Applications porting

Secondo corso di formazione "Calcolo Parallelo su Grid e CSN4cluster"

Roberto De Pietri

Università di Parma e INFN Parma

Uso di applicazioni complesse su TRAMONTANA

- Here you can find information on how two run two parallels, publicly available, application using the grid infrastructure on the Tramontana INFN cluster.
- The two application selected are the one that the presenter as better knowledge that are sufficient complex and have very different characteristic. The first one deal with montecarlo simulation of lattice QCD and the other one with the evolution of matter coupled to the Einstein equation (General Relativistic Hydrodynamics).

http://usqcd.jlab.org/usqcd-docs/

USQCD

US Lattice Quantum Chromodynamics

Quick Links

USQCD Software Home

Acknowledging Chroma in publications

Chroma Tutorials through the ages

HackLatt'08 Chroma Tutorial

HackLatt'07 Chroma Tutorial

HackLatt'06 Chroma Tutorial

Numerical methods lecture

Lattice Practices 2008 tutorials by A.Juettner and

The Chroma Library for Lattice Field Theory

The Chroma package supports data-parallel programming constructs for lattice field theory and in particular lattice QCD. It uses the SciDAC QDP++ data-parallel programming (in C++) that presents a single high-level code image to the user, but can generate highly optimized code for many architectural systems including single node workstations, multi-threaded SMP workstations (soon to come), clusters of workstations via QMP, and classic vector computers.

Code releases:

Source Code

Chroma source code is available via the JLab Git Server. You can also see the the Git FAQ. Currently the following branches are availble:

- The *master* is the canonical stable branch
- The *devel* branch is the branch with the proposed changes for the next version

The current tarball release is chroma-3.38.0.tar.gz.

Previous versions can be found in the release directory

What? No RPMS?

```
wget http://usqcd.jlab.org/usqcd-software/chroma/chroma-3.38.0.tar.gz
wget http://usqcd.jlab.org/usqcd-software/qmp/qmp-2.1.6.tar.gz
wget http://usqcd.jlab.org/usqcd-software/qdp++/qdp++-1.36.1.tar.gz
```

http://einsteintoolkit.org/

einstein toolkit

About the Toolkit
- Members
- Maintainers
- Governance
- Capabilities
- Resources
- Releases
- Tools

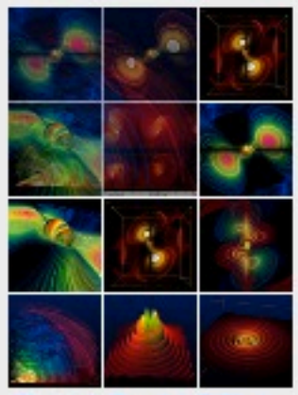
Community

Services

Welcome

The Einstein Toolkit Consortium is developing and supporting open software for relativistic astrophysics. Our aim is to provide the core computational tools that can enable new science, broaden our community, facilitate interdisciplinary research and take advantage of emerging petascale computers and advanced cyberinfrastructure.

Please read our pages about the Einstein Toolkit, its governance, and how to get started with the toolkit for more information.



EinsteinToolkit@Flickr

Albero di compilazione occupa 567MBytes di disco e contiene 55451 files

TRAMONTANA (risorse)

Risorse: (si ringrazia E. Mazzoni, A. Ciampa, S. Arezzini):

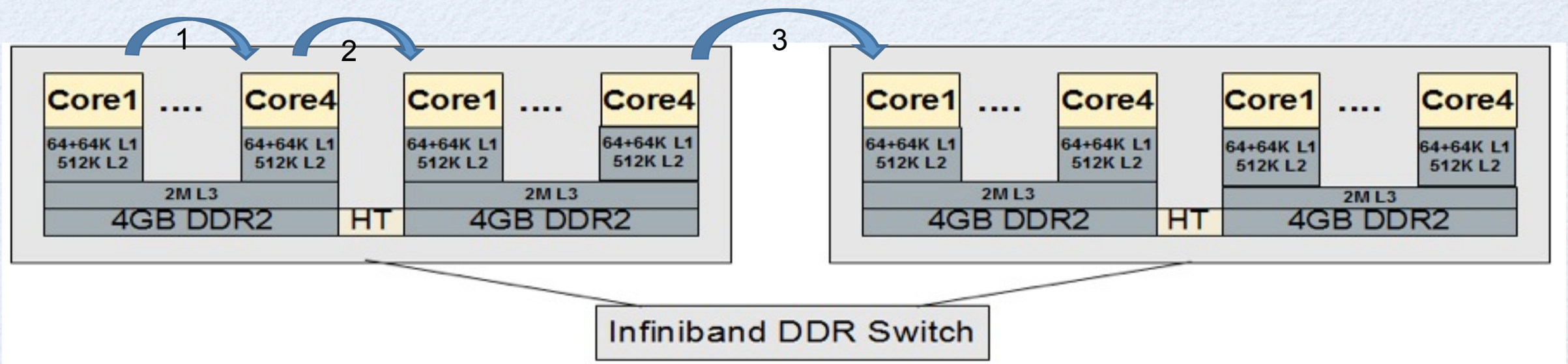
1 CE gridce3.pi.infn.it (Cream - LSF)

128 WNs Dual-Opteron 8356

(2x4 cores per node)

≈ 10 TFlops peak perf.

Comm Type	Latency	MAX Bandwidth
Intra-socket	0,64 µs	14 GBytes/s
Intra-board	0,82 µs	12 GBytes/s
infiniband	3,32 µs	11 GBytes/s



TRAMONTANA (risorse2)

- ######## DiskUsage@Pisa: HOME #########
- uberftp -D 0 gridce3.pi.infn.it
  "cat /gpfs/gpfshds/csn4home/.disk_usage"
- Disk used 877 GB of 1000 GB (87.76%)
- ######## DiskUsage@Pisa: SRM #########
- uberftp -D 0 gridce3.pi.infn.it
  "cat /gpfs/gpfshds/srm/theophys/.disk_usage"
- Disk used 792 GB of 9000 GB (8.81%)

Un comando utile

- CopyToGrid.sh

- ```
  #!/bin/bash
  lcg-cr -v --vo theophys \
  -d srm://gridsrm.pi.infn.it/theophys/IS_OG51/Parma/CorsoGrid/$1  \
  -l lfn:/grid/theophys/IS_OG51/Parma/CorsoGrid/$1 file://$(pwd)/$1
  ```

- Utile per rendere disponibili i file localmete sul cluster TRAMONTA situato a PISA

- Permette di risparmiare sui tempi di trasferimento (in un JOB il copiare conta sui ....)
  ```

Dove vengo eseguiti i JOBs

- Disco BASE: **/gpfs/gpfshds/csn4home/**
- Directory di Lavoro per un JOB:

  /gpfs/gpfshds/csn4home/thogea10/home_cream_949111983/CREAM949111983/

- BASE: **/gpfs/gpfshds/csn4home**

  +UTENTE: **/thogea10**

  +JOB name: **/home_cream_949111983/CREAM949111983/**

- comando utile: **"uberftp"**

Cactus/Whisky su TRAMONTANA

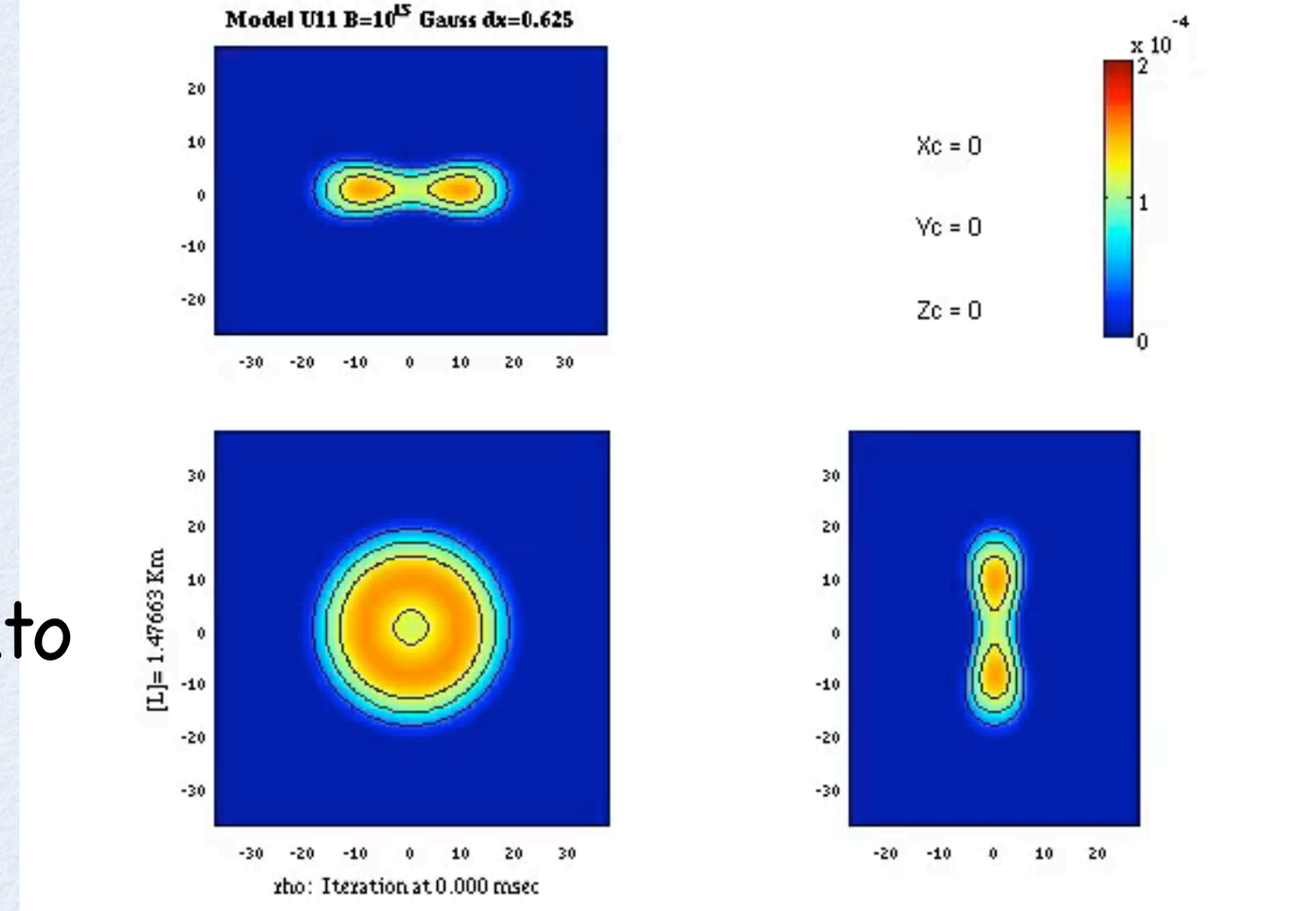
- Il gruppo di Parma fa simulazioni su tramontana usando un applicativo parente stretto di ET
- CACTUS/WHISKY
- Simula anche i campi magnetici
- Esempio di MOVIE generato con dati prodotti su tramontana

16 nodi o 128 core

200 Mbyte per CORE

5 run da ~48 ore =

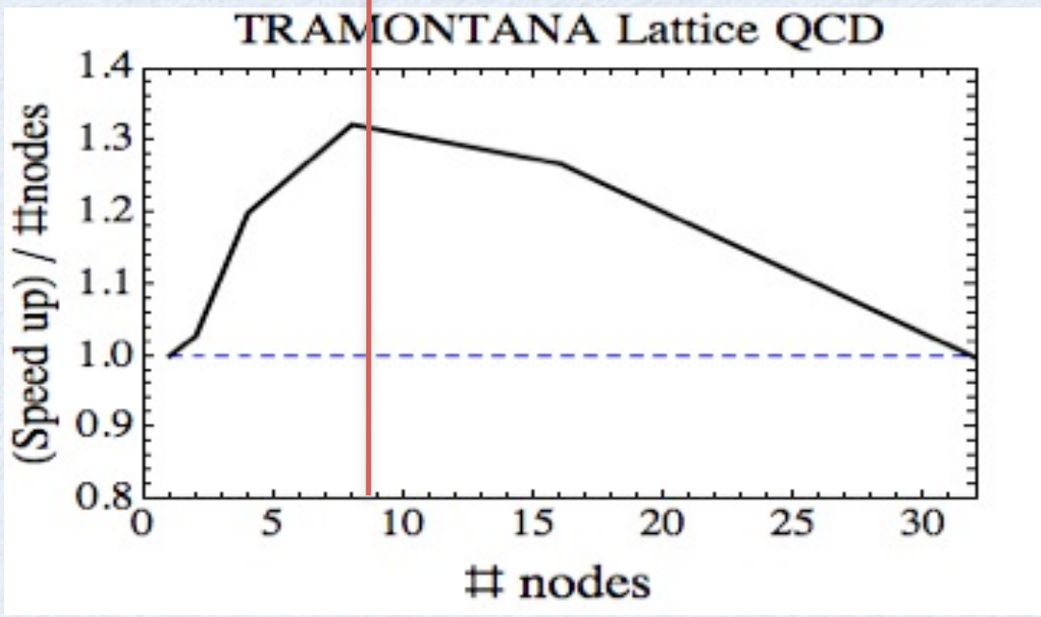
= ~ 32000 CPU hours



CHROMA su TRAMONTANA

(1) Hybrid-Montecarlo simulation of the Pure Gauge SU(3) on a 32x32x32x8 lattice (2000 sweep) using the publicly available **USQCD collaboration** "chroma" library (http://usqcd.jlab.org/usqcd-docs/chroma/). (Thanks to A. Feo, Turin U.)
Pure MPI code.

2.25 Mbyte dati/CPU



Np	**8** (1x8)	**16** (2x8)	**32** (4x8)	**64** (8x8)	**128** (16x8)
	295 min	146 min	62 min	27 min	14 min
ranked	287 min	139 min	59 min	27 min	14 min

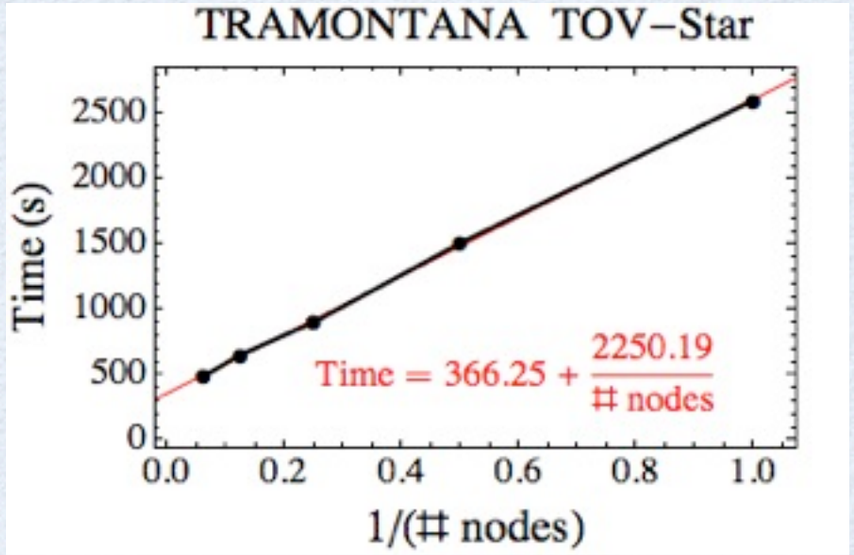
Einstein su TRAMONTANA

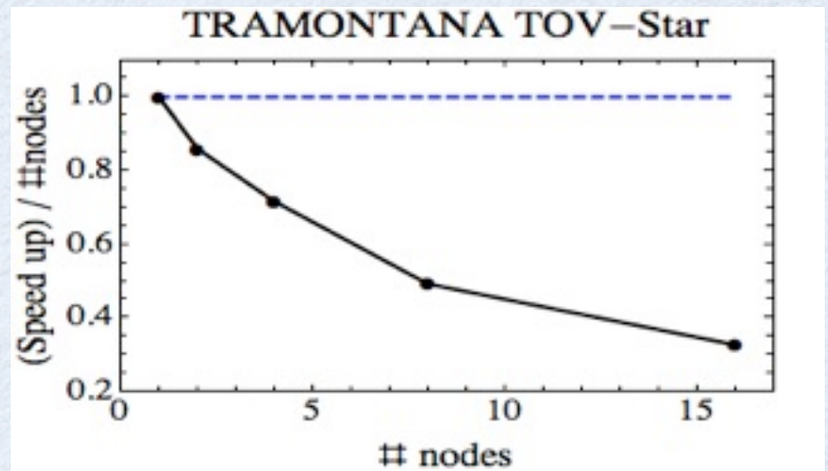
Si vede (anche se parzialmente):

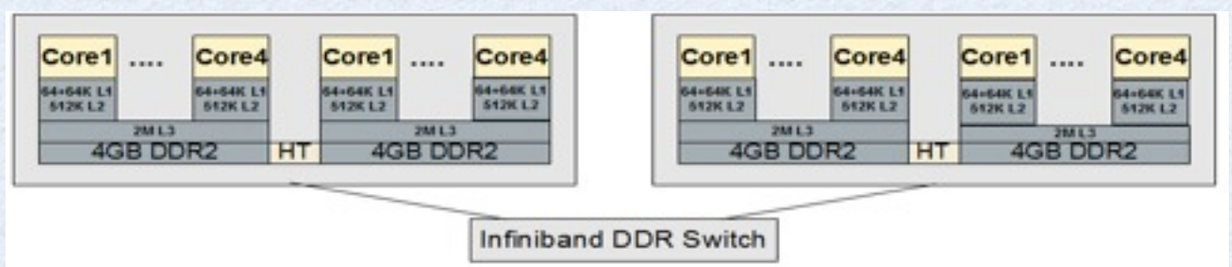
(1) L'importanza dell'affinità CPU-memoria

(2) il codice non è completamente parallelizzato ma la richiesta di memoria richiede PARALLELISMO.

#node	Np=8x#	Np=4x#	Np=2x#	Np=#	Np=2x#
	Nt=1	Nt=2	Nt=4	Nt=8	Nt=4 (rank)
1	2291.90	2934.21	3126.73	3360.96	**2608.08**
2	1438.72	1619.83	1797.30	2061.55	**1516.04**
4	1007.71	993.79	1007.71	1268.79	**909.36**
6	767.45	783.07		927.35	**745.63**
8	663.03	638.81	694.31	753.79	**661.37**
16	461.85	448.77	484.20	552.89	**497.78**







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17

Continua sul WIKI ……

Il futuro ....

- Tre area di storage locali
- **/gpfs/gpfshds/csn4home/** **==>** Esecuzione dei JOB
- **/gpfs/gpfshds/theompi/chk/** **==>** Area permanente
- **/gpfs/gpfshds/srm/theophys/==>** Area SRM