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## LIP - Laboratoire de l'informatique du parallélisme

Rapport Hcéres

► **To cite this version:**

Rapport d'évaluation d'une entité de recherche. LIP - Laboratoire de l'informatique du parallélisme. 2010, ENS de Lyon, Université Claude Bernard Lyon 1 - UCBL, Institut national de recherche en informatique et en automatique - INRIA. hceres-02034170

**HAL Id: hceres-02034170**

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Submitted on 20 Feb 2019

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agence d'évaluation de la recherche  
et de l'enseignement supérieur

Section des unités de recherche

AERES report on  
the unit:

Laboratoire de l'Informatique du Parallélisme

University or school

École normale supérieure de Lyon,

CNRS,

Université Claude Bernard

May 2010



agence d'évaluation de la recherche  
et de l'enseignement supérieur

Section des Unités de recherche

AERES report on the research unit  
Laboratoire de l'Informatique du Parallélisme  
From the  
École normale supérieure de Lyon,  
CNRS,  
Université Claude Bernard

Le Président  
de l'AERES

Jean-François Dhainaut

Section des unités  
de recherche

Le Directeur

Pierre Glorieux

May 2010



# Unit

Name of the unit: Laboratoire de l'Informatique du Parallélisme (LIP)

Requested label: UMR

No. in case of renewal: UMR 5668

Unit director: Mr. Gilles VILLARD

## Members of the expert committee

### Chairperson:

M. Gilles DOWEK, École polytechnique et INRIA

### Reviewers:

M. Ernst BIRSACK, EURECOM, Sophia Antipolis

M. Jean-Luc DEKEYSER, Université de Lille

Mme. Christiane FROUGNY, Université de Paris 8

M. Emilio LUQUE, Universitat Autònoma de Barcelona

M. Domenico TALIA, Università della Calabria

### Reviewer(s) nominated by the staff evaluation committees:

M. Jean-Yves MARION, CNU

M. Stephan MERZ, CoNRS

## Representatives present during the visit

### Scientific delegate representing AERES:

Mme Jacqueline VAUZEILLES

### University or School representative:

M. Jacques SAMARUT, Directeur de l'ENS Lyon

Mme Chantal RABOURDIN, Directrice adjointe chargée de la recherche de l'ENS-Lyon

Mme Christelle GOUTAUDIER, Vice-présidente déléguée aux sciences mathématiques, de la matière, pour l'ingénieur et humaines et sociales, Université Claude Bernard, Lyon

### Research organization representative :

M. Philippe BAPTISTE, CNRS

# Report



## 1 • Introduction

- *Date:* December 14 and 15, 2009
- *Conduct of the visit:*

Progress report (1h), team presentations (6 times 1h30, in two parallel sessions), meeting with the heading organizations (1h), transverse scientific initiatives (1h), laboratory project (1h), teaching (15mn), meeting with the students (30mn), meeting with the administrative and technical staff (30mn), meeting with the LIP board (30mn).

- *History and geographical location of the unit and brief description of its field of study and activities:*

The LIP has been created in 1988. Its heading organizations are the École normale supérieure de Lyon (since its creation), the CNRS (since 1989), the INRIA (since 1999) and the Université Claude Bernard (since 2003). The two main activities of the LIP are parallelism and theoretical informatics.

- *Management Team:* Gilles Villard and Daniel Hirschhoff.
- *Staff :*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	20	23
N2: Number of EPST, (Public scientific and technological institution) or EPIC, (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	22	23
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	1
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	8	10
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	21	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	45	40
N7: Number of persons accredited to supervise research and similar	16	18



## 2 • Assessment of the unit

- *Overall opinion.*

The LIP is among the best laboratories in informatics at a national level.

It is focused on two main topics: parallelism (three teams) and theoretical informatics (three teams). It is also very involved in interdisciplinary research, in particular with computational sciences, microelectronics, semiconductor and telecommunication research, life sciences, around the theme of complex systems.

The laboratory has grown significantly over the evaluation period and has a great turnover (one third of the permanent members in 2005 left due to promotions or appointments elsewhere). Many of the PhDs graduating from LIP find top positions in academia or (to a lesser extent) in industry. Two more teams are proposed for creation in a near future. All this shows the dynamism of the laboratory.

The quality of research is extremely good with about 900 publications (in total including invited talks and short communications) in four years for 133 researchers (at the day of the evaluation). The impact of research is also excellent, in terms of scientific impact (89 invited conferences), software development (several dozen, with various degrees of achievement), contracts with industry (such as STMicroelectronics, Alcatel-Lucent, Thalès, EADS, the clusters Minalogic and Nano2012, and three start-ups created or about to be created) and animation of scientific life (in particular the participation to the creation of the *Institute for Complex Systems (IXXI)*).

The LIP is also very involved in teaching at the ENS-Lyon, the Université Claude Bernard, and other places.

- *Strengths and opportunities.*

The strengths of the LIP are the scientific quality of its research, the impact and visibility of this research, and the existence of transverse themes (such as that of formal proofs, algorithmic complexity, tools for code generation, services) that creates synergies between teams.

- *Weaknesses and threats.*

The weaknesses of the LIP are a too small administrative staff with a too high turnover, and a relatively local hiring of doctoral students. The LIP could hire more students coming from outside of Lyon (in France and abroad).

- *Recommendations for the unit director.*

1. The lab lacks dramatically administrative and technical staff. Having administrative work done by researchers and managers is a non-effective allocation of resources. Hire more staff in a near future and replace people quicker (for instance, the head of the administrative staff has left and has not been replaced yet). Give the people real career opportunities to reduce the turnover.

2. Hire more doctoral students coming from outside of Lyon (in France and abroad).

3. Support the creation of a team on new paradigms of computation in the LIP / IXXI and rebuild the team on complexity by giving more support to the team MC2.

4. Stabilize the junior researchers who have an HDR in the Plume team and whose departure may jeopardize the stability of the team.

5. Increase the communication between the heading organizations of the LIP, in particular each of them should check of the sustained support of the others. For instance, the team MC2 regrets that the retirement of two of its members has not been compensated.

6. Put on an equal footing parallelism and theoretical informatics (MC2, Arénaire, Plume), that is strongly attractive for the students from the ENS-Lyon.

7. Stimulate interactions with other departments in the ENS-Lyon (around complex systems, system biology, modeling and simulation) through IXXI and the creation of joint teams.

8. Support the creation of joint teams with the EPFL.



9. Make sure all doctoral students have a *monitorat* and / or a teaching experience.

10. The lab receives a lot of public money as agency funding (*e.g.* ANR funding). This creates an increase of workload for researchers. Limit this work overhead by providing more non-agency public funding (through the CNRS, the INRIA, the ENS-Lyon, the Université Claude Bernard, ...).

11. Stimulate exchanges between MC2, Compsys, and Plume on complexity.

12. Stimulate exchanges between teams on formal proofs and proof assistants.

13. Split the Graal team into Avalon and Roma.

14. Support the creation of the D-net team, if it can be adequately staffed.

15. Investigate the possibility of the creation of a team in cryptology.

- *Data on work produced.*

A1: Number of <i>produisants</i> (professors and researchers whose names appear in a minimum number of "publications" over a 4-year period) listed in N1 and N2 in the project column	46
A2: Number of <i>produisants</i> among the other staff listed in N3, N4 and N5 in the project column	4
A3: Proportion of <i>produisants</i> in the unit $[A1/(N1+N2)]$	1
Number of theses for accreditation to supervise research defended	3
Number of theses defended	40
Any other data relevant for the field (please specify)	

### 3 • Detailed assessments:

- *Assessment of work produced and scientific quality.*

By focusing on two topics only (parallelism and theoretical informatics), the LIP has a real scientific policy that allows it to be very strong in these topics. This is reflected by the number of publications (173 journal publications, 89 invited conferences, 402 conference proceedings, 213 other publications in four years), the 16 awards at conferences received in four years and the 40 theses defended in four years. Among the most visible achievements, we can mention the participation to the new version of the IEEE standard for floating point numbers, the participation to the creation of the *Institute for Complex Systems* (IXXI), the key role of LIP in the Grid5000 project, and new compilation techniques that have been reused by STMicroelectronics.

- *Assessment of the influence, appeal and integration of the research unit in its environment.*

The participation to 58 national projects (ANR, ARC, Région, ...), 18 European projects and 24 international ones shows the integration of the LIP in its scientific environment. The recent recruitment, in particular in the team Plume, who recruited four of the best researchers in logic in two years, shows the strong attractiveness of LIP.



- *Assessment of the strategy, governance and life of the unit.*

The head of LIP has succeeded in handling the rapid growth of the laboratory in harmony. The laboratory life is rich with several team and transverse seminars. The allocation policy has favoured a financing of the teams through contracts, reserving most of the lab money for new and incentive projects.

- *Project assessment.*

The project of the LIP is in phase with several major scientific evolutions of informatics: the pervasiveness of networks and ubiquitous computing and the transformation of structured networks into more cloudy objects where the location of data and the location of computation may be unknown to users. The second trend is the emergence of computational paradigms as modeling paradigms in biology, social sciences, and even physics. This idea - everything is an algorithm - is mostly the research topic of MC2 and of IXXI, but the main theme of the Plume team - a proof is an algorithm - can also be considered as part of this project.

#### 4 • Team-by-team analysis

Name of the team : Arénaire (Computer arithmetic)

Name of the team leader : Florent de Dinechin

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	2	3
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	6	7
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	0
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	0.5	0.5
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	2	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	9	9
N7: Number of persons accredited to supervise research and similar	3	4

- *Assessment of work produced and scientific quality.*

The team is one of the world leaders in a domain that gathers hardware arithmetic, software arithmetic, floating-point matters, formal proofs, number-theoretic tools and linear algebra in computer arithmetic. The scientific production is excellent: 131 in peer-reviewed journals and conferences, or in books and book chapters. The





team has also written, totally or in collaboration, 11 free software. Eleven doctoral theses or HDR have been defended.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

The team has a great visibility, both at a national and international level. It is an international expert in its field "Computer Arithmetic". They have participated to the new norm IEEE 754-2008 for floating-point arithmetic. The team belongs to the GDR *Informatique Mathématique* of the CNRS. Two of its members are at the direction committee of this GDR. Arénaire also belongs to the GDR *Architecture, Systèmes, Réseaux* of the CNRS. One member of the team was *chargé de mission* at CNRS. The team has organized several international events or chaired steering committees, such that the IEEE conference ARITH, and the conferences RNS, SCAN, ISSAC, several times, and they are program committee members. The members of the team have given invited lectures at several international conferences. Members of the team have received the second prizes of the thesis awards from SPECIF and ASTI in 2006; best paper award at CHES 2007. The team has collaborations with 15 foreign universities or institutes. The team has obtained 19 grants: CNRS, ANR, ACI,

PAI, PHC, *Région Rhône-Alpes*, private companies. The team attracts good doctoral students, and top-level researchers. The past members have found good academic positions everywhere in France.

- *Assessment of the strategy, governance and life of the team or project.*

The team has a wide competence, from FPGA to algorithms, but all the members understand all the research topics. They have written several books or book chapters together. The teachers teach at the ENS-Lyon, the Université Claude Bernard, and the Université de St-Étienne. The researchers (CNRS or INRIA) also teach at the ENS-Lyon and the Université Claude Bernard, at Master level.

- *Project assessment.*

The team had to face the departure of several of its members (promotions or mutations). They have taken this fact as an opportunity of change, and they have recruited two specialists in lattice reduction with future enlargement to cryptography.

- *Conclusion and Recommendations.*

The team is excellent, strong, and united. They have started a new stream of research, oriented towards lattice reduction and possibly cryptography. They should investigate the possibility of the creation of a team on this topic. Nevertheless, to pursue some of their traditional activities, they want to hire a specialist of hardware, and they need a permanent engineer. A risk of weakness could be the increase of the number of members, leading to a loss of this common ability to work closely together.



Name of the team : Compsys (Compilation and embedded computing systems)

Name of the team leader : Alain Darte

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	1	1
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	3	3
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	0
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	0	0
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	1	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	3	1
N7: Number of persons accredited to supervise research and similar	2	2

- *Assessment of work produced and scientific quality.*

Code optimization for embedded system using High Performance Compiler techniques is a promising and original approach, made possible by the high level background of the team. The new systems on chip could benefit of these results due to high level of parallelism they integrate. The team has a controlled publication policy that results in a good quality list of journals and communications in the top conferences. These last years the team developed a strong relationship with STMicroelectronics, a leader in embedded system. This action should continue.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

Due to the quality of publications, they received 5 best paper awards in the best conferences in code optimization and compilation. One member of the team received an award from Euro-Par steering committee for his career. Postdoc flow is standard. A productive collaboration with STMicroelectronics allows hiring doctoral students and should increase in a near future. Attractivity could be improved at the different levels: doctoral students, postdoc fellows, young researchers, associate professors... Senior scientists of the team are in editorial boards and PC members of important events. Over the next four years they could diversify the funding and propose projects to ANR. In the past they participated to ITEA MARTES project.

- *Assessment of the strategy, governance and life of the team or project.*

The team had to adapt due to the departures of two permanent members and the arrival of a new one, and appears to have successfully mastered this transition. Due to the small size of the team, it is thematically focused and coherent. The scientific policy of the team refocused on Embedded Systems, and in particular resulted in a new



proposal for compilers targeted towards ES. We encourage the team to participate to the GDR SOC-SIP, ISIS and to be more present in the HIPEAC network. Members of Compsys (most of which hold full-time research positions) contribute very little to teaching, which may partly explain the lack of PhD students. The first participation to the Pôle de compétitivité Minalogic stopped with the departure of the person involved in this project. A second one is ongoing via the collaboration with STMicroelectronics.

- *Project assessment.*

This project addresses an important challenge in the area of embedded systems, namely the design of optimizing compilers specific for such systems. The team background already produces interesting new techniques for that. Improving this background with knowledge on synthesis and SoC design will guarantee the success of the project. To limit the risk, the size of the team does not permit today to diversify the topics addressed by the team. Addressing even more specifics of embedded systems will require additional expertise, which could be obtained through the hiring of a new permanent team member on this complementary area. The scientific quality of the team is there, the publication score is excellent for the size of the team. They are active in industrial exchange through a collaboration between INRIA and STMicroelectronics, where the results of the research is also validated.

- *Conclusion and Recommendations.*

The size of the team has to be increased, and the departures have to be anticipated. New permanent team members should cover topics that complement the expertise of the present members; more implication in teaching could be a means for attracting more PhD students. The team should increase its participation in the Embedded Systems community; this will improve the attractiveness of the team as well.



Name of the team : Graal (Algorithms and scheduling for distributed heterogeneous platforms)

Name of the team leader : Frédéric Vivien

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	5	5
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	7	7
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	0
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	0.5	0.5
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	5.5	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	11	12
N7: Number of persons accredited to supervise research and similar	5	6

- *Assessment of work produced and scientific quality.*

The main research interests of the Graal team are: scheduling strategies for distributed systems, resource discovery and management algorithms in distributed systems, scheduling and data replication strategies, middleware and platforms for HPC servers on the Grid. Some of the main results of the research in the last four years can be organized in three topics. In the topic of "Scheduling Strategies and Algorithm Design" they developed steady-state scheduling, algorithmic skeleton work-flows, on-line scheduling and scheduling in a stochastic context. In "Scheduling for Sparse Direct Solvers", their contributions were on task scheduling, parallel analysis and work on numerical features. For the topic "Providing Access to HPC Servers on the Grid" the main contributions have been in data management and scheduling, service discovery on P2P environment and component models over Grids.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

The team has a good national and international visibility, was involved in organizing well known conferences in the area of distributed systems and Grids and is involved in national and European research projects. The publication record is very good in quality and numbers both in journals and conferences. They also developed software systems like DIET (a middleware for building computational servers) and significantly contributed to deploy and manage the Grid5000 infrastructure. To exploit the DIET system recently a start-up company was launched. They have a few contacts with industry, but this could be improved. Collaborations with USA universities are active. The team has a good involvement in national, European, and international projects and collaborations: National (9), European (3) and International (10) (USA (8), Japan (2)). They also developed some industrial collaborations (5 +1 starting).



- *Assessment of the strategy, governance and life of the team or project / Project assessment.*

The Graal team made a proposal to be divided into two teams: Roma and Avalon. The first will focus on resource optimization and the second on software architectures for service oriented platforms. This appears to be a good strategy because both new teams would have sufficient persons and expertise to implement them.

- *Conclusion and Recommendations.*

Split the team into Avalon and Roma. The Roma team should however be careful with the clarity of its subtitle "Optimisation des ressources: modèles, algorithmes et ordonancement". The two new teams should also tightly cooperate, otherwise some benefits and potential of the Graal team could be lost. The team has produced a large number of software artifacts that are widely used; the team and the laboratory should consider how the longevity of this software can be maintained.



Name of the team : MC2 (Models of computation and complexity)

Name of the team leader : Pascal Koiran and Éric Thierry

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	4	4
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	0	0
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	0
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	1	1
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	5.5	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	6	4
N7: Number of persons accredited to supervise research and similar	2	2

- *Assessment of work produced and scientific quality.*

The MC2 team has an outstanding reputation on two fields. The first one is algebraic complexity. The second one is about new paradigm of computations (cellular automata, self assembly systems, quantum computing). In particular, they develop some fruitful multidisciplinary researches in the domain of complex systems and contributed to the creation of IXXI. The quality of the publications is unquestionable. For example, there are about 30 papers in international review of rank A like Theoretical Computer Science, Journal of Computer System and Science, Journal of Complexity... The team has an active contract policy with 8 ANR projects and 4 European projects.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

The influence and visibility of the team is quite large. One member of the team is a junior member of the IUF. Over the four-year period, there have been 21 invitations to give invited talks at international (e.g. MCU, Oberwolfach, Dagstuhl) or national venues. They supervised 5 doctoral students. They hired 10 post-doctoral fellows and 5 of them got a research position. There are collaborations with Chile, Denmark, Russia... Now, two team members are on sabbatical at Toronto, sponsored by the European funds PACCAP and the Fields institute.

The MC2 team has also had a socio-economic impact. Indeed, MC2 was one of the leading forces, which contributed to the creation of the institute of complex systems (IXXI). The IXXI allows to bridge researches from different areas like physics, biology and informatics, in order to model complex systems and their evolutions. This has led to the creation of the start-up Cosmo.

- *Assessment of the strategy, governance and life of the team or project.*

Five permanent members left the team during the last four years: 2 are retired, 1 went to industry, 2 obtained a position at other universities. There was no hiring in this team during the last four years. Moreover, two members are in Toronto. So only two members are at LIP. Evidently, all this disorganizes the team governance. Nevertheless, they have succeeded to develop a multi-disciplinary research through IXXI. Each member of the team is teaching.



- *Project assessment.*

The team project focuses on algebraic complexity, quantum computing from a complexity point of view, self-assembly systems, and network calculus. Despite the strong potential of each member of the team, there is a risk of dispersion.

- *Conclusion and Recommendations.*

The main strength is the team reputation and the quality of their researches. The MC2 team has created a school, being a historical leader on cellular automata and related topics. MC2 is still one of the strongest team in France in the field of computational complexity. It is worth noticing that it plays a key role in the teaching at the ENS-Lyon because of the master "Informatique fondamentale". Moreover, because of its research subjects, the team attracts students with a strong mathematical background to informatics.

However, as mentioned above, five team members have left. As a consequence, the team is reduced to four members. This is clearly a weakness.

We suggest that the team members redefine their scientific projects. The team might consider the creation of a team on new paradigms of computation in the LIP / IXXI. It should also rebuild a strong team on complexity by opening a position on this topic, without refraining from taking advantage of good opportunities.



Name of the team : Plume (Programs and proofs)

Name of the team leader : Olivier Laurent

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	5	5
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	2	2
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	1	1
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	0	0
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	7	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	3	4
N7: Number of persons accredited to supervise research and similar	2	2

- *Assessment of work produced and scientific quality.*

The research of Plume concerns several themes that closely interact (concurrency, semantics of programming languages, programs and proofs, implicit computational complexity, game theory, ...). All members share a common scientific culture, grounded in logic, type theory and the Curry-Howard correspondence of programs and proofs; they usually complement their theoretical research by validation and implementation in the Coq proof assistant. Among their most visible results during the evaluation period are techniques for program extraction from classical proofs (the first implementation of Krivine's theory of classical realizability), "up-to" techniques for weak bisimulation, spatial

logics for mobile concurrent systems, and work on termination applied to sequential and concurrent systems. Their work has given rise to a good number of publications in high-level journals (13) and conferences (19). Several Coq formalizations are available to the scientific community. Five doctoral theses have been defended during the evaluation period, one HDR is imminent.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

Plume has grown considerably during the report period and has attracted 4 young scientists since September 2008 (two CNRS researchers, one "chaire ENS-Lyon / CNRS", and one CNRS secondment). Members of the team have received two "best student paper" awards (ICALP and TLCA). The Plume team coordinates one ANR project and is a partner in seven others. It maintains several bilateral international exchanges (Italy, UK, U.S.A., Germany, Japan, Serbia), contributes to several national working groups, and is an active member of the Coq community. Several members of the team regularly participate in the program committees of high-level conferences (Concur, ICALP...). One member is an editor of an international journal. Several members of Plume have responsibilities in the master in Theoretical Computer Science at the ENS-Lyon.





- *Assessment of the strategy, governance and life of the team or project.*

The team has successfully mastered a transition period from the traditional subjects of rewriting, semantics of programming languages, and proof theory to a more foundational approach to programming languages and concurrency through concepts such as type theory, linear logic, game semantics, and implicit computational complexity. While initially this reorientation represented a risk, it is now obvious that the team members share a common culture and start to cooperate successfully, with some initial common publications of team members. The team is well integrated in the laboratory, evidenced in particular by interactions with Arénaire around Coq and with Compsys around termination proofs and complexity. Many members of Plume are very active in teaching at the ENS-Lyon; one member coordinates the first year of the Master in Theoretical Computer Science, and another is in charge of its Informatique Mathématique track.

- *Project assessment.*

The perspectives of the team are clearly presented and of high potential and interest. Plume plays an important role for the Theoretical Computer Science track of LIP, serving as “consultants” to teams such as Arénaire or Compsys, and sharing common expertise with MC2 in models of computation and complexity theory. A medium to long-term challenge is to contribute to a Curry-Howard-like foundation for concurrency, a topic for which the team is uniquely positioned given the expertise of its members.

The panel recommends the team to augment the cooperation and joint publications of its members, concentrating on key fields of expertise. Although the team is quite successful in attracting doctoral students from the ENS-Lyon, it would be beneficial to diversify the origins of doctoral students, for example by relying on the foreign partners with which Plume has active cooperation. The connections with the national community in the areas of logics, semantics and concurrency should be actively maintained, and tangible results (such as Coq developments) should be shared wherever possible.

- *Conclusion and Recommendations.*

After a transitional period, Plume is now well positioned to build on the individual strengths of its members to further augment its visibility and impact as a team (nationally and internationally) over a relatively short term. Well grounded in solid foundations (logic, type theory, concurrency, ...), the team is unique in combining linear logic, realizability, game semantics, implicit computational complexity and concurrency theory in a single team with a coherent project. The team has a particularly strong opportunity to contribute to foundational theories that encompass sequential and concurrent computation. The pervasive use of proof assistants to validate and implement the theoretical work is to be highly recommended. Given the different backgrounds of the team members, there is a certain risk of dispersion, of which the team is well aware. The panel is confident that the team will concentrate even more on its core subjects, which are already quite broad, and reduce its investment in some of its less central themes.

The team benefits from long-term national and international partnerships, which it should maintain. The panel expects the number of doctoral students to increase during the coming period. We also expect Plume to increase its involvement as coordinators of national projects and to participate in European projects.

Two members of Plume will retire during the coming four years, and Plume will in particular lose its only member at the professor / senior researcher level. The laboratory and its governing organisms should anticipate and accompany this evolution, either by attracting a new senior member or by promoting one of the more senior (HDR) members who are currently at the associate professor / junior researcher level; the recently arrived members should not yet be considered as local candidates in this context.



Name of the team : Reso (Optimized protocols and software for high performance networks)

Name of the team leader : Pascale Vicat-Blanc Primet

- *Team staff.*

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	5	5
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	4	4
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	0	0
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	1	1
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	0	0
N6: Number of doctoral students (see Form 2.7 of the unit's dossier)	13	10
N7: Number of persons accredited to supervise research and similar	3	3

- *Assessment of work produced and scientific quality.*

RESO concerns itself with a wide set of questions in computer communications such as protocol implementation, design and evaluation, measurements, and services, with a strong focus on Grid communication. The team is involved in many international collaborations and is very visible in the Grid community. The team is very large in size, participates in a large number of projects, and has a significant quantitative output in terms of patents, software, publications. There is no information whether the patents have given rise to any commercial exploitation.

- *Assessment of the influence, appeal and integration of the team or the project in its environment.*

Members of the team have published 32 journal papers, 104 conferences papers, and have edited 24 books. The journal publications are in some good venues such as the Journal of Future Generation Computer Systems; the conference publications are in many diverse venues, often related to the Grid; there are very few publications in the top general networking conferences such as Infocom, Internet Measurement Conference, Sigcomm, Sigmetrics, or CoNExt. To have a larger impact in the networking community at large, the team should be more selective in targeting to publish in top conferences.

The project team has also produced a large number of SW artifacts, which requires significant resources; however, not in all cases it is clear that the approach taken sufficiently advances the state of the art to justify the required effort. It is therefore recommended to more carefully evaluate the originality of the approach and the payoff and impact; as far as the research topics selected are concerned, the team connects itself to all recent trends in networking (e.g. virtualization, semantic networking, and green computing) at the risk of being a follower rather than a real leader that breaks new ground.



- *Assessment of the strategy, governance and life of the team or project / Project assessment / Conclusion and Recommendations.*

Dynamic team, good international visibility; team should be more focused and also try to select research topics where the risk is high and the potential award accordingly high and to publish more in top conferences. The creation of the team D-net should be supported if it can be adequately staffed.

Note de l'unité	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : Arénaire

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : Compsys

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A	A	A+

Nom de l'équipe : Graal (bilan) - Avalon et Roma (projet)

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A+	A	A	A



Nom de l'équipe : MC2

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A	A	B

Nom de l'équipe : Plume

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A+	A	A	A

Nom de l'équipe : Reso (bilan) - D-Net et Reso (projet)

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A+	A	A



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Site Monod

Lyon, le 15 mars 2010

à

Monsieur Jean-François DHAINAUT  
Président de l' AERES

Objet : Réponse au rapport du Comité d'experts  
Unité: Laboratoire de l' Informatique du Parallélisme -UMR 5668

Monsieur le Président,

J'accuse réception du rapport du Comité d'experts concernant l'évaluation de l'unité :  
« Laboratoire de l'Informatique du Parallélisme ».

Le rapport d'évaluation représente un outil précieux pour le pilotage et la positionnement de l'unité.

Vous trouverez ci-joint la réponse de l'unité à ce rapport. Elle comporte des observations sur le rapport d'évaluation.

Je vous prie d'agréer, Monsieur le Président, l'expression de ma plus haute considération.

Olivier Faron





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## Réponse de l'unité Laboratoire de l'Informatique du Parallélisme – UMR 5668

Directeur : G. Villard

Directeur adjoint : D. Hirschkoff

Chefs d'équipe : F. de Dinechin, A. Darte, F. Vivien, P. Koiran, O. Laurent, P. Vicat-Blanc  
Primet

Au nom de tous les membres du LIP nous remercions chaudement les experts et les instances de l'AERES pour le vif intérêt porté à nos recherches et pour leur travail d'évaluation. Le laboratoire se félicite de la reconnaissance de la qualité de sa production et de ses projets et se voit largement aidé par les divers commentaires et recommandations du rapport.

Sur le fond, les deux thèmes "parallelism" et "theoretical informatics" (section 1 page 3, section 2 page 4, recommandation 6, section 3 page 5) apparaissent un peu en opposition ce qui peut suggérer une dichotomie dans les équipes. Cette dichotomie est reprise, de manière plus ou moins implicite, dans le project assessment (page 5) et la recommandation 6 page 4. Cette présentation ne reflète pas la structuration du laboratoire. En effet, au sein du LIP le parallélisme relève d'aspects théoriques et, dans le même ordre d'idées, l'équipe Compsys ne relève pas uniquement du parallélisme. Le LIP se structure plutôt autour deux grands thèmes : « challenges of computation and communication architectures » et « theoretical informatics ». Ces deux thèmes sont transverses aux équipes et complémentaires.

S'agissant plus spécifiquement de l'équipe MC2, il nous semble important de ne pas séparer les paradigmes du calcul et la complexité ; dans ce contexte l'équipe favorise plutôt, avec un souci de cohérence, l'entrelacement des deux thèmes au sein d'une même équipe.

