POLITECNICO DI MILANO

PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 1 - Computer Science and Engineering

THEMATIC Research Field: DATA DRIVEN METHODS FOR PERFORMANCE MODELLING AND MANAGEMENT OF HPC-CLOUD-EDGE SYSTEMS

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 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	Because of their strategic importance for the promotion of social and economic development, high performance computing (HPC) and cloud-edge systems have been among the most active research areas in both computer science and engineering over the last 40 years. Given the inherently distributed nature, coupled with an ever-increasing complexity in terms of heterogeneity of the supported applications, the enabling software stacks, the heterogeneity of the underlying hardware, and dynamicity of the workloads, guaranteeing the performance of mission-critical applications is extremely challenging. The aim of this thesis is to develop machine learning based models and Bayesian optimization methods to optimize the performance of HPC clusters and cloud-edge systems.
Methods and techniques that will be developed and used to carry out the research	The techniques used and developed in this research fall under performance evaluation theory and applications, machine learning and Bayesian optimization. The research will be based on machine learning approaches applied to predict the performance of HPC-cloud-edge applications and Bayesian optimization methods. The optimization final goal is to identify the minimum cost configuration of the underlying infrastructure which will provide performance guarantees (e.g., a deadline) to the

	end-users running the target application.
Educational objectives	From an educational point of view, the research activity aims at teaching students rigorous methods for the development of HPC-cloud-edge systems that have strict performance requirements.
Job opportunities	This research opens the doors to a career in the engineering of complex HPC and cloud-edge systems, in particular data-intensive and scientific applications with performance concerns, in addition to an academic career.
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 4 PhD Students
Name of the research directors	Danilo Ardagna

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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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student 5.707,13 Euro TEACHING ASSISTANTSHIP: (availability of funding in recognition of supporting teaching activities by the PhD student) There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY: individual use

DESK AVAILABILITY: individual use