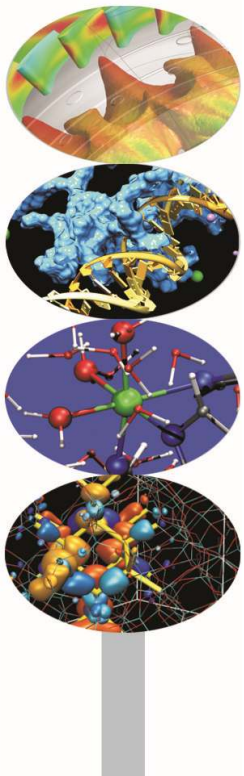Politecnico di Milano

PhD School Courses
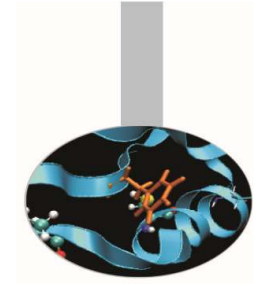
Corso interdottorato 095309

PARALLEL COMPUTING USING MPI AND OPENMP

June 2017

Topics

1. parallel hardware architectures and related programming techniques

2. common SW tools and libraries for developing parallel scientific applications

   - MPI library

   - OpenMP

3. specialised parallel scientific SW libraries

4. winning strategies for programming massively parallel applications

Agenda
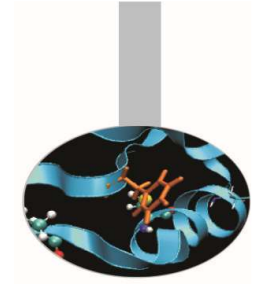
Tuesday, June 6th, 2017

   9.30 - 12.30 –   Parallel Architectures (P.Ramieri)
  14.30 - 17.30 –   MPI introduction (P.Ramieri)
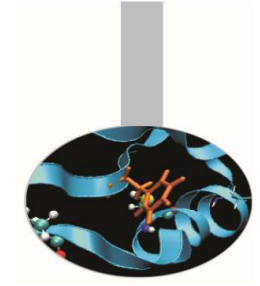

Wednesday, June 7th, 2017

   9.30 - 12.30 –   Advanced MPI (M.Cremonesi)
  14.30 - 17.30 –   Exercises (M.Cremonesi)

Thursday, June 8th, 2017

   9.30 - 12.30 –   OpenMP introduction (P.Dagna)
  14.30 - 17.30 –   Exercises (P.Dagna)

Agenda

Monday, June 12th, 2017

  9.30 - 12.30 –   Parallel scientific SW libraries (M.Guarrasi, N.Spallanzani)

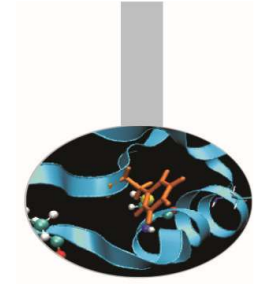14.30 – 17.30 –   Exercises (M.Guarrasi, N.Spallanzani)

Tuesday, June 13th, 2017

  9.30 - 12.30 – Winning strategies (P.Bonfà, M.Cremonesi)

14.30 - 17.30 –   Exercises (P.Bonfà, M.Cremonesi)

Training material:
https://hpc-forge.cineca.it/files/CoursesDev/public/2017/Milan/Cross_Sectoral_Course_PhD/
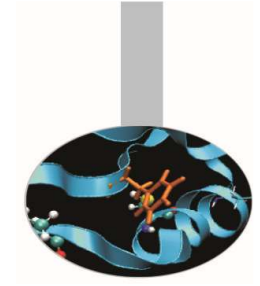
Final application

The course attendant will develop a **final application** on selected themes. This project should be completed in about one month (the estimated workload is about 20 hours per man).
It is suggested to work in a group of **two** people maximum but it is also possible to work alone.

The project will be discussed and evaluated to assign the **final grade**.

A **predefined project** will be provided, but if you are developing your own program, personalized projects may be taken into consideration if discussed in advance within the end of the lessons.

Please send an email to m.cremonesi@cineca.it for communicating your preference about the final application.

Final application

The final application will consist in the parallel optimisation of a documented program.

In order of being able to discuss the exam properly, course attendants should provide a PDF presentation describing:
- The original (not optimised) version of the application program
- The efforts carried out for optimising the code
- Benchmarks showing the benefits of optimisation
- Graphs about speed-up and efficiency of the optimised code
- Differences between numerical results of original and optimised program

If you do not have the availability of a multi-node server, access to CINECA clusters for developing the final application is welcome: please send email to m.cremonesi@cineca.it for communicating your interest in it.

Please note: access will be granted until June 15th, 2017 only!