



**Computação Científica Nacional  
FCCN**

## **Call for Advanced Computing Projects on Scientific Research, Technological Development and Innovation areas**

**Guide for Technical Evaluation**

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## 1. Introduction

### 1.1 About FCT

Fundação para a Ciência e a Tecnologia, I.P. (FCT), the Portuguese Foundation for Science and Technology, is the public agency responsible for implementing the Portuguese government's science and technology policy.

FCT funds all areas of knowledge, including exact, natural and health sciences, engineering, social sciences and humanities.

FCT's mission is to promote the advancement of scientific and technological knowledge in Portugal, exploring opportunities to attain the highest international standards, in any scientific or technological domain, and to stimulate the diffusion of that knowledge and its contribution to improve education, health, environment, and quality of life and well-being of citizens.

FCT pursues its mission by funding fellowships, studentships and scientific employment, research projects, research centres and infrastructures, via competitive calls with international peer-review.

### 1.2 About RNCA

RNCA, the National Network for Advanced Computing (Rede Nacional de Computação Avançada - RNCA) offers services of advanced computing to research, innovation and public administration communities.

This network was created in 2018 by the Portuguese digital competence's initiative INCoDe.2030. It was integrated in the RNIE - National Roadmap for Research Infrastructures of Strategic Interest, via Dispatch no. 4157/2019 of the minister of Science and Technology, as the Portuguese counterpart of the Iberian Network for Advanced Computing (RICA), in terms of the Agreement signed between Portugal and Spain in 2018, based on the creation of «MAAC — Minho Advanced Computing Centre», in collaboration with FCT IP. FCCN-FCT, the scientific computation unit of FCT, acts as RNCA's promoter and general manager. Through Supercomputer Bob at MACC, RNCA has already served many scientific areas from exact sciences and engineering, to environmental and life sciences, with more than 22 million core.hours during the pilot phase since June 2019.

Since 2018 RNCA has expanded and at present incorporates 4 operational centers:

- **Bob** operated by MAAC — Minho Advanced Computing Centre (<https://macc.fccn.pt/>);
- **Navigator** operated by LCA-UC - Laboratório de Computação Avançada da Universidade de Coimbra ([www.uc.pt/lca](http://www.uc.pt/lca));
- **Oblivion** operated by HPC -UE – *High Performance Computing* da Universidade de Évora (<https://www.oblivion.uevora.pt/>).
- **Cirrus-A and Stratus** operated by INCD - Infraestrutura Nacional de Computação Distribuída ([www.incd.pt](http://www.incd.pt));

RNCA provides a variety of valuable resources, now available in this call to all scientific domains in research, innovation and public administration areas. The following computational resources are included: HPC (high performance computing) in 4 different supercomputers, HTC (High Throughput Computing) and Cloud Computing (Virtual Machines). To use them, three types of access are available in this call: A1 – Preparatory Access and A2 – Project Access, detailed in further sections.

## 2. The 1<sup>st</sup> 2020 Call for Advanced Computing Projects (CPCA)

The 2020 Call for Advanced Computing projects - CPCA 1st edition, aims to provide computational resources to support Scientific Research, Technological Development and Innovation to existent and future projects in all scientific domains, without costs to its users.

This call was launched by FCT through a public announcement outlining the required features of the applications and the evaluation criteria to be applied. The rules under which the applications and the

accepted projects are governed are specified in a public document entitled: Regulation Governing Access to Advanced Computing Projects (Regulamento de Projetos de Computação Avançada).

The submission period is continuously open between **14<sup>th</sup> August 2020** until all resources are fully booked or the call is closed. Please find a copy of the evaluation calendar on the appendix of this document. The content of the application must be written in English in a bespoke form available at [https://concursosfct.formstack.com/forms/rncacall\\_2020\\_01](https://concursosfct.formstack.com/forms/rncacall_2020_01).

Approval of projects is based on technical review and the time of submission of applications sent online in the referred form. Evaluation of the submitted applications will be performed by the access committee appointed by FCT, and it will occur in the evaluation calendar on the appendix of this document.

The current call distributes computational capacity only. It does not provide financial support or human resources to develop or support the computational projects present on the applications.

## 2.1 Framework and motivation of CPCA

The Call for Advanced Computing Projects are included in the actions promoted by the National Digital Competencies Initiative e.2030, Portugal INCoDe.2030 (namely Axis 5 - Research). It aims to promote the use of advanced computing resources amongst the scientific research, technology, innovation and public administration communities.

Advanced computing resources are very useful tools for science, technology and innovation processes. It is used for numerical modelling and analysis. Some problems cannot be solved without large calculus capabilities only available at large facilities integrated on networks such as RNCA.

Also, last decade's technical development in computing allows to collect and process unprecedented amounts of data. This possibility is deeply changing the methodologies used by the different fields of knowledge and activity. It is expected that INCoDe.2030 takes benefit from the National Network for Advanced Computing (NNAC) resources for processing, analysis, visualization and presentation of data, thus stimulating cooperation and development of specialized digital skills.

## 2.2 Main Aspects of the Applications

This call is intended to support SR&TD and innovation projects sharing computational resources, carried out by a team of the IR. These are the legal institutions that will receive the funds from FCT, and herein named as beneficiary entities.

The beneficiary entities that may apply, either individually or jointly, are:

- a) Non-entrepreneurial entities of the R&I system, namely:
  - a. Higher education institutions, their institutes and R&D units;
  - b. State or international laboratories with a head office in Portugal;
  - c. Non-profit private institutions whose main object is R&D activity;
  - d. Other non-profit public and private institutions developing or participating in scientific research activities.
- b) Entrepreneurial entities of any legal framework.

## 2.3 Available Computational Models

The following computational models are available to applicants:

- High Performance computing (HPC).
- High Throughput computing (HTC).
- Cloud Computing.

### 2.3.1 High Performance computing (HPC)

In the present call, each HPC system consists of the following elements:

- A set of compute nodes operating simultaneously, temporarily dedicated to a single application; each set together can execute at least  $40 \times 10^{12}$  floating point operations per second, tightly coupled, operating in standard nonspecialized microprocessors.

- A filesystem accessible to each compute node with a shared bandwidth of at least 40 Gbps with multiple simultaneous flows in each compute node.

### 2.3.2 High Throughput computing (HTC)

Of note: contrary to HPC, HTC applications do not require frequent and large exchanges to data between compute nodes.

In the present call, each HTC system consists of the following elements:

- A set of distributed or concentrated compute nodes, usually shared between several applications, in virtualized or containerized modes.
- A filesystem available from each compute node.

### 2.3.3 Cloud Computing

In the present call, each Cloud computing system consists of the following elements:

- A set of compute nodes shared among several users and applications, available via a self-service system with maximum a quota available, through a virtualized software layer in cloud computing IaaS.
- Virtual machines (VM) made available will access a virtual disk through local devices, or with a remote filesystem.

## 2.4 Types of access

The applications should select one or more of the following types of access, further explained here:

- **A1 – Preparatory Access.** This type of access should be used for all projects without previous experience in HPC or HTC and/or usage history in the proposed computational resources of RNCA. It should be primarily focused on software performance or scalability tests, benchmarking, refactoring and even small/short projects that do not require more than the resources limit established for this access. Technical support will be made available for all users, on a best effort system, from each operational center. Each A1 preparatory access will have a maximum time limit of 2 months, renewable for another 2 months, in justifiable and approved cases. Maximum limit of computational resources is 50.000 core.hours or vCPU.hours.
- **A2 – Project Access.** This type of access is intended for HPC or HTC usage, mainly for larger projects requiring more than 50.000 core.hours or vCPU.hours in 6 months, up to a maximum limit of 3.000.000 core.hours or vCPU.hours, with renewable possibility upon request. Maximum admitted duration in this access is 6 months, renewable for another 6 months, in justifiable and approved cases. Use of resources should be distributed in time, in a fair-share system. At least 40% of approved resources should be used until half of the project duration. To demonstrate scalability and minimum performance, there should be a prior run in access mode A1 or other similar system outside RNCA. For all projects that require virtual processing and/or storage capacity, they can select Cloud Computing. For this computational model, maximum admitted duration for this access is 6 months, renewable for another 6 months, in justifiable and approved cases. Moreover, maximum resources limit will be 256 GB of RAM, 128 vCPU and 5 TB of disk per approved project, conditioned to any changes related to the capacity installed at the operational center.

Besides administrative requirements that are verified by FCT, projects to be supported under this call must meet the following specific requirements:

- The projects will have duration of 2 or 6 months, depending of the respective type of access A1 or A2, and extendable for equal period of time during its execution, if justified and approved.

- Have a maximum total of resources established in this call for each type of access.
- Identify the Responsible Investigator (IR) for the project that is responsible, for meeting the proposed objectives and rules governing the use of RNCA resources.
- Identify a co-responsible for the project, the Co-Responsible Investigator (Co-IR), that will replace the IR when he/she is unable to fulfil his/her duties;
- Each IR may only submit, in that quality, one application for this call for each type of access. This condition is administratively verified by FCT;
- The IR must have a working contract or post-doctoral fellowship with the proponent institution.

Multiple applications of the same project are allowed for more than one computational model (HPC, HTC and Cloud Computing)

## 2.5 Available Resources

In the present call, the following table shows the available resources at the 4 operational centers enlisted in RNCA. FCT can at any time reinforce or adjust maximum allocation of available resources, if justifiable.

Operational center	Platform	System	Computacional model(s)	6 months allocation
MACC	Bob	360 compute nodes, each with two Intel X86 Xeon E5-2680 (8 cores each CPU) @2.7Ghz 2GB-RAM/core	HPC (CPU)	15 Millions of core.hours
LCA-UC	Navigator/ Navigator+	-164 compute nodes, each with two Intel Xeon E5-2697v2 (12 cores each CPU)@2.7 GHz -32 compute nodes, each with two Intel Xeon Gold 6148 (20 cores each CPU)@2.4 GHz + GPU	HPC (CPU+GPU)	5 Millions of core.hours
HPC-UE	Oblivion	68 compute nodes, each with two Intel Xeon Gold 6154 (18 cores each CPU)@3.0 Ghz	HPC (CPU)	4,3 Millions of core.hours
INCD	Cirrus-A	- CPU type AMD EPYC 7501, each with 500GB and 64 cores; - CPU type AMD Opteron 2356, each with 32 GB-RAM and 8 cores - CPU type AMD Opteron 2356, each with 24 GB-RAM and 8 cores - CPU type Xeon E5-2680 v3 @ 2.50GHz, each with 200 GB-RAM and 24 cores - GPU type Tesla T4, each with 16GB-RAM and 2.560 cores;	HPC (CPU + GPU), HTC	1,3 Millions of core.hours
	Stratus	vCPU using AMD EPYC 7501, 500GB-RAM and 64 cores	Cloud	1,7 Millions of vCPU core.hours

Annotations:

- Except in the case of INCD, available resources indicated on the table above correspond to the best possible estimate at the time of the first publication of the call notice. These amounts could be altered due to computational projects that have started their allocation, whilst the application process is still open.
- Details about Hardware and Software can be found at each operational center technical annex

## 2.6 Beneficiaries and Project Eligibility Criteria

Eligibility criteria, both for beneficiary entities and projects, follow the applicable Regulations, and will be subject to an administrative review to be carried out by FCT. Eligibility is thus not part of the evaluation process.

More on eligibility criteria can be found on Article 6 of Regulations on Advanced Computing Projects. All applications will be subject to an administrative validation prior to the evaluation process.

## 3. Evaluation criteria

Article 15 of the Advanced Computing Projects Regulations establishes that the ranking of applications is made by order of submission or merit, as defined in the notice of each call for applications.

All applications will be reviewed according to the following criteria:

- Access A1– Preparatory Access:
  - Order of submission
- Access A2– Project Access:
  - A: Feasibility of the work plan, in terms of the technical adaptation and computational rationality of the selected resources
  - B: Existence of previously approved R&D project linked with the submitted proposal, with independent evaluation of scientific or technical merit, either done by a national or European competent entity.
  - C: Order of submission

### 3.1 Explanation of main criteria

#### 3.1.1 Access type A1– Preparatory Access criteria

Criteria for A1 Preparatory access are the following:

- “Order of submission” relates to the submission time stamp of each application. It is a number between 1 and the maximum number of applications received before the end of the defined submission period.

Applications will be ranked decreasingly by submission time. Applications submitted first will have a better rank than applications submitted later.

#### 3.1.2 Access type A2 – Project Access criteria

Criteria for A2 Project access are the following:

- A: “Feasibility of the work plan, in terms of the technical adaptation and computational rationality of the selected resources”

- B: “Existence of previously approved R&D project linked with the submitted proposal, with independent evaluation of scientific or technical merit, either done by a national or European competent entity.”
- C: “Order of submission” relates to the submission time stamp of each application. It is a number between 1 and the maximum number of applications received before the end of the defined submission period.”

Primarily, applications linked with previously approved projects (B) will be ordered according to their submission time (C). After those, applications without any link with previously approved projects will be ordered according to their submission time. Any submission with no technical feasibility will be removed from the list (A). A ranked list will be produced and order of platform preference - in case of HPC computational model - will be taken into account.

## 4. Evaluation process and procedures

### 4.1 General Information

- In this call there is no scientific evaluation. All applications will be analysed according to criteria mentioned above in 3.1.1 and 3.1.2.
- FCT is responsible for verifying the eligibility requirements of each project according to factual and legally binding criteria.
- Technical evaluation of criteria A is assessed by staff of the operational centers.
- A ranked list and an evaluation report will be produced, comprising all applications eligible. The proposed list of ordered projects will be prepared by the access committee, headed by a Coordinator.
- Whenever a particular expertise is not covered by the access committee members, they may ask advice to external counselling.
- The reviewer has to declare any Conflict of Interest identified for any particular application;
- The access committee will issue a final report on its activities containing the following elements:
  - The score and comments for each of the evaluation criteria
  - A recommendation section for adjusting computational capacity.
- The access committee members are asked to give support to FCT during the period spanning the evaluation meeting and the final decision (i.e., analysis of potential appeals of technical nature presented by the applicants);
- There is an allocated FCT team for the evaluation process, which will act as the contact point for the staff of the operational centers.

### 4.2 Constitution of the Access Committee

Note: in this document “access committee”, “evaluation panel” and “evaluation committee” are all synonyms for the same expression.

- The access committee is composed of a coordinator, nominated by FCT, and an element from each operational centre (MACC, LCA-UC, HPC-UE and INCD).



## 5. Confidentiality and conflicts of interest

### 5.1 Confidentiality

The confidentiality of written applications must be protected. All reviewers involved in the evaluation are asked not to copy, quote, disclose or otherwise use material contained in the applications. All reviewers are requested to accept a statement of confidentiality relative to the contents of the applications and to the results of the evaluation.

### 5.2 Conflicts of Interest (Col)

Access committee members that have submitted any application to the present Call, as PI, co-PI, team member or consultant to the project, may have to decline participating in the evaluation process.

## 6. Glossary and translations

- Col = Conflict of Interest
- Co-Ir = Co-Responsible Investigator
- FCT-FCCN = unidade de Computação Científica Nacional da FCT
- IR = Responsible Investigator
- R&D = Research and Development
- R&I = Research and Innovation
- RNCA = National Advanced Computing Network, acronym for Rede Nacional de Computação Avançada
- SR&TD = Scientific Research and Technological Development
- TA – Technical adequacy

## 7. Appendix - Applications evaluation calendar

### A1- Preparatory access

This access follows a simpler procedure, where small projects will be fast-track evaluated every 2-3 weeks.

### A2 – Project access

Actual dates depend on the need to program usage of computational resources. The Access Committee will not meet if no free capacity is available to distribute.

Preliminary 2020 calendar:

Evaluation stages	Latest submission date
1st round	14th September (12:00)

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