# TRIPARTITE MEMORANDUM OF UNDERSTANDING
# BETWEEN
# Centre for Development of Advanced Computing (C-DAC),
# Indian Institute of Science Bangalore (IISc)
# AND
# Lomonosov Moscow State University (MSU)

## On

## Collaboration for Education in High Performance Computing

This Tripartite Memorandum of Understanding for Cooperation (hereinafter – the "MoU") is entered and between **Centre for Development of Advanced Computing,** a Scientific Society of the Department of Electronics and Information Technology (DeitY), Ministry of Communications and Information Technology, Government of the Republic of India, registered under the Societies' Registration Act 1860 and the Bombay Public Trust Act of 1950, and having its head office at University Campus, Pune 411 007, hereinafter referred to as "C-DAC" (which expression shall mean and include its successors and assigns, **PARTY OF THE FIRST PART**).

And

**Indian Institute of Science Bangalore,** a deemed university and premier institute for advanced scientific and technological research and education incorporated as a deemed university under the University Grants Commissions Act 1956 (3 or 1956), having its registered office at Bangalore India, hereinafter referred to as "IISc" (which expression shall mean and include its successors and assigns, **PARTY OF THE SECOND PART).**

And

**M. V. Lomonosov Moscow State University,** a federal state budgetary educational institution of higher education acting on the basis of the Charter approved by the Resolution №223 of the Government of the Russian Federation of March 28, 2008, which has the right to carry out educational activities on the basis of the license (Series 90Л01 №0008333, registration №1353 of 01 April 2015, term: unlimited) issued by the Federal Service for the Supervision of Education and Science, State

Accreditation Certificate (Series 90A01 № 0001389, registration №1308 of 01 June 2015) issued by the Federal Service for the Supervision of Education and Science for the period up until 3rd of July 2020, having its registered office in Moscow, Russia, hereinafter referred to as "MSU" (which expression shall mean and include its successors and assigns, **PARTY OF THE THIRD PART**).

C-DAC, IISc, and MSU (hereinafter referred to jointly as the "Parties" and separately as the "Party").

Whereas C-DAC was set up to emerge as a premier R&D institution for the design, development and deployment of electronic and ICT technologies and applications for socio economic advancement with the mission of expanding the frontiers of Information and Communication Technologies, evolving technology solutions, architectures, systems and standards for nationally important problems, achieving rapid and effective spread of knowledge by overcoming language barriers through application of technologies, sharing experience and know-how to help build advanced competence in the field of Information Technology, bringing benefits of Information Technology to society, and utilizing the Intellectual Property generated by converting it to business opportunities.

**And whereas** IISc was set up in 1909 as a result of the joint efforts of Jamsetji Nusserwanji Tata, the Government of India, and the Maharaja of Mysore, in pursuit of excellence in higher studies and research in various areas of science and engineering.

**And whereas**, MSU was established in 1755 by the decree of the Russian Empress Elizabeth, named in honour of Mikhail Lomonosov (1711-1765) - an outstanding Russian scientist of encyclopaedic knowledge, and being now Russia's largest classical university.

And whereas as a result of interactions at different levels and recognizing that integration of the Parties' synergistic efforts will contribute to successful cooperation in the areas specified herein below

**"Collaboration for Education in High Performance Computing"**

**Have reached the following understanding:**

## *1. Purpose/Scope of the MoU*

The purpose of the present MoU is to establish a framework of cooperation between the Parties based on mutual interests, equality, non-discrimination and for mutual benefit in the following identified areas of common interest

- Creation of suitable High Performance Computing (hereafter HPC) programmes to be replicated in universities in India.
- Creation of suitable evaluation mechanisms and certification methods.
- Creation of educational programmes for replication within the country.
- Exchange visitors between MSU and Indian counterparts.
- Joint academic programmes.

The broad scope of the MoU, identified areas of interest and action plan are defined and detailed in the annexure to this MoU.

This MoU only reflects a statement of intent by the Parties to enhance cooperation in the above mentioned areas and does not constitute a legally binding instrument. Any specific activities under the purview of this MoU will be conducted through mutually agreed projects and for such projects specific MoU/Agreement shall be signed between the Parties defining the specific rights and responsibilities of the Parties, commercials/financial obligation and other terms etc.

## *2. Instruments for cooperation*

The Parties hereby agree to the implementation of this MoU by carrying out the following activities.

a) For the purposes of operationalising the spirit of cooperation between the Parties in carrying out the purposes of the MoU, the Parties have agreed to constitute a working group consisting of two representatives from each Party. The Parties shall finalize the schedule of the working group meetings within 30 days from the date of concluding and signing the present MoU. The working group will finalize specific action plan leading to the execution of specific projects in specific areas as agreed upon in this MoU.

b) For successful carrying out of common activities the Parties may decide to exchange the information and other requisite materials on terms mutually agreed upon in writing between the Parties and in compliance with the laws and regulations of the two countries.

c) The Parties have agreed that the existence of the present MoU can be disclosed by either Party hereto within the scope of informational support of the Party's activities.

## *3. Responsibilities*

**1. Responsibilities of C-DAC**

a. Shall support MSU and IISc in defining the HPC education programmes to be replicated in universities in India by means of assistance in defining syllabus, evaluation mechanisms and certification methods.

b. Shall define jointly with MSU and IISc the education programmes at the level of post-graduate diplomas and undertake the execution of such HPC education programmes.

c. Shall collaborate with MSU and IISc in defining evaluation mechanisms and certification methods. For the programmes conducted by C-DAC, the certificates shall be issued by C-DAC.

d. Shall take the lead role in creation of educational programmes for replication within the country and support role in formal degree programmes.

e. Shall contribute towards Joint Academic Programmes by defining research projects and joint thesis works.

f. Shall take part in the exchange of scientists and researchers between MSU and Indian counterparts.

**2. Responsibilities of IISc**

a. Shall take lead in creation of suitable HPC programmes to be replicated in universities in India by means of defining syllabus, evaluation mechanisms and certification methods in collaboration with C-DAC and MSU as deemed fit.

b. Shall support the creation of educational programmes for replication within the country.

c. Shall contribute towards Joint Academic Programmes.

d. Shall take part in the exchange of researchers and scientists between MSU and Indian counterparts.

**3. Responsibilities of MSU**

a. Shall develop and implement programmes of advanced training of specialists, training and retraining of teachers in the field of supercomputing and parallel computing technologies on the basis of Russian and Indian universities.

b. Shall hold consultations and provide scientific and methodological support for the creation of supercomputing system of education in India, based on the successful experience of the national project "Supercomputing Education" in Russia.

c. Shall organize exchanges and internship/probation for students, postgraduates and specialists in Russian and Indian universities.

d. Shall contribute to the Joint Academic Programmes by:

   i. Organizing world-class joint research projects to train highly qualified specialists in Russia and India in priority areas of development of scientific research and technologies.

   ii. Creating a system of educational supercomputing platforms for collective usage which combines supercomputing systems, software and sets of educational materials in order to support supercomputing education in Russia and India.

**4. Joint Responsibilities**

a. To carry out the action plan as outlined in the annexure in line with the general guiding principle of this MoU.

b. To nominate Coordinators as nodal contacts to represent the Parties and promote interface so as to plan, implement, monitor and review the various activities as agreed from time to time.

c. To draw the attention of the top management in case of any interface or operational problems.

d. To ensure the safety of the personnel and material whenever placed at either end by the other Party.

e. Each Party shall make its respective Contributions to the Project to the extent of availability of manpower/material/other resources.

f. Each Party confirms that it will act in good faith when complying with its respective obligations under this MoU.

## *5. Financial Aspects*

a) No financial commitment from any Party will be assumed unless a formal approval/ acceptance of the effect for the works or services has been accorded through signed documents by the Parties.

b) Unless otherwise agreed in writing through a separate agreement signed by the Parties, the Parties shall bear their own costs and expenses.

## *6. Confidentiality and Non-disclosure*

a) Neither Party shall disclose nor distribute any confidential information that is provided by the other Party in the conduct of cooperative activities under this Memorandum of Understanding to any third party, except as and to the extent authorized in writing to do so by the other Parties.

b) Specific confidentiality and non-disclosure agreement will be a part of specific MoUs agreed by the Parties for each project.

## *7. Intellectual Property Rights*

a) The Party, which provides information/materials to the other Party, according to the applicable national laws shall be the one having the ownership, intellectual property rights and all the related property rights of the materials, and the Parties confirm that the Party receiving such information/materials shall respect and protect the above mentioned rights, from disclosure in any manner inconsistent with this MoU.

b) The Parties understand that all the intellectual property rights concerning this MoU, developed and researched independently, by one Party shall be in possession of that Party and shall constitute property of that Party, according to the applicable national laws.

c) Parties further declare that according to the applicable national laws, intellectual property rights concerning this MoU, developed and researched through the efforts or using the common resources of Parties shall be the common property of the Parties.

d) The Parties shall ensure appropriate protection of intellectual property rights generated from such cooperation, consistent with respective domestic laws, rules and regulations in force and international agreements, to which both countries are signatories.

## *8. Validity term, termination of the MoU*

a) The MoU enters into force upon its signing by the Parties and shall be valid for three years, unless the Parties decide on termination of the MoU.

b) Nothing in this MoU shall be construed as a Party's obligation to deliver a payment/product/technology, to make expenses or to disclose certain confidential information to any other Party to this MoU.

c) The MoU shall expire on the day it will complete the period of three years from the date of its signing unless is extended by mutual agreement in writing signed by the authorized signatories of the Parties.

d) A Party may terminate the MoU by sending a termination notice to the other Party of the MoU through Air Mail. The MoU shall be deemed to be terminated after 30 (thirty) days upon receipt of the termination notice by the other Party.

e) Unless otherwise agreed by the Parties, termination of the present MoU shall not affect the activities already jointly approved or being in progress under the terms of the present MoU. The Parties will also decide about continuance or otherwise of specific contracts entered amongst them while terminating this MoU.

f) The MoU shall be automatically terminated when the performance of the respective obligations is prevented by an Event of Force Majeure, that arises after the Effective Date, as an unforeseeable circumstances beyond the control of the Parties.

## *9. Settlement of Disputes*

Any dispute or difference arising out of the interpretation, application or implementation of the present Memorandum of Understanding shall be settled amicably through consultation or negotiation between the Parties.

## *10.Communication*

Any communication or notice or intimation shall be addressed to the Nodal contacts of the respective Parties and sent to the registered address of the Parties concerned, and in case of all important documents such as but not limited to financial and performance related documents, E-mail correspondence should be followed by the signed hardcopy.

**Contact Person for C-DAC,**

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**Contact Person for IISc**

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**Contact Person for MSU**

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IN WITNESS WHERE OF, the undersigned being duly authorised thereto, by their respective Parties, have signed this MoU.

Signed at Moscow on 24th December 2015 in three originals in the English language.

**For and on behalf of C-DAC**

Ambassador of India, Moscow

**For and on behalf of IISc, Bangalore**

Ambassador of India, Moscow

**For and on behalf of MSU**

Academician V. A. Sadovnichy

Rector, MSU

**In presence of witnesses**

**1.**

**2.**

## Annexure to the MoU on
## Collaboration for education and research in HPC between C-DAC, IISc and MSU

### 1. Preamble

A delegation led by the Secretary DeitY visited Russia for a joint working group meeting during the month of October 2015 to explore potential collaborations between India and Russia. During that time, a visit was carried out to Lomonosov Moscow State University computing center where a powerful supercomputer is installed which is also the largest supercomputer in Russia.

Lomonosov Moscow State University was established in 1755 and today has about 40000 graduate and postgraduate students. The staff strength include about 6000 professors and about 5000 researchers. Several international students also attend the university. The University also has an excellent library.

Computing Center of the Moscow State University was founded in 1955 and is one of the first of its kind in the Russia.

The MSU has done extremely well in the area of education in HPC domain. A project was funded by the Government of Russia under which a consortium of Russian universities led by MSU developed extremely powerful program for HPC at the undergraduate course work level and some faculty members have also developed a set of modules even for school level to get the students acquainted with HPC.

In India, the Government has approved a national supercomputing mission which is being led by Centre for Development of Advanced Computing (C-DAC) and Indian Institute of Science (IISc) Bangalore. Under this mission a major component is to develop HPC-aware manpower at all levels including those who get expertise to develop parallel computing applications and those who can run the facilities.

### 2. Areas of collaboration

1. Creation of suitable HPC programs for education and academic research to be replicated in universities in India. IISc and C-DAC can take lead in defining these programs with MSU along with identified academic institutions and universities in India.
2. Creation of suitable evaluation mechanisms and certification methods for the HPC programs.

3. Creation of finishing school programs for replication within India.
4. Exchange of students, researchers and scientists between MSU and Indian counterparts.
5. Joint academic programs.

## 3. Action Plan

The following is the broad action plan to be jointly carried out by C-DAC, IISc and MSU.

- Establishment of close contacts between the members of the Supercomputing Consortium of Russian universities and the leading Indian universities; creation of the International Supercomputing Consortium of Russian and Indian universities in order to coordinate the development of national systems of supercomputing education.
- To develop and implement programs or advanced training of specialists, training and retraining of teachers in the field of supercomputing and parallel computing technologies on the basis of Russian and Indian universities.
- To develop proposals for the implementation of various forms of educational programs in areas of high performance computing, exa-flops computing technologies, programming of homogeneous multi-core computing and hierarchical systems with accelerators, parallel processing of data, modelling of problems using supercomputers, supercomputing technologies, high-performance computing for bigdata processing, cloud computing etc.
- To develop training and methodological support for supercomputing education in basic technologies, as well as in specific subject areas; to develop a set of knowledge and skills in the field of supercomputing and parallel computing based on advanced computing systems with ultra-high levels of parallelism and performance.
- To analyse the current status of the training programs in the field of supercomputing education, to specify the proposed areas, and to allocate priorities of cooperation in all forms of training and for all target groups (students, bachelors, masters, post-graduate students, researchers, and teachers).
- To hold consultations and to provide scientific and methodological support for the creation of supercomputing system of education in India, based on the successful experience of the national project of "Supercomputing Education" in Russia.
- To prepare and publish a series of monographs, textbooks and teaching aids on standard parallel computing technologies, and in specific subject area in order to support the

proposed new generation educational programs.

- To participate in thematic scientific conferences, seminars, summer schools and other scientific and educational activities in Russia and India; and to organize joint events;

- To organize exchanges and internship/probation for students, postgraduates and specialists in Russian and Indian universities; academic trips and lectures by specialists and teachers of both countries in Russian and Indian universities and research organizations.
- To organize world-class joint research projects for training of highly qualified specialists in Russia and India in priority areas of development of scientific research and technologies with active usage of state-of-the-art technology in advanced supercomputing and parallel computing.
- To create of a system of educational supercomputing platforms for collective usage which combines supercomputing systems, software and sets of educational materials in order to support supercomputing education in Russia and India.