Microsoft Research-INRIA Joint Centre

Jean-Jacques Lévy

INRIA Rocquencourt and MSR-INRIA Joint Centre

January 11, 2007

Plan

1. Context
2. Track A
3. Track B
4. Future

Context

Politics

INRIA

Gilles Kahn

MSR Cambridge

Roger Needham

Joint Centre

Gérard Huet
↪ J.-J. Lévy

Michel Cosnard

Andrew Herbert

Stephen Emmott
Gérard Giraudon
Jean Vuillemin
Ken Wood

Strong points in french CS research

mathematics and theoretical CS

formal methods	b, coq, trusted logic
programming langages	ada, caml, lelisp, lustre, esterel
computer algebra	maple libraries, scilab
computer human interfaces	nextStep, Mac OS X interface
computational geometry	CGAL
vision	realviz
· · · INRIA · · ·	ilog, altavista · · · exalead
basic software (prototypes and real tools)	polyspace, astree, unison
	⋮

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Strong points in french CS research

formal thinking = theory + *hacking*

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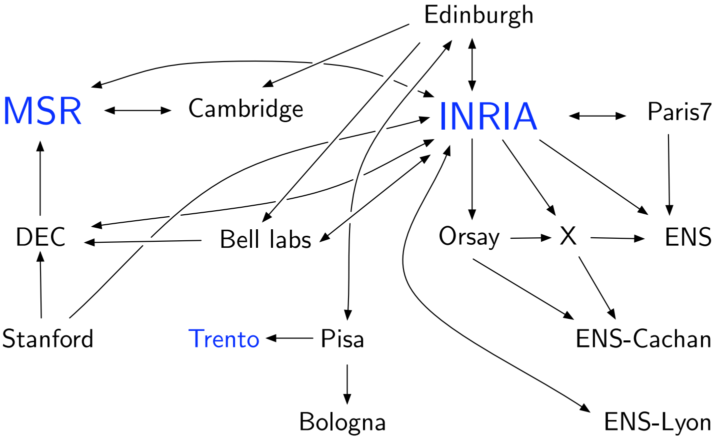
Long cooperation between researchers



Track A

Software Security

Trustworthy Computing

Mathematical components

Georges Gonthier, MSR
Assia Mahboubi, INRIA-MSR
Enrico Tassi, Bologna
Y. Bertot, L. Rideau, INRIA Sophia

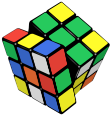
Sean McLaughlin, Carnegie Mellon
Benjamin Werner, INRIA Futurs
Roland Zumkeller, LIX

Computational proofs

- computer assistance for long formal proofs.
- see Georges Gonthier's talk

4-color

Appel-Haken



finite groups

Feit-Thompson

Kepler

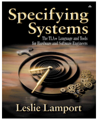
Hales

Tools for formal proofs

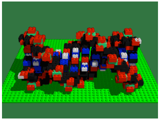
Damien Doligez, INRIA Rocq.
Leslie Lamport, MSR
Stephan Merz, INRIA Lorraine

Natural proofs

- first-order set theory + temporal logic
- specifications/verification of concurrent programs.
- tools for automatic theorem proving


Specifying Systems
The TLA+ Language and Tools for Hardware and Software Engineers
Leslie Lamport

TLA+



tools for proofs

Zenon

Secure Distributed Computations and their Proofs

Cédric Fournet, MSR
Karthik Bhargavan, MSR
Ricardo Corín, INRIA-MSR
Pierre-Malo Deniélou, INRIA Rocq.
G. Barthe, B. Grégoire, S. Zanella, INRIA Sophia
James Leifer, INRIA Rocq.
Jean-Jacques Lévy, INRIA Rocq.
Tamara Rezk, INRIA-MSR
Francesco Zappa Nardelli, INRIA Rocq.

Distributed computations + Security

- programming with secured communications
- certified compiler from high level primitives to low level crypto-protocols
- formal proofs of probabilistic protocols

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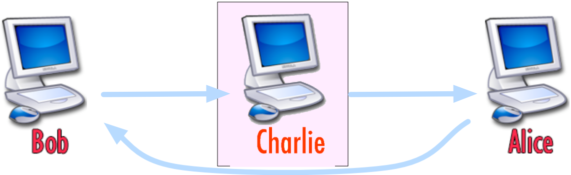

Track B

Computational Sciences

CS research in use for other Sciences/Scientists

Current proposals

- Information interaction
  - ▸ dynamic encyclopedia of mathematics
    (Bruno Salvy)
  - ▸ management of scientific workflows
    (Wendy Mackay, J.-D. Fekete, Mary Czerwinski, George Robertson)
- Scientific data visualisation
  - ▸ image and video analysis for environmental sciences
    (Patrick Perez, Andrew Blake)
  - ▸ geometric methods for data analysis
    (J.-D. Boissonnat, F. Chazal, F. Cazals, D. Cohen-Steiner)

Future

Future

- install Track B in 2007
- 30 researchers
- tight links with french academia (phD, post-doc)
- develop useful research for scientific community
- provide public tools (BSD licence)
- become a new and attractive pole in CS research