CALL FOR GRANT APPLICATIONS
(AE2024-0544)

INESC TEC is now accepting grant applications to award 1 Research Grant (BI) within the scope of the project CDMS, with reference 17409 (COMPETE2030-FEDER-01193000) Co-funded by ERDF - European Regional Development Fund through the Innovation and Digital Transition Thematic Programme (COMPETE 2030) within the scope of Portugal 2030.

1. GRANT DESCRIPTION

Type of grant: Research Grant (BI)

General scientific area: COMPUTER SCIENCE

Scientific subarea: Computer Systems

Area of Work: Distributed Systems

Grant duration: 6 months, starting on 2025-01-27with the possibility of being renewed for a maximum term of one year, in cases where the grant has been awarded to students who are enrolled in non-award courses, or up to two years, in the cases of students enrolled in a master's degree.

Scientific advisor: Ricardo Gonçalves Macedo

Workplace: INESC TEC, Braga , Portugal

Maintenance stipend: € 990,98, according to the table of monthly maintenance stipend for FCT grants , paid via bank transfer. Grant holders may be awarded potential supplements, according to a quarterly evaluation process (Articles 19, 21 and 22 of the Regulations for Grants of INESC TEC and Annex II), up to a maximum limit of 50% of the monthly maintenance stipend.

INESC TEC supports costs with registration, enrolment or tuition fees, during the grant duration, under the terms established in the internal document: "Payment of Tuition fees to grant holders".

The grant holder will benefit from health insurance, supported by INESC TEC.

2. OBJECTIVES:

This grant is part of the “Claim Denial Management Solution” project, which aims to develop an innovative platform to manage and optimize reimbursement claims with health insurers. The solution will be based on advanced hyper automation and generative artificial intelligence techniques, focusing on efficiency in terms of performance, energy consumption, and accuracy.
Training deep learning models, especially in LLMs, faces critical challenges that compromise the optimal use of GPUs. These bottlenecks result in poor computational resource utilization, leading to performance losses and excessive energy consumption. The problem is exacerbated in distributed environments, where hundreds or thousands of GPUs operate sub-optimally.
This grant aims to develop a system that improves the energy consumption of GPUs in deep learning scenarios, with special emphasis on training LLMs in distributed environments. The system should be agnostic of the model to be trained, minimize the impact on training time, and reduce the energy consumption of GPUs.

3. BRIEF PRESENTATION OF THE WORK PROGRAMME AND TRAINING:

Responsibilities under the grant:
- Design a system for managing the energy consumption of GPUs used in deep learning within distributed environments.
- Implement and optimize a prototype based on the initial design.

- Conduct experimental evaluations of the developed prototype, using a variety of deep learning models and hardware devices (e.g., various processing and storage devices).
The tasks described in this work plan require the application and development of concepts and techniques from Computer Engineering, which are typically addressed in the core curriculum of the Integrated Master's Degree in Computer Engineering or the Master's Degree in Computer Engineering.

4. REQUIRED PROFILE:

Admission requirements:
BSc Degree in Informatics Engineering Sciences.
The awarding of the fellowship is dependent on the applicants' enrolment in study cycle or non-award courses of Higher Education Institutions.

Preference factors:
- Experience in the design and development on energy control systems for GPUs;
- Solid knowledge in the state-of-the-art of energy control systems for deep learning;
- Experience with the C++ programming language.

Minimum requirements:
Knowledge with energy monitoring and energy control systems (i.e., Intel RAPL, PowerJoular, EnergAt, NVML, DVFS);
Knowledge on deep learning frameworks and models (i.e., PyTorch, ResNet18, AlexNet, Cifar-10), as well as heterogenous workloads (e.g., cloud-based workloads, supercomputing workloads);
Solid knowledge on operating systems;
Solid knowledge on distributed systems.

5. EVALUATION OF APPLICATIONS AND SELECTION PROCESS:

Selection criteria and corresponding valuation: the first phase comprises the Academic Evaluation (AC), based on the criteria referred to in Article 12 of the Regulations for Grants of INESC TEC, while the second phase comprehends the Individual Interview (EI). All factors are evaluated on a scale of 0 to 100, taking into account the applicants' merit, suitability and conformity with the preference factors.
The weight of the AC factors are as follows: Academic Qualifications (FA, 70%), Scientific Publications (PC, 10%), Experience (EX, 10%) and Motivation Letter (CM, 10%).
Candidates who score less than 50 points in the AC average will be considered excluded on absolute merit. The top five candidates approved on absolute merit will be qualified for the individual interview. The Final Grade (CF) is obtained by the weighted average of AC (80%) and EI (20%).

DISABILITY INCENTIVE

Candidates who present a degree of disability equal to or greater than 90% will benefit from an incentive (20) in the score of the CV Assessment.
Candidates who present a degree of disability equal to or greater than 60% and less than 90% will also benefit from an incentive (10) in the score of the CV Assessment.
Said score may, in these cases, exceed 100 points.
Candidates must demonstrate the degree of disability during the application, namely through the submission of the Multi-Purpose Medical Certificate of Disability, issued in accordance with Decree-Law no. 202/96, of October 23 - currently in effect.
Candidates must declare, in the application form, the type of disability used throughout the selection process, in order to proceed with the required adaptations.

The Selection Jury is composed of the following members:
President of the Jury: Ricardo Gonçalves Macedo
Full member: João Tiago Paulo
Full member: Tânia Conceição Araújo
Substitute member: José Orlando Pereira

Release of results and prior hearing: the results of the selection process, as well as the terms and procedures for prior hearing, will be released to the applicants by email, under the terms referred to in Article 13 of the Regulations for Studentships and Fellowships of INESC TEC.

6. FORMALISATION OF APPLICATIONS:

Application Documents:

1. Motivation letter;
2. Curriculum Vitae (must include the list of previous fellowships, their type, beginning and end dates, funding entities and host institutions);
3. Certificate or diploma degree;
4. Proof of enrollment in a degree awarding study cycle or in a non degree awarding Higher Education program.
   - The proof of enrollment may be presented just during the grant hiring stage.
5. Signed declaration stating the infringement of the grant holder's duties (article 14, no. 4)
6. Documental evidence to support the country of residence, residence permit or other legally equivalent document, in cases where the applicant is a foreigner or non-resident in Portugal - valid until the beginning of the grant.
7. Other supporting documents relevant to the final assessment.

Failure to deliver the required documents within the 90-day period after the date of the notice of the conditional awarding of the grant implies its cancellation.

Application period: From 2024-12-19 to 2025-01-03

Submission of applications: the application will be formalised by submitting the form available in the *Work With Us* section of INESC TEC website.

7. BINDING LEGISLATION AND REGULATION

The hiring process shall comply with the current legislation regarding the Research Grant Holder Statute, approved by Law no. 40/2004 of August 18, in its current wording, as well as by the Regulations for Grants of INESC TEC and for FCT Grants Regulation in force.

For more information, please check the Regulations for Grants of INESC TEC and relevant annexes at www.inesctec.pt/bolsas