



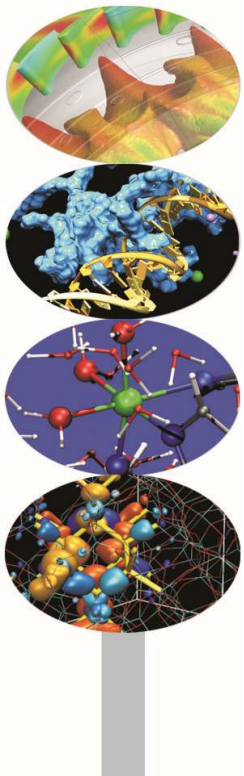
Politecnico di Milano

PhD School Courses

Corso interdottorato 098772

PARALLEL PROGRAMMING WITH MPI AND OPEN MP

May 2016



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



Monday, 2 May 2016

- 9.00 - 12.00 – Parallel Architectures (P.Ramieri)
- 14.00 - 17.00 – MPI introduction (P.Ramieri)

Tuesday, 3 May 2016

- 9.00 - 12.00 – Advanced MPI (M.Cremonesi)
- 14.00 - 17.00 – Exercises (M.Cremonesi)

Wednesday, 4 May 2016

- 9.00 - 12.00 – OpenMP introduction (P.Dagna)
- 14.00 - 17.00 – Exercises (P.Dagna)

Agenda



Thursday, 5 May 2016

9.30 - 11.30 – Parallel scientific SW libraries (M.Cremonesi)

11.45 - 12.45 – Exercises (M.Cremonesi)

14.00 - 16.00 – Exercises (M.Cremonesi)

Friday, 6 May 2016

9.30 - 11.30 – Winning strategies (M.Cremonesi)

11.45 - 12.45 – Exercises (M.Cremonesi)

14.00 - 16.00 – Exercises (M.Cremonesi)

Training material:

https://hpc-forge.cineca.it/files/CoursesDev/public/2016/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@cinca.it for communicating your interest in it.

Please note: access will be granted until end of June 2016 only!