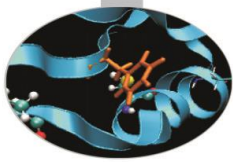
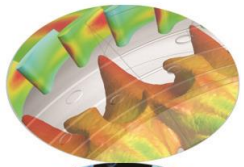
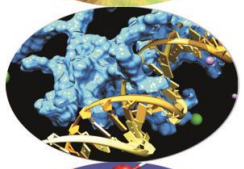
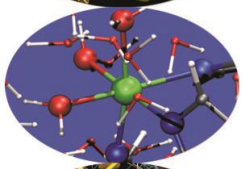
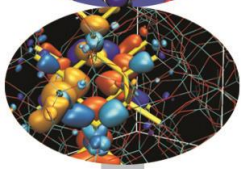
CINECA SCAI
SuperComputing Applications and Innovation



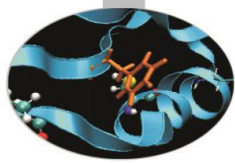
HPC Computer Aided Engineering @ CINECA

Raffaele Ponzini Ph.D.
CINECA
SuperComputing Applications
and Innovation Department – SCAI

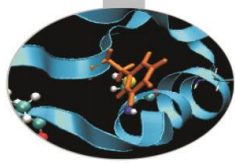
16-18 June 2014
Segrate (MI), Italy

PRACE
CINECA



Outline

- Analysis of student background
- Overview and timing of the school
- Timing of the day

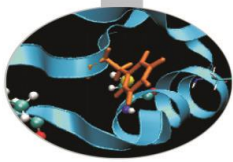


Students background

About 5 minutes per student:

- Who/Where/Why
- CAE tools
- CAE background

Overview and timing of the school



	Lecture	Presentation of theoretical and technical background by school teachers
	Tutorial	Practical, interactive walkthrough
	Question and Answer	Open session for question and answer
	Break	Coffee or Lunch Break

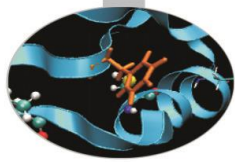
CINECA Lecturer Milan site	Ponzini (coordinator), Pasqua
SCS Lecturer	Pieri, Chiarini
Invited Lecturer	Morbiducci

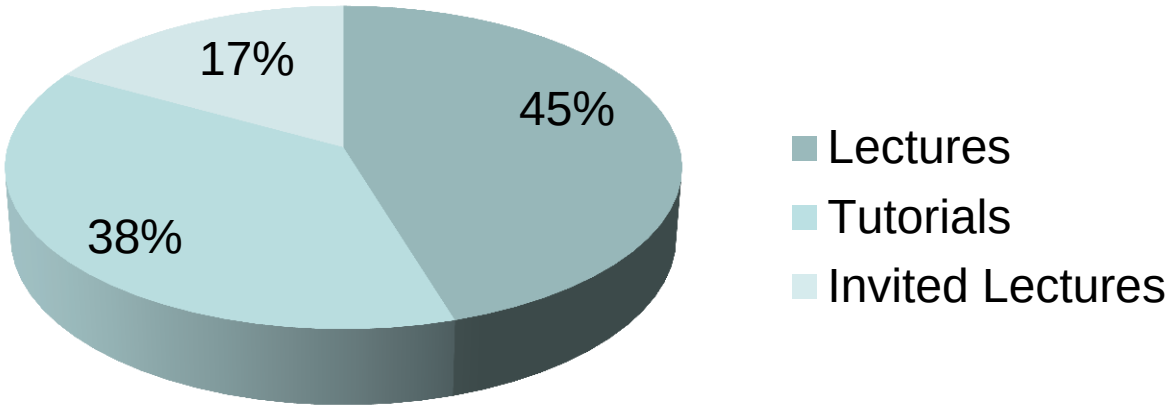
Day1	Lecturers	Time		Title	Details
	Ponzini	10.00-10.30		School Presentation	Analysis of student background, general info, overview and timing of the school, timing of the day
	Ponzini	10.30-11.15		Introduction to Computer Aided Engineering	Enginnering applications, measures and facilities, computational tools: time,costs,usability, accuracy
		11.15-11.30		coffe-Break	
	Ponzini	11.30-12.30		Introduction to Computational Fluid Dynamics	CFD workflow on HPC systems: pre-processing, computing, post-procesing
	Ponzini	12.30-13.00		Pre-processing: basic concepts	Meshes: what, why, standards, open issues in HPC platforms
		13.00-14.30		Lunch-break	
	Ponzini + **Pieri**	14.30-16.00		Basic tools for pre-processing	SnappyHexMesh, Pointwise: automation and usability on HPC systems
	Ponzini + **Pieri**	16.00-17.00		Tutorial	CAD import, meshing, mesh analysis

Day2	Lecturers	Time		Title	Details
	Pieri	10.00-10.30		Introduction to openFOAM	Introduction to the toolbox: structure, concepts, phylosophy, links, projects on HPC systems
	Pieri	10.30-11.15		OpenFOAM selected solvers	Introduction to some solver: steady incompressible, unsteady incompressible, steady+thermo
		11.15-11.30		coffe-Break	
	Pieri + **Ponzini**	11.30-13.00		Tutorial	Virtual Wind Tunnel CFD model setup and data anlysis
		13.00-14.00		Lunch-break	
	Ponzini	14.30-16.00		OpenFOAM selected solvers	Introduction to the Two-phase solver for naval engineering applications
	Ponzini + **Pieri**	16.00-17.00		Tutorial	Virtual Towning Tank CFD model setup and data anlysis

Day3	Lecturers	Time		Title	Details
	Ponzini	10.00-10.45		DDES CFD modelling of a sailing yacht	Delayed Detached Eddy Simulation of AC33-class yacht on HPC systems
	Morbiducci (POLITO)	10.45-11.30		CAE application in Biomedicine	Medical devices studied with CAE tools and HPC infrastructures
		11.30-11.45		coffe-Break	
	Pasqua	11.30-12.00		VPIV: virtual PIV application	Using CFD data to design PIV experiments (in collaboration with Prof. S. Malavasi POLIMI)
	Ponzini	12.00-13.00		OpenFOAM@CINECA	HPC concepts, advantages, performances, open issues
		13.00-14.00		Lunch-break	
	Chiarini	14.30-16.00		SaaS and CAE applications	Cloud paradigs applied to CAE and HPC: web-compute, GUI, pay-per-use, customized interfaces, Fortissimo,SHAPE
	Ponzini	16.00-17.00		Question and Answer	Open session with final remarks and questions

Overview and timing of the school





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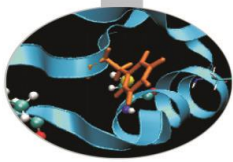


Raffaele Ponzini (CINECA). Raffaele Ponzini has a PhD (cum Laude) and a master's degree in Bioengineering from the Politecnico di Milano. His research interests include **computational models in hemodynamics**, and **scientific visualization**. Since 2003 he worked as a member of the **High Performance Computing group of CILEA** for the management of fluid dynamics computational codes. His working domain includes also teaching **C/C++ and Python programming for scientific applications.** Starting from September 2012 he's working at **CINECA** within the **Supercomputing Applications and Innovation Department.**

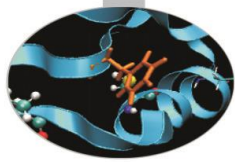
Roberto Pieri (SCS). B.Sc. in Aerospace Engineering at Politecnico di Milano. M.Sc. in Aeronautical Engineering at Politecnico di Milano with specialization in Aerodynamics. From 2014 working at SCS as CFD application specialist.

Francesco Pasqua (CINECA). B.Sc. in Aerospace Engineering at Politecnico di Milano. M.Sc. in Aeronautical Engineering at Politecnico di Milano with specialization in Aerodynamics. LISA Scholarship holder at CINECA.

Overview and timing of the school

Alessandro Chiarini (SCS). Responsible for High Performance Computing (HPC) services for industrial customers: applications in manufacturing, pharma and big data.

Umberto Morbiducci (POLITO). Associate Professor at Politecnico di Torino, DIMEAS-Department of Mechanical and Aerospace and member of the Board of Biomedical Engineering. His working domain includes CFD analysis of medical and implantable devices.



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