

Joint Laboratory
for Petascale Computation



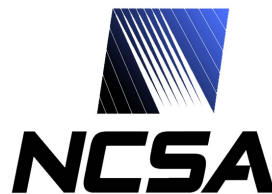
10th Workshop of the INRIA-Illinois-ANL Joint Laboratory for PetaScale Computing

November 25-27 2013

NCSA, Urbana, IL



informatics mathematics
inria



Joint Laboratory
for Petascale Computing

10th Workshop



First Workshop of the
INRIA-Illinois Joint Laboratory
on PetaScale Computing

Franck Cappello



Second Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

December 2-4 2009
NCSA, Urbana, IL



Third Workshop of
the INRIA-Illinois Joint Laboratory
On Petascale Computing

June 22-24 2010
INRIA Bordeaux, France



Fourth Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

November 22-24 2010
NCSA, Urbana, IL



Fifth Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

June 27-29 2011
WTC, Grenoble, France



6th Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

November 21-23 2011
NCSA, Urbana, IL



7th Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

June 13-15 2012
Rennes, France



8th Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

November 19-21 2012
Argonne National Laboratory

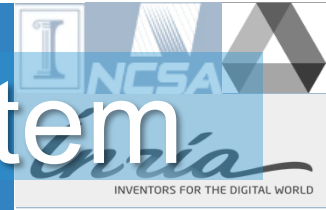


9th Workshop
of the
INRIA-Illinois Joint Laboratory for
PetaScale Computing

June 12-14 2012
Inria Lyon

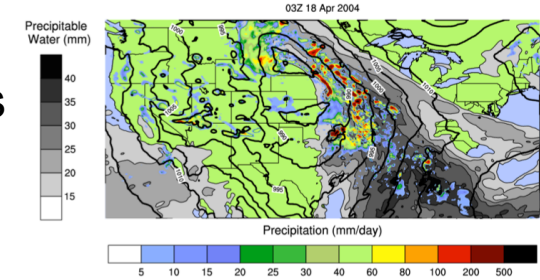


INRIA-Illinois-ANL Eco system



Applications:

- Contagion on very large social networks
 - Earthquake system science
 - Formation of the first galaxies
- ETC.



Users (Center for Atmospheric research, etc.)

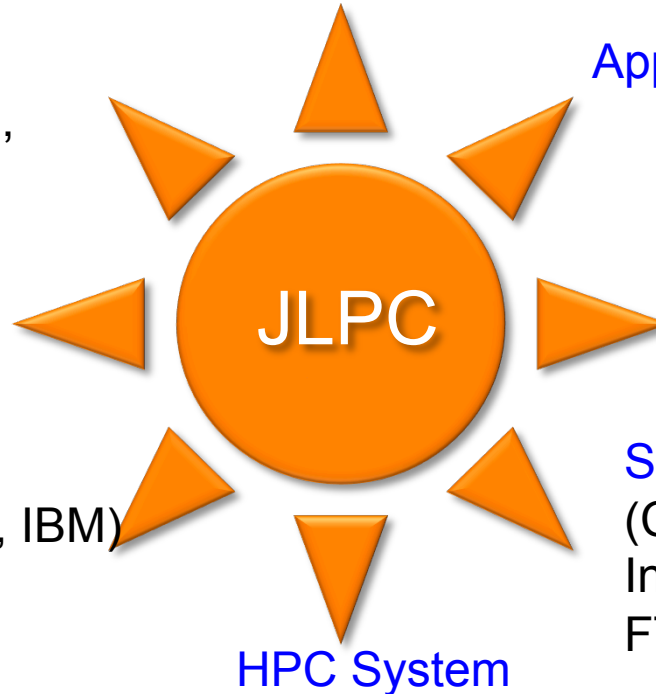
Application developers

System practitioners.

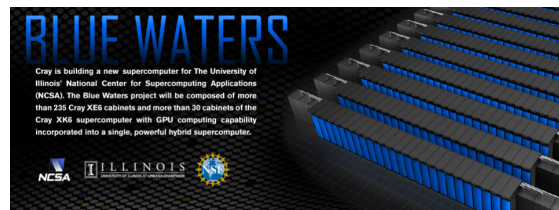
Algorithm research and development (Numerical methods, Mapping + load balancing, FT, I/O)

Hardware vendor (CRAY, IBM)

System software R&D (Charm++, HDF5, MPICH, Integrated System Consol, FTI, etc.)



HPC System



Mira

Joint-Lab Areas of Collaboration

- **Numerical Algorithms and Libraries**

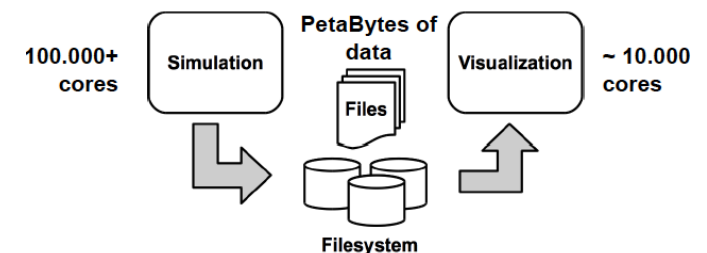
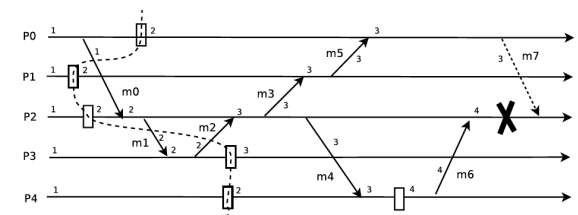
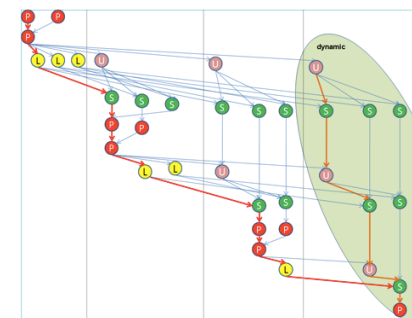
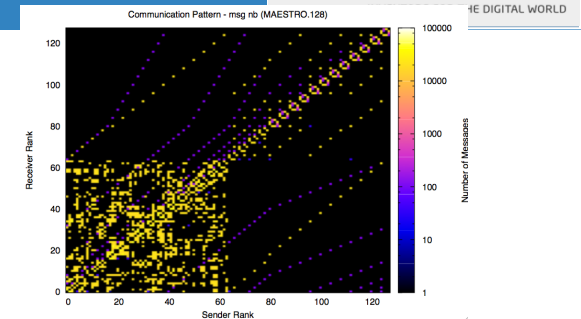
(Communication avoiding, dynamic scheduling, linear algebra, adjoint methods, etc.);

- **Programming and runtime** (parallel languages, runtime, multi-threading, process mapping, scheduling, communication libraries, etc.)

- **Resilience** (FT-protocols, event log analysis, multi-level checkpointing, resilience performance modeling, energy consumption, etc.);

- **System software** (monitoring, resource-job manager, I/O & file systems, visualization, etc.).

- **Cloud** (HPC Cloud, Fault tolerance, testbed, etc.)



**21 accepted
Publications**

**PUF proposal
Accepted (8%
Acceptance rate)**

HOME
ABOUT
EVENTS
PEOPLE
RESEARCH
VISITS
► PUBLICATIONS
SOFTWARE
EDUCATION
GRANTS
JOINT LAB WIKI

Joint Laboratory Publications

Multi-criteria checkpointing strategies: optimizing response-time versus resource utilization

Proceedings of EuroPar 2013

Aurelien Bouteiller, Franck Cappello, Jack Dongarra, Amina Guermouche, Thomas Herault and Yves Robert

Failure prediction for HPC systems and applications: current situation and open issues

International Journal of High Performance Computing Applications, SAGE, 2013

A. Gainaru, F. Cappello, M. Snir, B. Kramer

AI-Ckpt: Leveraging Memory Access Patterns for Adaptive Asynchronous Incremental Checkpointing

to appear in proceeding of ACM HPDC 2013

B. Nicolae, F. Cappello

BlobCR: Virtual Disk Based Checkpoint-Restart for HPC Applications on IaaS Clouds

To appear in Journal of Parallel and Distributed Computing, 2013

B. Nicolae, F. Cappello

ECOFIT: A Framework to Estimate Energy Consumption of Fault Tolerance protocols during HPC executions

to appear in Proceedings of CGGRID 2013

M. El Mehdi Diour, O. Gluck, L. Lefevre, F. Cappello

Software being transferred to production:

- HELO, ELSA (system event analysis and failure prediction)
- Damaris (I/O and visualization)
- FTI (fault tolerance Interface, multilevel checkpoint/restart)

Objectives of the workshop

Present:

- The evolution of the domain with background talks
- Outstanding collaborative contributions
- Results obtained in the past 6 months
- New grand challenges, new research directions
- New collaboration supports (calls, meetings, etc.)

Identify:

- Commonalities
- Collaboration topics
- Researchers/student potential interactions
- Visits

Discuss:

- BlueWaters and MIRA details and time allocations

10th Workshop Highlights

- Session 1 **Extreme Scale Systems and infrastructures**
- Session 2 **Applications, I/O, Visualization, Big data**
- Session 3 **Resilience**
- Session 4 **Numerical Algorithms**
- Session 5 **Programming models, compilation and runtime**
- Session 6 **Large scale systems and their simulators**
- **ACM/IEEE SC13 Best paper**
- **ACM/IEEE SC13 Best paper candidate**

Mini Workshops

Tuesday Afternoon and Wednesday Morning

Small groups and focus on specific topic

More like a brainstorming meeting. Try to identify commonalities

Discuss how the collaboration could be implemented in the next 6 months. The research results will be presented at the next workshop

Try to implement collaboration with visits. Visits could be in two directions: to USA and to France

Workshop Logistics 1/3

- Monday and Tuesday morning sessions in Auditorium
- Tuesday afternoon and Wednesday mini-workshops in rooms 1030 and 1040
- For any question, please ask Beth or Judy at the lobby

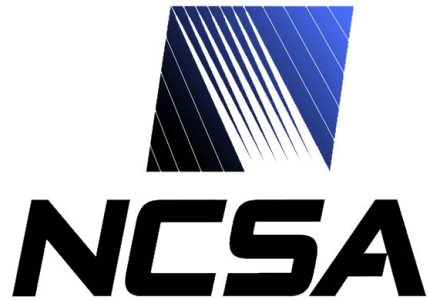
- All lunches will take place in the NCSA atrium
- Breaks will take place in the NCSA atrium
- Dinners will take place in different restaurants
- Two mini buses (driven by Marc and Franck) will pick you up at the Hampton 1/4 hour before the diner (as mentioned in the program)



- Use your laptop for presentation
- We collect ALL presentations
- Presentations will be stored on the join-lab web site.
- Please put you presentation on the USB key, right after your talk.

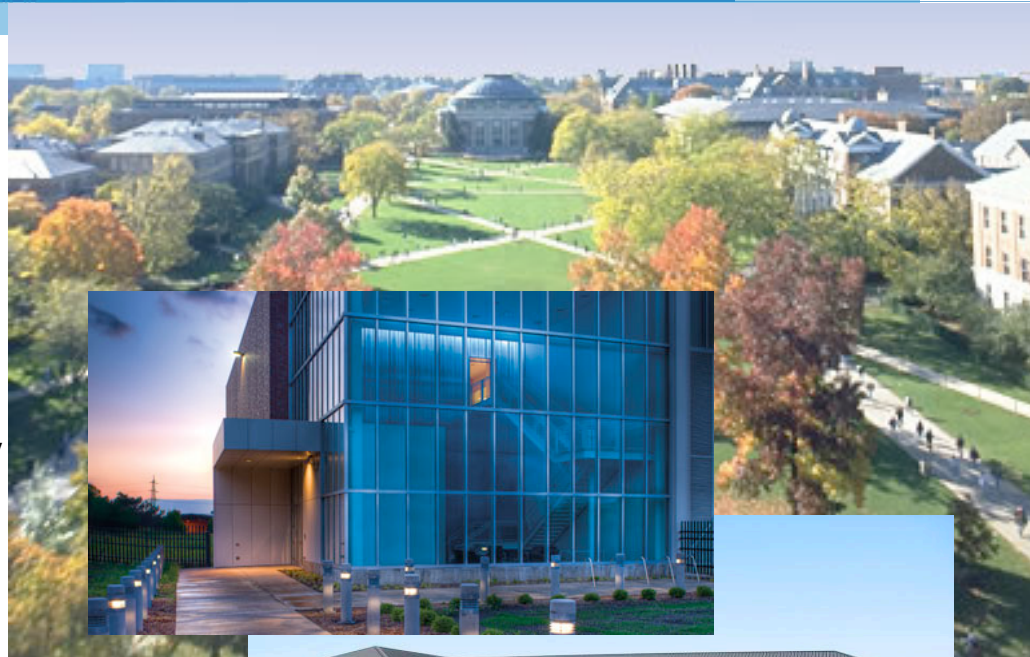
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Acknowledgments



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Enjoy the Workshop!



Simulation of hurricane Sandy

Cloud top temperature
overlaid with horizontal
wind vector

Maximum radar reflectivity
overlaid with horizontal
wind vector

An Ultra-Fine Resolution Simulation of the Life Cycle of Hurricane Sandy

Science

Mei Shapiro (NCAR)
Thomas Galarneau (NCAR)

Simulation

Mark Straka (NCSA)
Peter Johnsen (CRAY INC)

Visualization

Alan Norton (NCAR)

Postproduction

Perry Domingo (NCAR)

These visualizations were produced with results of the WRF-ARW weather prediction system, run on the Blue Waters Cray Computer at NCSA, using VAPOR visualization software from the NCAR Computational and Information Systems Laboratory (CISL).

WRF-ARW is the Weather Research and Forecasting Model, Advanced Research Modeling System, developed at NCAR, the National Center for Atmospheric Research (NCAR), at Boulder, Colorado, USA. NCSA is the National Center for Supercomputing Applications at Urbana-Champaign, Illinois, USA.

