, 2007
- *International Symposium on Methodologies for Intelligent Systems (ISMIS)*, Ch. Collet, 2005
- *Conference on Information and Knowledge Management (CIKM)*, Ch. Collet, 2005
- *International Database Engineering and Applications Symposium (IDEAS)*, Ch. Collet (2006, 2007, 2008), G. Vargas-Solar (2005-)
- *International Workshop on High-Performance Data Management in Grid Environments (HPDGrid)*, Ch. Collet, 2006
- *International Conference on Data Engineering (ICDE)*, Ch. Collet, 2008
- *International Mexican Conference on Computer Science (ENC)*, Ch. Collet(2007, 2008), Ch. Bobineau (2008)
- *IFIP Conference on e-Business, e-Services, and e-Society, I3E*, Ch. Collet, 2009
- *numéro spécial intitulé “Services Web Sémantiques” de la revue ISI (Ingénierie des Systèmes d’Information)*, Ch. Collet, 2009
- *Extended Data Base Technologies school (EDBT school) program definition*, Ch. Collet, 2004, 2007
- *International Conference on Data Mining (ICDM)*, A. Termier, 2006, 2009
- *SIAM International Conference on Data Mining (SDM)*, A. Termier, 2009
- *International workshop on ambient data integration (ADI)*, F. Jouanot, 2009
- *Bases de Données Avancées (BDA)*, Ch. Collet (2005, 2006, 2008), Ch. Bobineau (2005, 2009), G. Vargas-Solar(2007)
- *Gestion des Données dans les Systèmes d’Information Pervasifs (GEDSIP)*, Ch. Bobineau (2008, 2009), G. Vargas-Solar (2009)
- *International Workshop on Data and Services Management in Mobile Environments (D2SME)*, Ch. Bobineau (2008, 2009)
- *Jornadas nacionales sobre Servicios Web (JSWEB), Spain*, G. Vargas-Solar (2006 -)
- *IEEE International Conference on Pervasive Services* , G. Vargas-Solar (2006)
- *International Conference on Intelligent and Information Technologies, (CITII)* G. Vargas-Solar (2008)
- *Conference on Advanced Information Systems Engineering (CAISE)* G. Vargas-Solar (2005)
- *Workshop on Philosophical Foundations of Information Systems Engineering (PHISE)*, G. Vargas-Solar (2005-2006)
- *International Conference on Database and Expert Systems Applications (DEXA)*, G. Vargas-Solar (2005-)
- *IEEE International Workshop on Web and Mobile Information Systems (WAMIS)*, G. Vargas-Solar, since 2006
- *International Conference on Data Management in Grid and P2P Systems (GLOBE)*, G. Vargas-Solar (since 2006)
- *Workshop on Service-Oriented Applications, Integration and Collaboration (SOAIC)*, G. Vargas-Solar (2006)
- *IEEE Latin American Web Congress (LA-WEB)*, G. Vargas-Solar, since 2006
- *EURO-PAR*, G. Vargas-Solar (2007)
- *International Workshop on Semantic Metadata Management and Applications (SeMMA)*, G. Vargas-Solar (2008)
- *International Conference on Soft Computing as Transdisciplinary Science and Technology (CSTST)*, G. Vargas-Solar (2008)
- *International ACM Conference on Management of Emergent Digital EcoSystems (MEDES)*, G. Vargas-Solar (2009)
- *International Conference on the Applications of Digital Information and Web Technologies (ICADIWT)*, G. Vargas-Solar (2009)
- *ICPADS (International Conference on Parallel and Distributed Systems) track on “Web Services”*, G. Vargas-Solar, 2009



## International expertise

- *Member of the evaluation panel for the ERC starting grants, Panel 5 (Information and Communication), M.-C. Rousset (nommée en avril 2007)*
- *Evaluator for FET Proactive, FP7 Call 3, “ICT Forever Yours”, M.-C. Rousset (2008)*
- *Member of the experts committee for projects evaluation of the Laboratoire Franco-Mexicain en Informatique: G. Vargas-Solar (2004-2006)*
- *Member of the experts committee for projects evaluation of the LACCIR Microsoft virtual lab on TICS for Latin America: G. Vargas-Solar (2007-)*
- *French delegate to the Program Committee Information Society Technology of the DGINFO for the 6 Framework Program (FP6): M. Adiba (2003-2006)*
- *French delegate to the Program Committee Information & Communication Technologies of the DGINFO for FP7: M. Adiba (2007-2008).*
- *French delegate to the COST Domain Committee Information & Communication Technology: M. Adiba (2007-2008).*

## National expertise

- *membre du CSD1 du comité de l'ANR “Jeunes Chercheurs” et “Non Thématiques” , M.-C. Rousset (-2007)*
- *Présidente du comité d'évaluation du CRIL (Centre de recherche en informatique de Lens), M.-C. Rousset (2008)*
- *ANR, Masses de données, Ch. Collet, 2005-2008*
- *Member of the Specialists Council of the Delegation of Science and Technologies in Puebla, Mexico:, G. Vargas-Solar(2007- )*
- *Chargé de Mission Europe & Computer Science at the Ministry of Higher Education & Research in Paris (half-time). Direction Générale de la Recherche et de l'Innovation (DGRI):, M. Adiba (2002-2008)*

## 7.2 Prizes and Awards

### Personal Awards

- M.-C. Rousset: awarded ECCAI Fellow, 2005.

### Best Paper Awards

- [40] L. D’Orazio, C. Labbé, C. Roncancio, and F. Jouanot. Query and data caching in grid middleware. In *Latinamerican Conference of High Performance Computing (CLCAR’07)*, Santa Marta, Colombia, aug 2007.
- [20] V. Cuevas-Vicentín, G. Vargas-Solar, and C. Collet. Web services orchestration in the webcontent semantic web framework. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC’08)*, pages 271-282. IEEE Press, 2008.

### Other Awards

- Best PhD work presentation, LIG, 2008: R. Tournaire

## 7.3 Public Dissemination

### Tutorials

- Tutorial EDBT Summer School on Data and Resource Management in Ambient Computing: Semantic oriented data spaces, 2009, M.-C. Rousset.
- Tutorial European Summer School on Advanced Courses on Artificial Intelligence (ACAI 2007): Logic-based techniques for information integration, M.-C. Rousset.
- Tutorial Ecole d’été Web Intelligence (WI 08): Web sémantique: modèles, langages et algorithmes, 2008, M.-C. Rousset.
- Tutorial on Data & Event Streams Processing, ENC08 Conference, Mexicali, Mexique, October 2008, M. Adiba.

## Keynotes

- Keynote CONAIC, Processing queries in multiscale environments, Universidad Juarez Autonoma de Tabasco (2007): G. Vargas-Solar
- Keynote Building the Mexican Dataspace, Microsoft Research Summit, Redmond, USA (2008): G. Vargas-Solar
- Keynote E-CLOUDSS: Building E-government Clouds using Distributed Semantic Services, Microsoft Research Faculty Summit, Buenos Aires, Argentina (2009): G. Vargas-Solar
- Keynote Observing the environment for building today's and future information systems, Universidad Juarez Autonoma de Tabasco (2009): G. Vargas-Solar
- Keynote Semana de Juarez, Mujer serpiente: une historia alternativa sobre el origen de la civilizacion, Universidad Juarez Autonoma de Tabasco (2009): G. Vargas-Solar
- Keynote Conference IETI, Services in Clouds: a new perspective for accessing the digital world, Universidad Popular Autonoma de Puebla (2009): G. Vargas-Solar
- Keynote International Conference on Ontologies Databases and Applications of Semantics (ODBASE 05): SomeWhere: a scalable P2P infrastructure for querying distributed ontologies, 2005, M.-C. Rousset.
- Keynote International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2006): Some-Where in the Semantic Web , M.-C. Rousset.
- Keynote International Conference on Conceptual Structures (ICCS 2008): SomeWhere: a scalable P2P infrastructure for querying distributed ontologies, 2008, M.-C. Rousset.
- Keynote Journées d'Intelligence Artificielle Fondamentale (IAF 08): Raisonnement distribué en pair à pair pour le Web sémantique, 2008, M.-C. Rousset.
- Keynote Journées Francophones sur les Ontologies (JFO 08): Interrogation et gestion d'ontologies distribuées en pair à pair, 2008, M.-C. Rousset.
- Keynote INFORSID: Les défis posés par le Web sémantique, 2006, M.-C. Rousset.

## Communications

- Keynote Observing the environment for building today's and future information systems, Universidad Juarez Autonoma de Tabasco (2009): G. Vargas-Solar
- Keynote Semana de Juarez, Mujer serpiente: une historia alternativa sobre el origen de la civilizacion, Universidad Juarez Autonoma de Tabasco (2009): G. Vargas-Solar

## Communication in public media

- 50 years of Computing Science in Mexico: current state and perspectives, Open panel of the Celebration of 50 years of Computing Science in Mexico, Autonomous University of Mexico, Palacio de Minería, 2008: G. Vargas-Solar
- Towards the construction of a virtual observatory in Astrophysics, Interview, National television in Mexico, SICOM, 2008: G. Vargas-Solar
- The implications of virtual worlds in the education of youngsters, Radio, SICOM, 2008: G. Vargas-Solar
- Studying a PhD in Informatics: implications in the development of Mexico, National television in Mexico, SICOM, 2008: G. Vargas-Solar
- Una vista parcial de la agenda de promoción de la investigación en Ciencia de la Computación en México, In Journal Faculty Connexion, Microsoft, 2008: G. Vargas-Solar

# 8 Educational Activities

## Supervision of Educational Programs

- M.-C. Rousset: Co-director for the M2R Informatique with M.-C. Fauvet, J. Crowley and A. Lux
- Ch. Collet: director of speciality "Ingénierie des logiciels et bases de données", of Master Mathématiques, Informatique de l'école doctorale "Mathématiques, sciences et technologies de l'information, Informatique", Grenoble (1999-2007).

## Teaching

Name	Position	Year	Number of hours	Academic Program	University
Ch. Bobineau	MdC Grenoble INP	from 2005 to 2009	220	2A, 3A, Master and MIDEP	INP - ENSIMAG
Ch. Collet	PR Grenoble INP	from 2005 to 2009	192	2A, 3A et Master	INP - ENSIMAG
F. Jouanot	MdC UJF	from 2005 to 2009	227	L1 INMA, L1 SIG, L1 PHYB, L3 M &I, L3 INFO, L3 MAI, M1 INFO, M1 MI-AGE, M2 IS, M2P GI, 3A	UJF - DLST, UFR IMAG
M-C. Rousset	PR UJF	from 2005 to 2009	192	Licence and Master	UJF, DLST and UFR IMA
A. Termier	MdC UJF	from 2007 to 2009	150	L1,L3, Polytech RICM1, Master	UJF

## 9 Industrialization, patents and technology transfer

### Software Licenses

- (*DigDag*, A. Termier, APP no IDDN.FR.001.410013.000.R.C.2008.000.20700, also registered with the APP equivalent agency in Japan, 2008)
- (*SomeWhere*, P. Adjiman, P. Chatalic, F. Goasdoué, M.-C. Rousset and L. Simon. APP no IDDN.FR.001.420022.000.S.P.2005.000.00000 par l'Université Paris 11. Octobre 2005 ). The system has been developed when M-C. Rousset was at the LRI lab.

### Consulting Activities

- A Termier: Scientific Consultant for the Fujitsu Research Institute (Tokyo, Japan) for a joint project with Japan Airlines and Osaka University, 2008-2009.

## 10 Self-Assessment

We believe that HADAS is a very good research team with a true international visibility. Our main strength is our experience for developing models, languages and components at the heart of database systems. We were one of the pioneer groups proposing the unbundling of database systems. This vision is nowadays well accepted. For the last four years we bring together researchers from data management and knowledge representation. The integration is still in progress and can be improved, especially by considering a database system as a large-scale semantic-based infrastructure for data and resources management. For that, we also collaborate with other LIG groups, particularly EXMO (for semantics ), MESCAL(for parallel pattern mining algorithms on multicore processors). We expect that these collaborations will yield scientific publications. Also the MESCAL collaboration should offer us the opportunity to implement our ideas on a new type of data management system architecture.

For five (equivalent) permanent researchers during the period (only two HDR), the number of doctoral students is rather stable over the last four years. we have 8 to 10 PhD per year, all supervised by faculty members, resulting in 3 PhD's defense per year. Four on-going thesis (co-tutelles) are done in collaboration with Mexico research teams from Tlaxcala and Puebla Universities, Mexico. This shows the strong relationships we have for years with Mexico that had lead to scientific results (publications and prototypes) and to the education of graduate students through co-advising contracts and the organization of thematic schools. We also developed collaborations with Vietnam (2 PhD students from Institute Polytechnic of Hanoi and one PhD from the National University in HCV) and with Japon (one co-tutelle and visits of PHD students in Japon). A new collaboration is emerging with China (LIAMA laboratory) through an ANR project and should lead in PhD in co-tutelle.

From the scientific production point of view, the numbers of publications in international conferences is significative and globally increased this past four years (from 9,5 to 14 per year). Publications in journals still has to be improved even if we noticed an increase from the previous four years period. It is our main objective in the incoming five years. The number of international publications per "publishing scientific" also increased (from to 2,14 to 2,3 per year). From the point of view of

research dissemination and recognition we have a very good impact with a lot of keynotes talks, tutorials and conferences programs participation among which are the well-known conferences in the domain of data and semantics management. From the point of views of contracts, the group is very active. We have an average of 210000€ as inputs per year. This means around 42000€ per (equivalent) permanent researcher per year. Contracts allow us to hire PhD students. However, during the period we also got 3 grants from the french research Ministry.

Managing and developing collaborations, PhD supervision, contracts is time consuming and is a potential cause of difficulty. It is why we decided that we should have a management of the group taking care of no dispersion. We have research talks and seminars and a (management) meeting every 2-3 weeks.

## 11 Perspectives for the research team

Several perspectives for new data management technologies have already been presented. They are nowadays completely justified by two approaches proposed in the data management system innovation (cf by the Claremont report<sup>2</sup>): (i) deconstructing core data-centric ideas and systems as basic data services; and (ii) reforming them for application needs considering architectural aspects. We explored these approaches since 2002, considering a data management system not as a storage service but as a middleware for sharing data and their associated management functions (persistence, replication, caching, query brokers, transactions, mediators, event managers). We developed: (i) data services integrating specificities of data and characteristics of the data resource architectures (networks and systems), (ii) adaptable composition mechanisms considering their non-functional properties; and (iii) algorithms for reasoning on semantics of data and services. Our research completely feet in the infrastructure and software research themes of the laboratory (cloud computing, services coordination) and also in the knowledge theme (Reasoning on context and data semantics).

Lot of research still has to be done. Our perspective global view for the incoming four years is to continue our research in that general framework of *putting data-centric ideas outside classical database systems*, merging them with knowledge and semantic descriptions for reasoning in new architectural supports such as large-scale clusters, multi-core processors, ad-hoc networks. This will lead in: HADAS, Heterogeneous Autonomous Distributed Data Services. During the next four-year period we will focus on:

- Treating query optimization as a unified, adaptive, self-tuning task to be carried out continuously in several context from network (protocols) to service-based applications.
- Reasoning on context and data semantics for key-word queries managing a rich collection of structured, semi-structured and unstructured data, spread over many repositories (data spaces).
- Exploring data-driven parallelism, in orders to adapt to the loads of pattern mining algorithms. Such exploration may be extended to other kind of algorithms for data management and querying. Parallel data mining is a promising and challenging topic on which we will reinforce our collaboration with Japanese groups that are world leaders in data-mining on structured data.
- Providing more functionalities (expressive querying, caching, atomicity, security) to cloud data services with consistency guarantees.
- Tackling at the same time classic, mobile and continuous queries by composing services that are (push/pull, static and nomad) data providers.

This research actions will clearly contribute to the efficiency and effectiveness of the way we manage and allocate our computing resources (algorithms, optimization, allocation, caching, semantics, etc.) for managing heterogeneous and largely distributed data and services within ambient and ubiquitous environments. They will contribute to the laboratory issues: data management and access in intelligent houses, ad-hoc and sensor networks, logical-based computing models, service-based and/or mining accessing methods, providing reliability to services composition.

Our agenda falls within the numerous scientific research directions on Information Technologies given by the CNRS and INRIA Institutes for the next 10 years. We identified two of them for our group:

- large data sets management coping with decentralized architecture networks;
- knowledge and services web for Information, Computation and Communication Everywhere.

Also considering the Claremont Report on Database Research our research agenda integrates the proposed directions:

- new database engine architectures (with our research on query optimizers and data mining algorithms for multicore architectures and ubiquitous environment) ;

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<sup>2</sup> Available at <http://db.cs.berkeley.edu/claremont/claremontreport08.pdf>

- interplay of structured and unstructured data (with our research on data semantics description, uncertainty, reasoning on context-sensitive data);
- cloud data services (with our research on models and tools for describing and managing autonomic data services composition taking care of their non functional properties).

## 12 Publications

### International peer reviewed journal [ACL]

#### 2009

- [1] F. Sais, N. Pernelle, and M.-C. Rousset. Combining a Logical and a Numerical method for Reference Reconciliation. *Journal on Data Semantics*, 12:66–94, 2009.

#### 2008

- [2] A. Portilla, G. Vargas-Solar, C. Collet, J. L. Zechinelli-Martini, and L. García-Bañuelos. Contract Based Behavior Model for Services Coordination. *Lecture Notes in Business Information Processing*, 8:109–123, 2008.
- [3] A. Termier, M.-C. Rousset, M. Sebag, K. Ohara, T. Washio, and H. Motoda. DryadeParent, an efficient and robust closed attribute tree mining algorithm. *Transactions on Knowledge and Data Engineering (TKDE)*, 20(3):300–320, Mar. 2008.
- [4] G. Vargas-Solar, J. L. Zechinelli-Martini, and V. Cuevas-vicenttin. Integrating and querying astronomical data on the e-GrOV data grid. *International Journal of Computer Systems Science and Engineering - Special Issue on Data Management in Grid and P2P Systems*, 23(2):107–119, 2008.

#### 2007

- [5] P. Adjiman, F. Goasdoué, and M.-C. Rousset. SomeRDFS in the Semantic Web. *Journal on Data Semantics*, 8:158–181, 2007.
- [6] M. Osorio and V. Cuevas-vicenttin. Updates in ASP: an approach based on basic structural properties. *Theory and Practice of Logic Programming*, 7(4):451–479, 2007.

#### 2006

- [7] P. Adjiman, P. Chatalic, F. Goasdoué, M.-C. Rousset, and L. Simon. Distributed Reasoning in a Peer-to-Peer Setting: Application to the Semantic Web. *Journal of Artificial Intelligence Research*, 25:269–314, 2006.
- [8] C. Le Duc, N. Le Thanh, and M.-C. Rousset. A Compact Representation for Least Common Subsumers in the description logic ALE. *AI Communications*, 19(3):239–273, 2006.

#### 2005

- [9] C. Labbé and D. Labbé. How to measure the meanings of words? Amour in Corneille’s work. *Language Resources and Evaluation*, 35(35):335–351, 2005.
- [10] P. Serrano-Alvarado, C. Roncancio, M. Adiba, and C. Labbé. An Adaptable Mobile Transaction Model for Mobile Environments. *International Journal Computer Systems Science and Engineering(IJCSSE) – Special issue on Mobile Databases*, 2005.

### International peer-reviewed conference proceedings [ACT]

#### 2009

- [11] N. Abdallah, F. Goasdoué, and M.-C. Rousset. DL-LiteR in the Light of Propositional Logic for Decentralized Data Management. In *IJCAI 2009:International Joint Conference on Artificial Intelligence*, July 2009.

- [12] M. Bauderon, C. Bobineau, S. Grumbach, A. Henry, X. Qi, W. Qu, K. Suo, F. Wang, and Z. Wu. Netquest: An Abstract Model for Pervasive Applications. In *Seventh IEEE International Conference on Pervasive Computing (Pervasive 2009)*, Nara, Japan, May 2009. LNCS.
- [13] V. Cuevas-vicenttin, G. Vargas-Solar, and C. Collet. Efficiently Coordinating Services for Querying Data in Dynamic Environments. Los Alamitos, CA, USA, 2009. IEEE Computer Society. To appear.
- [14] J. A. Espinosa-oviedo, G. Vargas-Solar, J.-L. Zechinelli-Martini, and C. Collet. Non-Functional Properties and Services Coordination Using Contracts. In *In proceedings of the 13th Int. Database Engineering and Applications Symposium (IDEAS 09)*, Cetraro, Italy, 2009. ACM.
- [15] J. A. Espinosa-oviedo, G. Vargas-Solar, J.-L. Zechinelli-Martini, and C. Collet. Securely coordinating services using contracts. In *In proceedings of the 8th Mexican International Conference on Computer Science (ENC 2009)*, Mexico City, Mexico, 2009. IEEE.
- [16] J. A. Espinosa-oviedo, G. Vargas-Solar, J.-L. Zechinelli-Martini, and C. Collet. Unmarrying Non-Functional Properties and Services Coordination Using Contracts. In *In Proceedings of the 1st Int. workshop on Model Driven Service Engineering (Mose 2009) in conjunction with the 18th CIKM conference*, Hong Kong, China, 2009. ACM.

## 2008

- [17] A. Bottaro, A. Gérodolle, and L. Gurgun. Home SOA - Controlling Home Pervasive Devices. In *5th IEEE International Conference on Pervasive Services - Demonstration proposals*, page 2, July 2008.
- [18] V. Cuevas-vicenttin. Hybrid query processing through services composition. In *Proceedings of the 11th International Conference on Extending Database Technology PhD Workshop (EBDT)*, pages 75–82, New York, NY, USA, 2008. ACM.
- [19] V. Cuevas-vicenttin. Towards multi-scale query processing. In *Proceedings of the First International Workshop on Data and Services Management in Mobile Environments (DS2ME'08)*, pages 137–144. IEEE Press, Apr. 2008.
- [20] V. Cuevas-vicenttin, G. Vargas-Solar, and C. Collet. Web Services Orchestration in the WebContent Semantic Web Framework. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC'08)*, pages 271–282. IEEE Press, 2008.
- [21] J. A. Espinosa-oviedo. Adding non-functional properties to applications based on services using contracts. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC'08)*, pages 145–147, Oct. 2008.
- [22] L. Gurgun, C. Roncancio, C. Labbé, A. Bottaro, and V. Olive. SStreaMWare: a service oriented middleware for heterogeneous sensor data management. In *International Conference on Pervasive Services*. Sorrento, Italy, July 2008.
- [23] L. Gurgun, C. Roncancio, C. Labbé, A. Bottaro, and V. Olive. SStreaMWare: a service oriented middleware for heterogeneous sensor data management. In *ICPS '08: Proceedings of the 5th international conference on Pervasive services*, pages 121–130, New York, NY, USA, July 2008. ACM.
- [24] L. Gurgun, C. Roncancio, C. Labbé, and V. Olive. Update Tolerant Execution of Continuous Queries on Sensor Data. In *IEEE International Conference on Networked Sensing Systems*, pages 51–54, Kanazawa, Japan, 2008.
- [25] L. Gurgun, C. Roncancio, C. Labbé, V. Olive, and D. Donsez. Sensor data management in dynamic environments. In *IEEE Fifth International Conference on Networked Sensing Systems (INSS'08) – demo session*, pages 256–256, June 2008.
- [26] F. Jouanot, L. D'Orazio, and C. Roncancio. Context-aware cache management in grid middleware. In *Data Management in Grid and Peer-to-Peer Systems (Globe'08)*, number LNCS 5187, pages 34–45, Turin, Italy, 2008. Springer-Verlag Springer Verlag.
- [27] D. G. Moreno garcia, G. Vargas-Solar, and C. Collet. Composing events by managing and querying distributed histories. In *Proceedings of the 1st workshop ILO: Integration, interrogation et analyse de LOGs, in conjunction with INFORSID'08*. Hermes Lavoisier, 2008.
- [28] J. Nagapraveen, T. Coupaye, C. Collet, and P.-C. David. Flexible Reactive Capabilities in Component-Based Autonomic Systems. In *In 5th IEEE Workshop on Engineering of Autonomic and Autonomous Systems (EASe 2008)*. Belfast, Northern Ireland, IEEE, Mar. 2008.

- [29] G.-H. Nguyen, P. Chatalic, and M.-C. Rousset. A Probabilistic Trust Model For Semantic Peer to Peer Systems. In *EDBT 08 Workshop on Data Management in Peer-to-Peer systems*, pages 59–65, Mar. 2008.
- [30] A. Pomares, C. Roncancio, and J. Abasolo. Virtual Objects in Large Scale Health Information Systems. In *HealthGrid Conference*, Chicago, United States, June 2008.
- [31] A. Pomares, C. Roncancio, J. Abasolo, and M. d. P. Villamil. Dynamic source selection in large scale mediation systems. In *Data Management in Grid and Peer-to-Peer Systems (Globe'08)*, number LNCS 5187, pages 58–69, Turin, Italy, september 2008. Springer Verlag.
- [32] A. Portilla. Providing reliability to services coordination. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC'08)*, pages 136–137, Mexico, 2008. SMCC.
- [33] A. Portilla, C. Collet, J. L. Zechinelli-Martini, and H.-B. Víctor. Providing persistency guarantees to services coordination. In *Proceedings of the Ninth Mexican International Conference on Computer Science (ENC'08)*, IEEE Computer Society, pages 169–178. IEEE, 2008.
- [34] A. Portilla, H. Tan, and J. A. Espinosa-oviedo. Building reliable mobile services based applications. In *Proceedings of the 24th International Conference on Data Engineering Workshops (ICDE)*, pages 121–128, Cancun, Mexico, Apr. 2008. IEEE Computer Society.
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- [36] A. Portilla, H.-B. Víctor, G. Vargas-Solar, J. L. Zechinelli-Martini, and C. Collet. Building Reliable Services Based Mashups. In J.-M. López-Cobo, A. Vallecillo, and A. Ruiz-Cortés, editors, *IV Jornadas Científico-Técnicas en Servicios Web y SOA JSWEB 2008, Sevilla, Spain*, volume 1 of *JSWEB*, pages 151–163. Jornadas Científico-Técnicas en Servicios Web y SOA, 2008.
- [37] C. Prada, M. d. P. Villamil, and C. Roncancio. Join queries in P2P DHT Systems. In *DB, Information Systems and P2P Computing, 6th Int. WS DBISP2P associé à VLDB*, 2008.
- [38] T.-T. Vu, C. Bobineau, and C. Collet. A strategy to develop adaptive and interactive query brokers. In *12th International Symposium on Database Engineering and Applications (IDEAS'08)*, pages 237–247, Coimbra, Portugal, Sept. 2008. ACM.

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- [39] L. D'Orazio, F. Jouanot, Y. Denneulin, C. Labbé, C. Roncancio, and O. Valentin. Distributed Semantic Caching in Grid Middleware. In *Proceedings of the 18th International Conference on Database and Expert Systems Applications (DEXA'07)*, LNCS 4653, pages 162–171, Regensburg, Germany, Sept. 2007. Springer.
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- [45] S. Tandabany, M.-C. Rousset, and Y. Tanaka. A logic-based language for describing device interoperability. pages 373–378, July 2007.

- [46] A. Termier, Y. Tamada, K. Numata, S. Imoto, T. Washio, and T. Higuchi. DigDag, a first algorithm to mine closed frequent embedded sub-DAGs. In *International Workshop on Mining and Learning with Graphs (MLG'07)*, pages 41–45, 2007.
- [47] H.-B. Víctor, A. Portilla, and J. L. Zechinelli-Martini. ROSE: A transactional services coordination engine. In *8th Mexican International Conference on Computer Science (ENC'07)*. ENC-SMCC, IEEE, Sept. 2007.

## 2006

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### 2009

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- [119] G. Vargas-Solar. E-CLOUDSS: Building E-government Clouds using Distributed Semantic Services. In *Microsoft Research Summit*, Buenos Aires, Argentina, 2009.
- [120] G. Vargas-Solar. Services in Clouds: a new perspective for accessing the digital world. In *Conference IETI*, Universidad Popular Autonoma de Puebla, 2009.

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- [122] M.-C. Rousset. Raisonnement distribué en pair à pair pour le Web sémantique. In *Exposé invité aux journées sur l'Intelligence Artificielle Fondamentale (IAF 08)*, Oct. 2008.
- [123] M.-C. Rousset. SomeWhere: a scalable infrastructure for querying distributed data through distributed ontologies. In *Invited talk at International Conference on Conceptual Structures (ICCS 2008)*, July 2008.

- [124] M.-C. Rousset. Web sémantique: modèles, langages et algorithmes. In *Tutoriel invité à l'Ecole d'été Web Intelligence*, July 2008.
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## 2007

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- [128] M.-C. Rousset. l'Intelligence Artificielle: Demarche, contours et tendances actuelles. In *conference orale invitée, assises du GdR I3*, Jan. 2007.
- [129] M.-C. Rousset. Logic-based techniques for information integration. In *Invited tutorial at the ACAI 2007 Summer School: Advanced Courses on Artificial Intelligence*, Aug. 2007.
- [130] G. Vargas-Solar. Processing queries in multiscale environments. In *CONAIC*, Universidad Juarez Autonoma de Tabasco, 2007.

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- [143] M.-T. Serna. *Entrepôts de données pour l'aide à la décision médicale: conception et expérimentation*. PhD thesis, Université Joseph Fourier, Grenoble, France, 2005.
- [144] G. Vargas-Solar. *La femme-serpent : un mythe fondateur dans le moyen âge européen et précolombien mexicain*. PhD thesis, Centre de Recherche sur l'Imaginaire, Grenoble, France, Jan. 2005.
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- [147] G. Vargas-Solar. The implications of virtual worlds in the education of youngsters, 2008.
- [148] G. Vargas-Solar. Towards the construction of a virtual observatory in Astrophysics, 2008.

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### 2008

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### 2007

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- [152] C. Collet, B. Finance, Z. Kedad, F. Tahi, D. Laurent, G. Bernot, G. Bruno, T.-H.-G. Vu, and G. Vargas-Solar. Rapport Final projet MEDIAGRID. Technical report, IMAG-LSR, PRISM et LAMI, Jan. 2005. 40 pages.
- [153] M.-T. Serna and M. Adiba. Conception d'un entrepôt de données médicales (Projet ADELEM). Technical report, 2005.

## Summary

	2005	2006	2007	2008	2009	<b>Total</b>
International peer reviewed journal [ACL]	2	2	2	3	1	10
International peer-reviewed conference proceedings [ACT]	14	15	9	22	6	66
Short communications [COM] and posters [AFF] in conferences and workshops	1	0	0	0	2	3
Scientific books and chapter [OS]	0	0	1	0	1	2
National peer reviewed journal [ACLN]	5	0	0	2	0	7
National peer-reviewed conference proceedings [ACTN]	5	7	6	6	1	25
Book or Proceedings editing [DO]	0	0	2	1	1	4
Invited conferences [INV]	0	3	4	6	3	16
Doctoral Dissertations and Habilitations Theses [TH]	4	2	2	3	1	12
Scientific popularization [OV]	0	0	0	3	0	3
Other Publications [AP]	2	0	2	1	0	5
<b>Total</b>	33	29	28	47	16	153