INSTITUT NATIONAL
DE RECHERCHE
EN INFORMATIQUE
ET EN AUTOMATIQUE

INRIA

Grand Scientific Challenges at Inria
Towards a Better Society

Claude Kirchner,
Chief Executive Officer for Science and Technology

Apologizes from Michel Cosnard President and CEO of Inria

- Called 3 weeks ago to participate to the eG8 Forum organized Tuesday and Wednesday in Paris
- Extremely supportive to the Inria@SiliconValley initiative
- Wishes a successful workshop
- And strong results and collaborations to all associated teams
- Thanks to all participants and to the organizers

Inria: French Institute for Research in Informatics and Mathematics

A scientific and technological public institution under the dual authority of the Ministry of Research and the Ministry of Industry

Inria Key figures

4200 PEOPLE

(60% paid by Inria)

A BUDGET OF €220 M

Of which more than 25% from external resources

3400 SCIENTISTS
1200 Doctoral students
250 Post-Doctoral
300 R&D engineers

180 PROJECT TEAMS

4500 SCIENTIFIC PUBLICATIONS

8 RESEARCH CENTERS IN FRANCE

68 ASSOCIATED TEAMS THROUGHOUT THE WORLD (2010)

25 INTERNATIONAL CONFERENCES

300 ACTIVE PATENTS *(in total)*

1000 SOFTWARE

Inria's Research Centres

Inria RENNES
Bretagne Atlantique

Inria BORDEAUX
Sud-Ouest

Inria LILLE
Nord Europe

Inria NANCY
Grand Est

Inria SACLAY
Île-de-France

Inria GRENOBLE
Rhône-Alpes

Inria SOPHIA
ANTIPOLIS
Méditerranée

5 RESEARCH DOMAINS

1 Applied Mathematics, Computation and Simulation

2 Algorithmics, Programming, Software and Architecture

3 Networks, Systems and Services, Distributed Computing

4 Perception, Cognition, Interaction

5 Computational Sciences for Biology, Medicine and the Environment

Inria's atomic scientific unit production: The Project-Team

- 10 to 30 people, with a scientific leader
- A focused scientific theme
- An international evaluation for creation and every 4 years
- Linked to and cooperating with industrial and scientific partners, around the world
- Financial and scientific autonomy
- Strong support for research transfer

In many cases in partnership with universities and academic organizations

Grand scientific challenges at Inria

Goals

- Creation of ambitious interdisciplinary and integrative research projects
- Support of INRIA Strategic Plan
- Contribution of INRIA to digital society challenges (Environment preservation, Energy, Health and Wellcare …)

Description

- Based on INRIA project-teams
- In closed partnership with academics (other organisms, other scientific fields) and/or companies
- Supported with a specific financial grant, including Phd, post-docs during a 4-years period

Large Scale Initiatives

CardioSense3D: a digital heart adapted to each patient

COLAGE: controlling the growth of bacteria

FUSION: simulating nuclear fusion

REGATE: modeling the reproductive function

SOFA-INTERMEDS: simulating surgical procedures

SYNCHRONICS: improving the programming of embedded systems

HEMERA: developing experimentation with grid computing

PAL: An initiative dedicated to assisting people

PAL: An initiative dedicated to assisting people

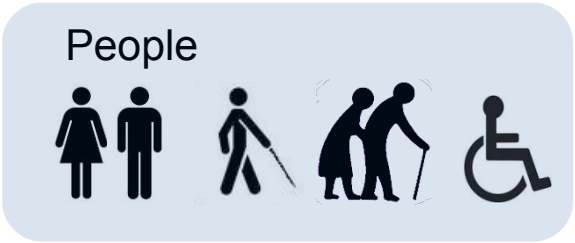
Description

- Personal Assisted Living : to offer elderly and/or disabled more autonomy for a better quality of life
- 2011-2014

Participants

- Leader D. Daney
- INRIA : Arobas, Demar, Coprin, E-motion, Lagadic, Maia, Prima, Pulsar, Trio

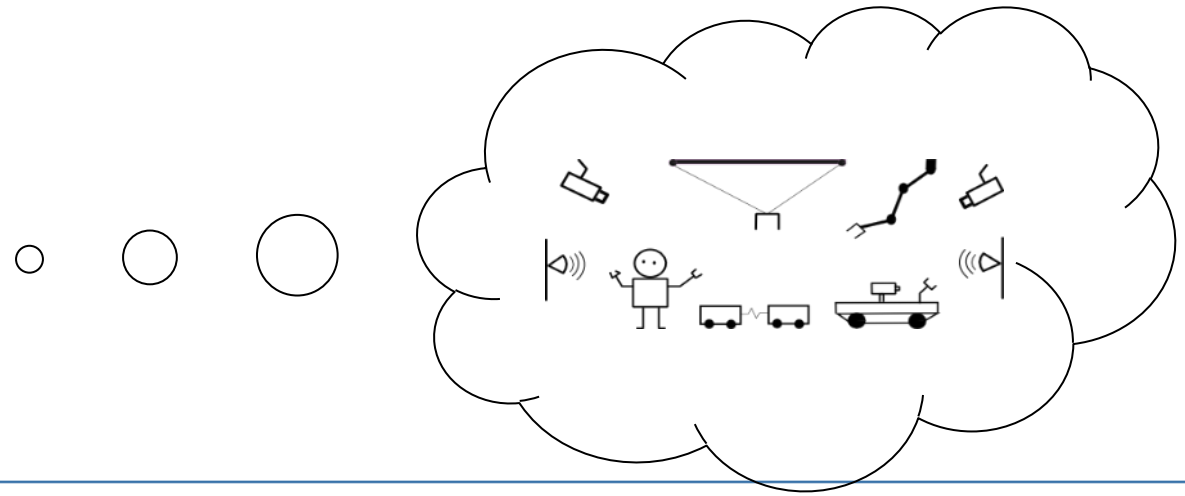
- www-sop.inria.fr/coprin/aen



PAL

Goals

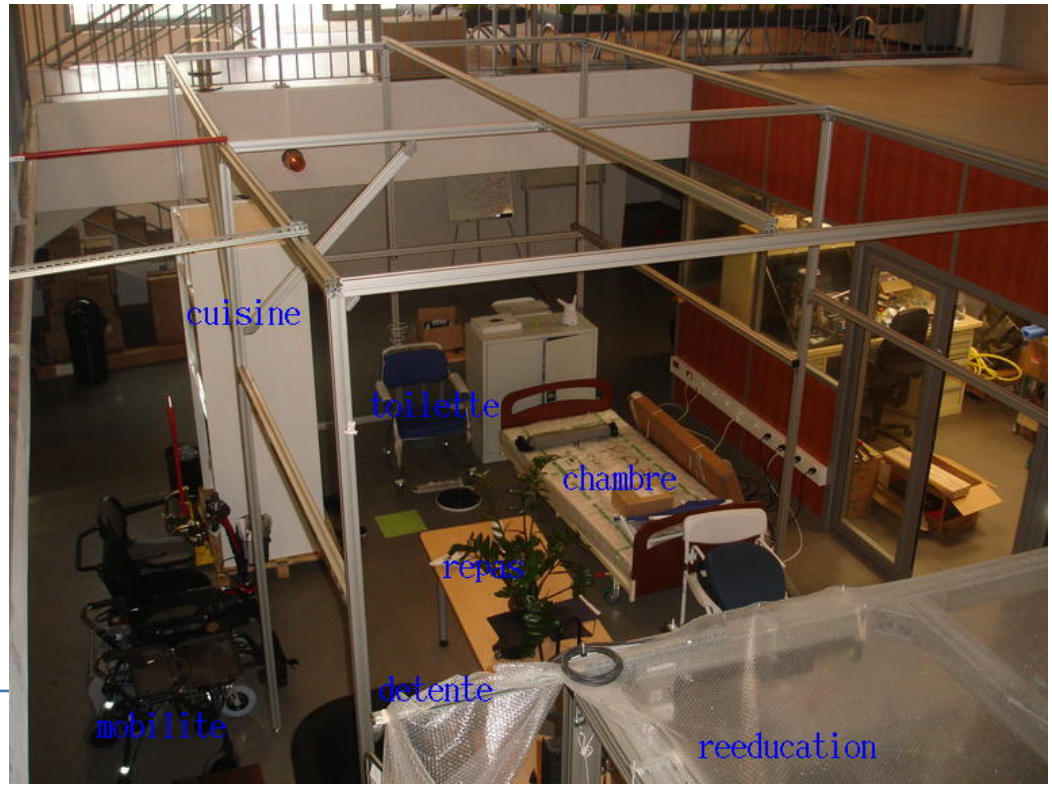
- Estimating the degree of fragility of elderly people using non-invasive sensors in order to detect falls or sign of malnutrition
- Developing mobility equipment such as walkers, weel chairs …
- Assisting people in getting up, for example from a bed
- Studying the best means of communication for preserving social links



PAL

Approaches

- Monitoring: censors, perception systems, intelligent building
- Preliminary health diagnostic : situation analysis
- Restore of mobility : lift assistance,



HEMERA: developing experimentation with grid computing

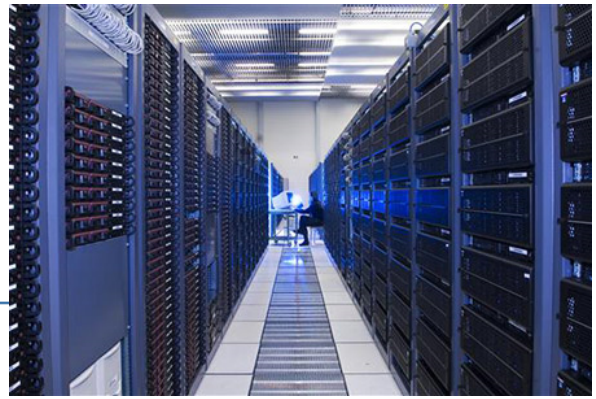
Description

- To demonstrate ambitious up-scaling techniques for large scale distributes computing by carrying out several dimensioning experiments on Grid'5000
- To animate the scientific community
- 2010-2013

Participants

- Leader : C. Perez
- INRIA : Algorille, Asap, Ascola, Astre, Cepage, Dolphin, Graal, Grand large, Kerdata, Mescal, Myriads, Oasis, Regal, Reso, RunTime, Sage
- CNRS, Universities (Strasbourg, Toulouse)

- www.grid5000.fr/Hemera



Grid'5000

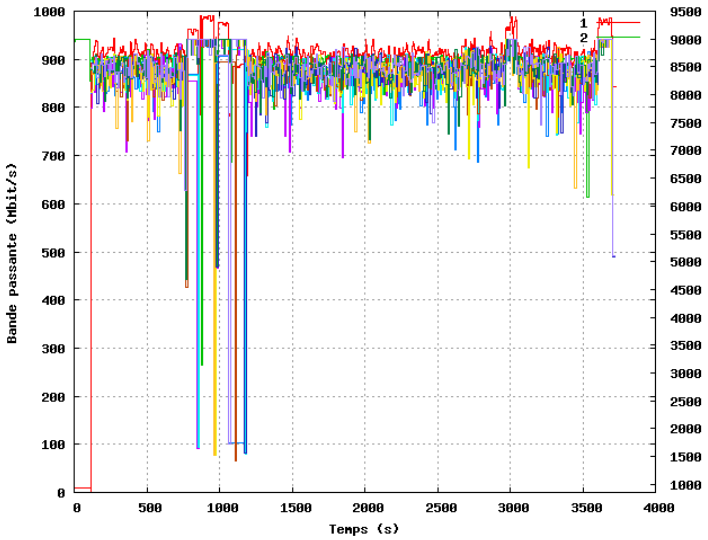
Description

- National Grid Framework
- Launched in 2004
- Highly reconfigurable, controlable and monitorable exprimental platform
- > 7000 cores, located in 9 french sites
  + Porto Allegre (Brazil)
- Very active research community
  (papers, PhD, ANR, UE …)

Companies

- Alcatel-Lucent Bell Labs, Orange Labs, Microsoft Research, EDR R&D, Bull, IBM
- Start-up : LYaTiss, SysFera, Activeon

Hemera - Topics



Network

- Traffic awareness :
  - influence of traffic on performances,
  - difficulty to monitor traffic on a production grid

- System
  - Energy profiling of large scale applications :
    - reduction of energy consumption (green computing) without impacting performance
  - Robustness of large systems in presence of high churn
    - to maintain the platform connectivity
    - distributed algorithms for dynamic systems
  - Orchestrating experiments on the gLite production grid middleware

Hemera - Topics

- Programing paradigms
  - Large scale computing for combinatorial optimization problems
    - Both for unsolved pbs and optimization of new pbs
  - Scalable distributed processing using the MapReduce paradigm
    - Data storage management (various platforms)

- Domain spécific
  - Multi-parametric intensive stochastic simulations for hydrogeology
    - Groundwater resource management & remediation
    - Modeling and simulation of large size geological domain
  - Thinking GRID for electromagnetic simulation of oversized structures
    - Transmission of signals from airborne sensors
    - Wheel antennas