ResInfra
EU-LAC

Identification of potential EU and LA partners for sustainability of the RICAP pilot

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Contents

Content of Tables

Introduction

EU-LAC ResInfra aims to identify a number of CELAC Research Infrastructures (RIs) that may be considered eligible for the construction of a bi-regional collaboration. This will be carried out through the definition of minimal key requirements these RIs would need to develop in the coming years. Also, EU-LAC ResInfra will use all the results and information obtained for drafting a Sustainability Plan, which will be presented to the EU-LAC RI Working Group for discussion and endorsement. The Plan will include specific actions to support the bioregional collaboration in a mid-term perspective.

The objective is to design specific variable geometry instruments for cofounding RIs of common interest, and to design measures that pursue the strengthening of the bi-regional RI cooperation, seeking to maximise the impact of the RI collaboration in the construction of the EU-LAC Common Research Area.

In this scenario, the 'Red Iberoamericana de Computación de Altas Prestaciones' (RICAP, Ibero American High Performance Computing Network, http://www.red-ricap.org/), one of the project's pilot, reports on the identification of potential EU and LA partners for sustainability of this pilot. This is one of the pledged steps for developing the activities of the pilot in the project's work plan.

1. Context

Sustainability of shared infrastructures between EU and LA is a must. There are several fields of actions for achieving it, but one of those is a correct identification of potential EU and LA partners and actors who could play a two-fold role. On one side, it is important that these institutions will count on (and even own) the correct infrastructure for providing services associated to them, i.e. develop own and collaborative research, and provide access to these infrastructures for a wide set of external users. On the other side, these institutions should have also influence on policy makers, acting as key institutions in the panorama covered by the technologies associated to these infrastructures.

RICAP is focused on High Performance Computing (HPC, i.e. supercomputing) infrastructure, probably the most multidisciplinary field nowadays as their resources are broadly used worldwide by almost every scientific and technological field, humanities included.

As part of the EU-LAC ResInfra project, RICAP describes in this report those institutions that have been identified as key for achieving a sustainable effort in EU and LA on HPC. Thus, up to seven (7) European and thirteen (13) Latin American institutions are listed, to which one (1) transnational entity are included too. In addition, identified manufacturers (up to 5) not belonging to whether EU or LA are also cited.

These institutions have longstanding and relevant experience on different aspects of research and innovation on HPC. In addition, they provide actual collaboration and synergies along projects and join activities in the last decade. Thus, most of them have worked together in different projects -different partnerships- to build advanced computing platforms, and have developed research initiatives in Latin America with the critical support of different European institutions.

EU co-funded projects such as EELA, EELA-2, GISELA, CHAIN, CHAIN-REDS, RISC, ENERXICO, or HPC4E initiatives of collaboration between national partners in France, Germany, Portugal, and Spain have been essential for academic and industrial development on advanced IT services on computation. To them, of course, RICAP itself ought to be added.

Another important topic to identify these institutions have been their involvement in major Pan-European or international initiatives such as the Network of Excellence on High Performance and Embedded Architecture and Compilation (HiPEAC[1]), the Partnership for

[1] https://www.hipeac.net/

Advanced Computing in Europe (PRACE[2]) and their advisory group for Strategic Technologies (STRATOS), the European Technology Platform for HPC (ETP4HPC[3]), the Advanced Computing System for Latin America and the Caribbean (SCALAC[4]), or the HPC Ibero American Network (RICAP[5]).

Last but not least, partners playing a leading role in national HPC networks such as the Red Mexicana de Supercomputación[6] or the Red Española de Supercomputación[7] have been considered as well.

As a result, what it follows aims to be a qualified representation of the HPC environment in the EU-LAC region pursuing to progress towards boosting viable innovative outcomes that will be exploited by the European and Latin American academia and industry. They all represent:

- Expertise in the domains of High Performance Computing and Supercomputing, where all the academic partners have a long record of successful experiences
- Expertise in the area of Computational Science and tackling large-scale scientific and industrial problems
- Capacity to organise high-level events and to involve the key policy and research actors as well as attracting good students;
- Expertise in the specific processes that are of interest to EU-LAC ResInfra
    - Policy and market observation
    - Virtual community building and research networking
    - Support to development, exploitation, and dissemination of developed activities
- Validation of results and formative evaluation
- Experience in management of large support projects in and outside the European Union;
- Consolidated experience in EU projects and extra EU international collaboration

All European teams have experience of participation in relevant H2020 projects and associations supporting the development and use of HPC. The Latin American partners of the

[2] https://prace-ri.eu/
[3] https://www.etp4hpc.eu/
[4] https://twitter.com/scalac_computo?lang=en
[5] http://www.red-ricap.org/
[6] http://www.redmexsu.mx/
[7] https://www.res.es/

consortium are among the top HPC-engaged institutions of their countries, and all of them already had experience in relevant H2020 actions.

2. List of identified potential EU and LA entities for sustainability of the RICAP pilot

The following list provides brief details on the specific expertise and contributions of each of the identified entities. Alphabetical order refers to the country acronym.

European institutions		
Participant organisation name	**Country**	**Expertise**
Jülich Forschungzentrum	DE	Jülich Supercomputing Centre (JSC) is involved in many EC funded projects related to HPC (e.g. Mont-Blanc, DEEP(est), EPI) and HPC strategy (ESSI, EESI-2, EXDCI, EXDCI-2, ETP4HPC). JSC is part of the PRACE consortium and it is a member of EoCoE, POP, E-CAM and MAX Centres of Excellence on HPC. JSC also plays a major role in the Fenix and HBP projects and is part of the German Helmholtz Association.
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)	ES	CIEMAT is pioneering in Spain in HPC for research and has worked on computational science on many scientific and technological fields. It provides a long track record of activities in LA, in particular in Computing related topics. It has led EU co-funded projects like EELA, EELA-2, and GISELA, and participated in CHAIN, CHAIN-REDS, HPC4E, ENERXICO… It currently leads the Ibero American HPC Network (RICAP) and is part of SCALAC.
Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS)	ES	BSC-CNS is one of the major HPC academic Centres worldwide, with a large set of activities on R&D&I on both computer and

		computational sciences. It coordinates the Spanish HPC Network (RES) and is main actor for developing a European processor as part of EPI and PRACE. It has led several projects in LA such as RISC, SIENA, EU-Brazil OpenBIO, ENERXICO, or HPC4E to mention a few. BSC-CNS also participates of SCALAC.
Institut National de Recherche en Informatique et en Automatique (Inria)	FR	Inria covers computer science related topics, mathematical methods and numerical algorithms, and large-scale applications. Inria has expertise in numerical simulation, high order finite element type methods, scalable numerical linear algebra, big data, and machine learning. Inria has been involved in the following HPC-related EU projects: EPEEC, HPC4E, PRACE, CoherentPaaS, ClouDBapplincs, and Cos4cloud.
ATOS	FR	Atos, under its brand Bull, is the European largest company in Big Data, Cybersecurity, HPC and Digital Workplace, Atos supports the digital transformation in Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecos… Bull participates in many EU HPC-related projects such as Mont-Blanc, Deep(est), Enerxico, HPC4E… and leads the European Processor Initiative
CINECA	IT	CINECA is the largest Italian entity working on HPC and related R&D&I activities on computer science. It has been part of the past RISC project and is involved in a number of EC funded projects in the area of HPC. CINECA is part of the PRACE consortium and it is a

		member of MaX, EXCELLERAT and ChEESE Centres of Excellence on HPC. CINECA is also the coordinator of the HPC-Europa3 project and part of Fenix and HBP projects.
Universidade de Coimbra	PT	UC is leading the Portuguese road map for HPC and has been partner in the RISC project, among others. Thus, It has experience in other European HPC-related projects like the PRACE-IP initiatives, and was recently involved in the e-Infracentral project, aimed at designing a portal for European e-infrastructures. It has recently launched the Consórcio High Performance Computing and High Performance Data Analytics (HPC+HPDA)
Latin American institutions		
Universidad de Buenos Aires (UBA)	AR	UBA has a structure made up of around 6,000 researchers and scholars and over 1,500 ongoing research projects. Some of those are focused on research and applications of high-end parallel and distributed tools. They combine strong foundations on new parallel architectures with the adoption of these new techniques in different fields of science and engineering, which are in the forefront of High Performance Computing
Laboratório Nacional de Computação Científica (LNCC)	BR	LNCC counts on the support and expertise of a highly qualified body of researchers, providing high-performance computing resources to public and private scientific and technological communities in Brazil. LNCC hosts the Santos Dumont supercomputer, which is currently the largest supercomputing facility dedicated to

		science in Latin America. LNCC is also the coordinator of the Brazilian network of HPC centres (SINAPAD).
Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE/UFRJ)	BR	COPPE is the largest graduate school in Engineering and Computer Science in Latin America and recognized as an excellency center in both areas. COPPE is a pioneer in the development of HPC applications in Brazil and has a long collaboration with key actors in the HPC arena, both in academia and industry. COPPE is the leader of Hub.Rio, a program for the advancement of AI in the State of Rio de Janeiro.
Universidade Federal do Rio Grande do Sul (UFRGS)	BR	The Institute of Informatics (INF) at UFRGS is a centre of excellence in Computer Science and Computer Engineering research, teaching, and innovation. The faculty is composed of 75 professors, which makes it one of the largest Computer Science and Computer Engineering groups in the country covering a great breadth of research areas. INF counts on tens of formal collaboration agreements with renowned international institutions.
National Laboratory for High Performance Computing (NLHPC)	CL	NLHPC has extensive experience in the use of HPC in collaborative international environments since 2003. More recently, the NLHPC was part of the RISC project, joined to RICAP and has strengthened the relationship with the other members of SCALAC. At the local level, NLHPC hosts the most powerful supercomputer in Chile and the largest scientific network in our country (with 25 associated institutions).

Universidad Industrial de Santander (UIS)	CO	The High Performance and Scientific Computing Center at UIS (SC3UIS) is the most important research and development center in advanced and scientific computing in Colombia. SC3UIS is the core of the Colombian Advanced Computing Consortium, the Colombian HPC National network and also founded the SCALAC collaboration, using parallel computing for academics and productive sectors.
Universidad de Los Andres (Uniandes)	CO	Uniandes holds first place nationally, 7th in Latin America according to the QS World University Ranking, counting with an active education and research on computer science. It counts on 3 research groups officially recognized by Colciencias. These groups promote the development of projects that generate knowledge and impact at a national and an international level for both the academia and the private sector.
Centro Nacional de Alta Tecnología (CeNAT)	CR	The Advanced Computing Laboratory at CeNAT has actively participated for more than 10 years in building up the HPC community in Latin America. CeNAT has been consistent in participating at the Latin America HPC Conference (CARLA), including the organization of CLCAR in 2012 and CARLA 2019 in Costa Rica. CeNAT is also one of the original members of SCALAC, a regular member in RedCLARA, RICAP, and other networks.
HPC-Cuba	CU	As a leader in high performance computing (HPC) infrastructure in Cuba, the HPC Cluster of the Central University “Marta Abreu” of Las Villas (HPC UCLV) is the main node of the HPC-

		Cuba Network, which is also composed by Universidad de Oriente and Universidad Ciencias Informáticas. HPC-Cuba is promoting the development of HPC in Cuba opening the country to international collaborations in this field.
Corporación Ecuatoriana para el Desarrollo de la Investigación y la Academia (CEDIA)	EC	The National Network of Ecuadorian Research and Education promotes research and innovative projects that link entrepreneurs, students, teachers, professionals, and researchers for the progress of Ecuador. In this regard, it has recently leaded the effort on computer science and is developing a strong activity in exploiting large HPC clusters in the country and tutoring and teaching students on the topic.
Centro de Investigaciones y Estudios Avanzados (CINVESTAV)	MX	CINVESTAV, through ABACUS the Laboratory for Applied Mathematics and High Performance Computing host's the largest supercomputing facility dedicated to scientific research and technological development in Mexico. CINVESTAV is one of the founders of the SCALAC collaboration and provides its expertise in mathematical modeling, numerical methods and computational parallel algorithms
Universidad de la República - National Supercomputing Center (UdelaR)	UY	UdelaR is the largest public university in Uruguay and holds the unique public Faculty of Enginnering. Through this institution, UdelaR promotes the development of projects that generate knowledge and impact at a national and an international level for both the academia and the private sector. A special focus is put on HPC by hosting the Centro

		Nacional de Supercomputación (ClusterUY), which participates in several collaborations.
Consorcio Latinoamericano de Redes Avanzadas (RedCLARA)	UY	RedCLARA is recognized as a key player in strengthening science and technology in Latin America by joining efforts of the region National Research and Education Networks. It has recently set an advanced service for advanced computing for the integration of advanced computational resources and the development of activities. RedCLARA has a strong liaison with GEANT and the European Commission.
Industrial partners outside EU and LA		
There are several companies in the private sector that can support the sustainability of the paradigm that RICAP is promoting. Make a list of them would be endless as most of them could be focused as final users of simulation capabilities. In this sense, we mention here those IT manufacturers who have been traditionally collaborating with the academia beyond "simple" provision of machines and services beyond the aforementioned Atos/Bull. In the area of traditional supercomputation with CPU based on Intel or AMD, Lenovo and HP/CRAY have a close relationship with several academic centres and collaborate with them in many topics. Regarding accelerators, NVIDIA has a huge program devoted to developments based on GPUs and training activities. All of these companies also hold specific programs of accreditation of centres of excellence in HPC, CUDA, etc.		

Table 1 – List of identified entities

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