

[656_24_CS_WDC_R1](#)

Recruitment App Link

<https://webapps.bsc.es/recruitment/job/3567>

Website Node ID

64288

Job Reference

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Position

PhD on Programming model for edge to cloud through swarm methodologies - AI4S (R1)

Closing Date

Tuesday, 15 October, 2024

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Job title: PhD on Programming model for edge to cloud through swarm methodologies - AI4S (R1)

About BSC

The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS) is the leading supercomputing center in Spain. It houses MareNostrum, one of the most powerful supercomputers in Europe, was a founding and hosting member of the former European HPC infrastructure PRACE (Partnership for Advanced Computing in Europe), and is now hosting entity for EuroHPC JU, the Joint Undertaking that leads large-scale investments and HPC provision in Europe. The mission of BSC is to research, develop and manage information technologies in order to facilitate scientific progress. BSC combines HPC service provision and R&D into both computer and computational science (life, earth and engineering sciences) under one roof, and currently has over 1000 staff from 60 countries.

Look at the BSC experience:

[BSC-CNS YouTube Channel](#)

Let's stay connected with BSC Folks!

We are particularly interested for this role in the strengths and lived experiences of women and underrepresented groups to help us avoid perpetuating biases and oversights in science and IT research. In instances of equal merit, the incorporation of the under-represented sex will be favoured.

We promote Equity, Diversity and Inclusion, fostering an environment where each and every one of us is appreciated for who we are, regardless of our differences.

If you consider that you do not meet all the requirements, we encourage you to continue applying for the job offer. We value diversity of experiences and skills, and you could bring unique perspectives to our team.

Context And Mission

The Computer Sciences (CS) department of the Barcelona Supercomputing Center aims to carry out research and development to influence the way computing machines are built, programmed and used. The Workflows and Distributed Computing group at the Barcelona Supercomputing Center aims to carry out research on programming models for distributed computing. More specifically, this group is working in the COLMENA project which contributes to the definition of next-generation computing and data technologies by proposing a framework to ease the programming, deployment and maintenance of hyper-distributed applications on the device-edge-cloud Continuum. The group will have a significant effort devoted to the definition of the COLMENA programming model and its software platform.

For this research, the group is looking for a PhD student to do research on AI topics related to the design and implementation of the COLMENA programming model and software platform. In particular, topics of interest can be focused on AI for swarm intelligence including bio-inspired algorithms and reinforcement learning. The job also includes active participation in the project, attending project meetings, collaborating with partners and writing deliverables.

More details on the COLMENA project are given below:

The new programming model environment is inspired on organic colonies: collections of autonomous individuals with heterogeneous characteristics that cooperate forming different social organizations. In this new approach, each smart device (IoT sensor/actuators, network access point/router or Edge/Cloud server) composing a cyber-infrastructure is considered as an Autonomous agent (ANT) aware of its own IT capabilities (data processing power, storage capacity, sensors and actuators equipped, available network interfaces, etc.) and context (geo-location, owner, etc.). In such an environment, services will be described as a society with different roles. Each role is defined by behaviour (program logic), the necessary software dependencies and the hardware requirements to play it. The role composition of such a society will be defined by a set of rules that indicate the number of players of each role. ANTs autonomously pick one or more roles to play according to its characteristics, the requirements of each role and the current role distribution. Upon their decision, they contextualize themselves downloading the necessary software and start the execution.

At any point, the infrastructure may change; a new ANT can join in or leave the Colony, the service may be in a peak or valley workload moment, or a network service may be disrupted. To rapidly adapt to these changes, ANTs constantly revisit their roles and consider any possible reconfiguration that may improve the service. The goal of the project is to develop a platform to create, deploy and operate services on the device-edge-cloud continuum. A programming framework capable of reducing the complexity of programming swarms. The “roles” will be programmable through simple, high-level programming interfaces, where no low level details are exposed. The project will also develop the necessary libraries and layers to support such an interface.

The funding for these actions/fellowships and contracts comes from the European Union Recovery and

Resilience Facility - Next Generation, within the framework of the General Invitation by the public business entity Red.es to participate in the talent attraction and retention programs within Investment 4 of Component 19 of the Recovery, Transformation, and Resilience Plan.

For more information, please check: <https://www.bsc.es/join-us/excellence-career-opportunities/ai4s>



Key Duties

- Research and development of the COLMENA programming model
- Research and development of the COLMENA software platform
- The candidate will work closely with other research members on the team of the Workflows and Distributed Computing group

Requirements

- Education
 - Computer science degree or similar
- Essential Knowledge and Professional Experience
 - Previous experience in runtime systems and system software
 - Knowledge of Distributed Computing
 - Good programming skills in Java and C, and/or Python
- Additional Knowledge and Professional Experience
 - Previous experience in distributed programming models
 - Experience in container management platforms (Docker, Kubernetes, ...)
- Competences
 - Fluency in spoken and written English, while fluency in other European languages will be also valued

Conditions

- The position will be located at BSC within the Computer Sciences Department
- We offer a full-time contract (37.5h/week), a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible working hours, extensive training plan, restaurant tickets, private health insurance
- Duration: 4 years
- Holidays: 23 paid vacation days plus 24th and 31st of December per our collective agreement
- Salary: : R1 - PhD 1st and 2nd year: 25.000,00 € / R1 - Phd 3rd and 4th year: 30.00,00€
- Additional Expenses Grant: Each fellowship will be associated with a grant for additional expenses, such as IT equipment, travel, training, stays, etc.
- Starting date: asap - the incorporation for this vacancy must be before the 16th of December 2024

Applications procedure and process

All applications must be submitted via the BSC website and contain:

- A full CV in English, including contact details.
- A cover/motivation letter with a statement of interest in English, clearly specifying for which specific area and topics the applicant wishes to be considered. Additionally, two references for further contacts must be included. Applications without this document will not be considered.

Development of the recruitment process

The selection will be carried out through a competitive examination system ("Concurso-Oposición"). The recruitment process consists of two phases:

1. **Curriculum Analysis:** Evaluation of previous experience and/or scientific history, degree, training, and other professional information relevant to the position. - **40 points**
2. **Interview phase:** The highest-rated candidates at the curriculum level will be invited to the interview phase, conducted by the corresponding department and Human Resources. In this phase, technical competencies, knowledge, skills, and professional experience related to the position, as well as the required personal competencies, will be evaluated. - **60 points**. *A minimum of 30 points out of 60 must be obtained to be eligible for the position.*

The recruitment panel will be composed of at least three people, ensuring at least 25% representation of women.

In accordance with OTM-R principles, a gender-balanced recruitment panel is formed for each vacancy at the beginning of the process. After reviewing the content of the applications, the panel will begin the interviews, with at least one technical and one administrative interview. At a minimum, a personality questionnaire as well as a technical exercise will be conducted during the process.

The panel will make a final decision, and all individuals who participated in the interview phase will receive feedback with details on the acceptance or rejection of their profile.

At BSC, we seek continuous improvement in our recruitment processes. For any suggestions or comments/complaints about our recruitment processes, please contact recruitment [at] bsc [dot] es.

For more information, please follow [this link](#).

Deadline

The vacancy will remain open until a suitable candidate has been hired. Applications will be regularly reviewed and potential candidates will be contacted.

OTM-R principles for selection processes

BSC-CNS is committed to the principles of the Code of Conduct for the Recruitment of Researchers of the European Commission and the Open, Transparent and Merit-based Recruitment principles (OTM-R). This is applied for any potential candidate in all our processes, for example by creating gender-balanced recruitment panels and recognizing career breaks etc.

BSC-CNS is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law.

For more information follow [this link](#)

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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