POLITECNICO DI MILANO

PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 39th cycle

THEMATIC Research Field: HYBRID (DATA-DRIVEN AND PHYSICALLY INFORMED) METHODS FOR STRUCTURAL HEALTH MONITORING WITH HIGH PERFORMANCE COMPUTING

Monthly net income of PhDscholarship (max 36 months)
€ 1195.5 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Structural mechanics and mechanics of materials often involve large computational burdens. To tackle these problems, High Performance Computing (HPC) can now exploit hardware and software solutions that combine execution on graphics cards and on standard CPUs, and other heterogeneous systems. A related challenge is that artificial intelligence models can augment expert analysis of data sets to produce results faster at the same level of accuracy. As exemplary application, the treatment of large data sets, such as those obtained from sensors distributed in dense networks, in the context of the monitoring of structures and infrastructures, requires deep learning techniques during the computational phase necessary to produce real-time data processing solutions involves high computational demands, using, which should adopt state-of-the-art hardware and software.
Methods and techniques that will be developed and used to carry out the research	Development of benchmarks for HPC systems in the context of structural engineering. Possible development of computer codes for HPC either in Fortran or C or Python language.

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Educational objectives	To build up a large pool of talents with strong expertise on state-of-the-art hardware and software technologies and tools for advanced computing, specifically for structural engineering applied also in multi-scale and multi-physics contexts. The goal is to contribute to the reduction of the severe skill gap in this area and to increase the number of highly-trained professionals who are essential for Italy's industrial growth and competitiveness in the digital economy.
Job opportunities	During the PhD period the student is encouraged to enter into contact with supercomputing centres and with companies with HPC facilities.
Composition of the research group	0 Full Professors 3 Associated Professors 1 Assistant Professors 3 PhD Students
Name of the research directors	Aldo Francesco Ghisi

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	597.76 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

List of Universities, Companies, Agencies and National or International Institutions that are cooperating in the research:

the following universities are collaborating in the framework of the National Center "Future HPC", flagship 5:
Università di Catania, Università di Bologna, Università di Torino, Politecnico di Milano,

Politecnico di Torino, Università di Pisa, Università di Padova, Università di Roma Tor Vergata, Università di Napoli, Università della Calabria, Università di Ferrara. The following public agencies are also collaborating: ENEA, INAF, CINEC, IIT.

Educational activities

The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.

Teaching assistanship

Ph.D. students are encouraged to apply upon prior authorization to the calls to support teaching activities at the undegraduate and Master levels at Politecnico, and they are paid for that. The teaching assistantship will be limited up to about 80 hours, maximum half of them devoted to teaching and classroom activities and the rest to support classworks and exams.

Computer availability

Each Ph.D. student has his/her own computer for individual use.

Desk availability

Each Ph.D. student has his/her own desk, cabinet and locker.