

**Memorandum of Understanding**

**Between**

**Centre for Development of Advanced Computing,  
An Autonomous Scientific Society  
of the  
Department of Information Technology  
Ministry of Communication and Information Technology  
Govt. of India**

**and**

**(Grid Partner Institution)**

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**Version: 3.7  
Dated: 06/09/2012**

## 1.0 The MOU

This Memorandum of Understanding made at \_ \_ \_ \_ \_ on this \_ \_ day of \_ \_ \_ \_ \_ 20\_\_ has been signed between the following parties

1.1 **Centre for Development of Advanced Computing**, an autonomous scientific society registered under Societies Registration Act, 1860 and Bombay Public Trust Act, 1950, of Department of Information Technology (hereinafter referred to as DIT), Ministry of Communication and Information Technology (hereinafter referred to as MCIT), Government of India and having its registered address as Pune University Campus, Pune- 411 007 represented by its Director General and hereinafter referred to as ‘C-DAC’ (which expression shall unless excluded by or repugnant to the context be deemed to include its successor in office or assignee)

1.2 Corporate/Registration details of <Organization Name >

\_\_\_\_\_registered under \_\_\_\_\_Act\_\_\_\_\_, and having its registered office at

\_\_\_\_\_represented by \_\_\_\_\_and hereinafter referred to as “Grid Partner” (which expression shall unless excluded by or repugnant to the context be deemed to include its successor in office or assignee)

## 2.0 Context of the MOU

2.1 **C-DAC**, in furtherance of its activities in undertaking technology, productization, provision of skill-sets and services in a number of application domains and facilities management in High Performance Computing (HPC) and associated solutions areas for the benefit of scientific and engineering

## Memorandum of Understanding

community, has identified Grid Computing as a major thrust area for future. As part of the same, it had implemented a “Proof of Concept (PoC) phase and Foundation Phase of National Grid Computing Initiative: Garuda”. The Major components of GARUDA are computational resources, high speed communication fabric, resource management and scheduling, program development environment, collaboration environment, data management and grid monitoring. Access portals and specialised problem solving environments will provide seamless access to the grid. GARUDA aims to provide high speed access to the grid resources, from 17 cities across the country (Annexure-1). The Grid has also, in the process enabled a collaborative problem-solving environment for the partners. The Grid has been successfully deployed and is operational. The Foundation Phase of the project has been completed on 31<sup>st</sup> July 2009 and this MoU deals with the activities relating to the GARUDA project beyond 1<sup>st</sup> August 2009.

2.2 <Grid Partner to indicate HPC and other relevant research activities of their institution here.> \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2.3 Recognizing the synergy between the activities of C-DAC & Grid Partner, the respective organizations would like to enter into an MOU, which states the overall scope of work and broad guidelines to facilitate the organizations to collaborate on HPC and Grid computing.

### 3.0 Scope of MOU

3.1 This MOU shall outline the collaborative arrangements between C-DAC and Grid Partner in promoting research and engineering of technologies, architectures, standards and applications in HPC and Grid Computing.

**NOW THIS MEMORANDUM WITNESSETH and is hereby agreed to by and between the parties hereto as follows.**

#### **4.0 Joint Responsibilities of C-DAC & Grid Partner**

- 4.1 C-DAC and Grid partner shall collaborate with each other as well as with other partners of the Grid initiative in Research, Design, Development and Engineering of Technologies, Architectures, Standards and Applications in HPC and Grid Computing.
- 4.2 C-DAC and Grid Partner shall acknowledge each others roles/contributions as well as usage of their resources in all relevant publications and also submit copies of the publications to the respective institutions.
- 4.3 C-DAC and Grid Partner shall facilitate wide spread usage of HPC resources on the Grid including access to the external user community as allowed by the individual organization's policies.
- 4.4 C-DAC and Grid Partner shall specify a single point/nodal contact for further communication; management & monitoring of the Grid setup (Annexure-5).
- 4.5 C-DAC & Grid Partner will bear expenditures for their respective staff in terms of other relevant resources, efforts, travel, time schedule, etc.
- 4.6 C-DAC & Grid Partner will bear expenditures for their respective facilities such as, compute, storage and network components etc.

#### **5.0 Roles and Responsibilities of C-DAC**

- 5.1 C-DAC shall support and help the partner institute for solving / escalating Garuda network connectivity issues in association with NKN.

- 5.2 C-DAC shall assist the Grid Partner, where requested, in deploying the Grid tools and services to facilitate seamless access to the nationwide Garuda Grid resources, subject to terms mutually accepted.
- 5.3 C-DAC shall assist the Grid Partner, where requested, in the integration of their resources including Compute, Data, Storage, Software, and Scientific Instruments into the nationwide Garuda Grid framework, subject to terms mutually accepted.
- 5.4 C-DAC shall provide access to its HPC resources on the Grid (NPSF & CTSF resources at Pune & Bangalore centres and Grid resources from Chennai & Hyderabad C-DAC centres). Grid Partner access to these C-DAC's resources is detailed in Annexure3.

## **6.0 Roles and Responsibilities of the Grid Partner**

- 6.1 Grid Partner shall provide adequate space, air conditioning and regulated and uninterrupted power supply for the equipments as detailed in Annexure-2 and for co-locating networking components for connecting to the high-speed communication fabric.
- 6.2 The Grid Partner shall be responsible for setting up, making available and maintaining the Grid facility and network equipment as detailed in Annexure-2
- 6.3 Grid Partner shall do the needful to extend the connectivity of NKN for Garuda lab. This shall involve providing the right of way for the establishment and testing of very last-mile networking cables to extend the NKN connectivity to the Garuda lab.
- 6.4 Grid Partner shall contribute to the aggregation of the resources in the Grid as per organizational policy (Grid resources include but are not restricted to compute, data, storage, software and scientific instruments)

- 6.5 Grid Partner shall provide necessary permissions and assistance and assistants to C-DAC's Grid administration team to administer the local Grid node setup as and when required.
- 6.6 Grid Partner shall ensure availability of system administrators to manage and monitor the local setup at their premises.
- 6.7 Grid Partner shall upgrade/enhance infrastructure/h-w/s-w etc. as and when required by C-DAC for smooth and efficient functioning/operation of the grid.

## **7.0 Grid Partner Categories & Annual Membership Fees**

- 7.1 Based on their participation in the Garuda National Grid Computing initiative, partner institutions will be classified as in Annexure-3. The annual membership fees, benefits and Grid Partner responsibilities as per category are also detailed in this annexure. Any duties/levies/taxes/cess etc. shall be borne and paid by the Grid partner.
- 7.2 Alternatively, the Grid Partners, in lieu of the annual membership fee for various categories of partnership, can make available a High Performance Computational Cluster, as described in Annexure-4, and host the said system on the Garuda network and agree to make available to the Garuda users at least 50% of its computational cycles.

## **8.0 Confidentiality & Non-Disclosure**

- 8.1 Any software/hardware design, architecture, material, product specifications, designs, financial information, technical documents etc, shall be deemed to be in private domain and it shall not be made public or shared with any other party without the prior written consent of the party which owns it. Data, including text, messages, graphs etc. exchanged through grid will also be kept confidential.

The material shall be treated as confidential for a minimum period of two years after this MOU comes to an end or as agreed from time to time

### **9.0 Intellectual Property Rights Sharing**

- 9.1 Any research publication and commercially exploitable innovations (including algorithms and software patents if any) or any other intellectual property arising out of the joint effort will be jointly shared, published or patented as appropriate. Parties shall sign/execute necessary applications, documents and papers for registration/protection of any IP arising out of joint efforts.
- 9.2 IPR ownership (and resultant revenue if any) sharing will be decided depending upon contributions of Grid Partner & C-DAC to the project on case-to-case basis and will be decided by mutual discussion keeping in mind the spirit of this MOU.

### **10.0 Force Majeure**

- 10.1 Neither party shall be held responsible for non-fulfilment of their respective obligations under this agreement due to the exigency of one or more of the force majeure events such as but not limited to flood, earthquakes, acts of GOD, war, strike, lockouts, epidemics, riots, civil commotion etc provided on the occurrence and cessation of any such events, the party affected thereby shall give a notice in writing to the other party within ten working days of such occurrence or cessation. If the force-majeure condition continues beyond six months, the parties shall then mutually decide about the future course of action.

### **11.0 Arbitration**

- 11.1 In the event of any dispute or difference between the parties hereto, such disputes or differences shall be resolved amicably by mutual consultation or through the good offices of empowered agencies of the Government of India. If such resolution is not possible, then, the unresolved dispute or difference shall be referred to arbitration of an arbitrator to be nominated by Secretary,

DIT. The Arbitration Act 1996 shall not be applicable to the arbitration under this clause. The award of the Arbitrator shall be binding upon parties to the dispute. Provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to DIT whose decision shall bind the parties finally and conclusively.

## **12.0 Termination of MOU**

- 12.1 Grid Partner/C-DAC may terminate this MOU, prior to expiry with three months' written notice and with the written consent of the Head of Grid Partner institution, and Director General, C-DAC. All the intellectual property will be returned to the respective organization on such termination.
- 12.2 The termination by either party by giving a notice of at least three calendar months is to enable the parties hereto assess the monetary impact and such other related factors impinging on the interest of the parties.
- 12.3 All parties shall honour their respective technical and financial commitments on the date of notice.

## **13.0 Communication**

- 13.1 Any formal communication or notice or intimation shall be addressed to the Nodal contacts of the respective parties with a copy sent to the Head of the organization and the Registrar. In addition, a registered post copy shall also be invariably sent to the nodal contacts.

## **14.0 Effective Date and Duration of the MOU**

- 14.1 This MOU shall be effective from the date of signing of MOU and valid for a period of two years
- 14.2 The validity of the MOU may be extended by mutual agreement.



This MOU has been executed in two originals, one of which shall be retained by Grid Partner and the other one by C-DAC.

The Annexure 1, 2, 3, 4 , 5, 6 & 7 are integral part of this MOU

## 16.0 Partners Contribution.

"Please complete applicable clauses as mutually agreed with CDAC:

- A. We agree to partner with CDAC in this national initiative as GP1 and remit a sum of Rupees ..... as membership fees.

**OR**

- B. We agree to partner with CDAC in this national initiative as GP1 and will make available the following computing resources as in annexure 6 of this MoU.

**OR**

- C. We agree to partner with CDAC in this national initiative as GP1 and will make available the scientific instruments as in annexure 6 of this MoU.

**OR**

- D. We agree to partner with C-DAC in this national Initiative as GP1 and will make available a combination of \_\_\_\_\_ (Computing Resources as in annexure 6), \_\_\_\_\_ (Scientific Instruments/Resources as in annexure 7) and remit a sum of rupees \_\_\_\_\_ as membership fees.

## 17.0 Disclaimer

C-DAC reserves the right to determine the level of participation (GP1/GP2/GP3) of the partner. C-DAC at its discretion may choose to determine conditions set for the partnership without giving any reason thereof.

*In witness whereof, the parties hereto have signed this MOU  
on the \_\_\_\_\_ day, \_\_\_\_\_ month and \_\_\_\_\_ year.*

**PARTIES**

For and on behalf of  
C-DAC.

For and on behalf of  
Grid Partner

Signature : \_\_\_\_\_  
Authorized Signatory  
Name & Designation

Signature : \_\_\_\_\_  
Authorized Signatory  
Name & Designation

**Witnesses (Name& Address)**

**C-DAC**

**Grid Partner**

1.

1.

2.

2.

**Annexure-1**

**List of Cities connected by the National Grid Initiative**

1. Bangalore
2. Chennai
3. Hyderabad
4. Pune
5. Mumbai
6. Ahmedabad
7. Delhi
8. Chandigarh
9. Roorkee
10. Kanpur
11. Lucknow
12. Allahabad
13. Varanasi
14. Kharagpur
15. Kolkata
16. Guwahati
17. Trivandrum

**Grid Setup at Partner Site**

1. Make available a ‘User Terminal Room’ with UPS and temperature controlled environment (Approximately 20 x 20 ft floor area)
2. Make available few dedicated user terminals with standard desktop PC configuration connected to local LAN with a gateway to head node.
3. Make available a dedicated Grid Head node compatible with the Grid Head Node at C-DAC centres as shown in Table-1

**Table-1 Minimum Configuration of Grid Head Nodes at C-DAC Centres**

Sl. No	System Configuration
1.	<ul style="list-style-type: none"> <li>• Single/Dual/Quad Processor Xeon 2.4GHz or above, 64-bit</li> <li>• 4GB memory</li> <li>• 2 x 300GB or more hot swappable HDD</li> <li>• DVD / Combo Drive</li> <li>• 2 Ethernet ports Copper GB 10/100/1000</li> <li>• 4 USB ports or more</li> <li>• Built in Redundant Power Supply</li> <li>• Keyboard, mouse, monitor (optional)</li> </ul>
2.	<ul style="list-style-type: none"> <li>• RedHat EL AS 4/AS 5 or above</li> </ul>

In addition partners can also set up Video Conference facility as well as can make available minimum three terminals for the external R&D users. (Including one graphic terminal and one emergency support/backup terminal).

**Grid Partner Categories & Annual Membership Fees**

<b>Grid Partner Categories</b>	<b>Explanation</b>	<b>Annual Membership Fees</b>	<b>Benefits</b>	<b>Responsibilities of Grid Partner</b>
GP-1	Enthusiastic Grid Partner	Rs.1lakh (Rupees One lakh only)	<p>Access at 1Gbps to the Grid resources through NKN Connectivity.</p> <p>Priority access to C-DAC's resources on the Grid.</p> <p>Priority support and maintenance for local Grid deployment.</p> <p>Onsite training on local Grid deployment.</p> <p>Confirmed Participation in Garuda Grid events.</p> <p>Access to Garuda Grid research papers.</p>	<p>Active participation in Garuda Grid R&amp;D initiatives.</p> <p>Make available &amp; setup User Terminal Room and local Grid configuration as per recommended configuration given in Annexure-2</p> <p>Contribution of resources to the Grid. (Optional)</p> <p>Dedicated system administrators for local Grid deployment (if any resource contribution).</p>
GP-2	Active Grid Partner	Rs.50,000/- (Rupees Fifty thousand only)	<p>Access to the Grid resources through Internet connectivity</p> <p>Priority access to C-DAC's resources on the Grid.</p> <p>Regular support and maintenance for local Grid deployment</p> <p>Training on local Grid deployment at C-DAC Grid centres.</p> <p>Confirmed Participation in Garuda Grid events.</p> <p>Access to the Garuda Grid research papers.</p>	<p>Active participation in Garuda Grid R&amp;D initiatives.</p> <p>Make available &amp; setup User Terminal Room and local Grid configuration as per recommended configuration given in Annexure-2</p> <p>Dedicated system administrators for local Grid deployment (if any resource contribution).</p>

**Terms of Payment**

The membership fee indicated above in this annexure is per annum and these rates are applicable only to Government organizations and academic institutions

The first year membership fee shall be paid within 30 days of signing of MoU or on any such payment terms mutually agreed between the grid partner and C-DAC.. The payment for the subsequent year shall be made within 30 days from the date of commencement of the second year. Payments are to be made in the form of Demand Draft in favour of Centre for Development of Advanced Computing, Bangalore payable at Bangalore. All fees are non refundable and non transferable. In lieu of the annual membership fee Partners can contribute resources as indicated in Annexure-4. This donor facility is relevant only to GP1 partners. Grid Garuda services are available to GP2 partners on payment basis only

Taxes and duties, if any, as applicable during the validity of this MOU shall be additional to the membership fees and shall be borne by the grid partner

**Alternate Membership Options**

<b>Grid Partner</b>	<b>Expected Contribution</b>	<b>Expected Peak Performance</b>
GP-1	128 CPU Cluster	400 Giga Flops
GP-2	Donor facility not available to this category	

C-DAC has deployed 40 nodes (320 cores) 4 Tera Flops (TF) Linux Clusters at its Bangalore, Hyderabad & Chennai centres. The Clusters of the Grid Partner are expected to be compatible with these resources. The node configuration details of C-DAC clusters at these centres is as follows:

**Server:** Dual CPU Quad core Xeon 3.16 GHz with Intel 5400 chipset

L2 cache 6MB

16GB DDRII 677/800 MHz SDRAM ECC

On board 2 Nos. Gigabit Ethernet ports

Infiniband Dual port 20 Gbps

SATA 250GB X 2 HDD

CDROM/DVD Drive (optional)

Redundant power supply

Support for RedHat EL- 5.x : x86-64

**Ethernet Switch:** 24/48/64 port Gigabit switch with 2 Gbps uplink

Infiniband switch – 48 / 96 port 20 Gbps

**Storage:** 24TB of Mass Storage (SAN/NAS/DAS); 1/2 file servers based on need

**Head node** has 4 Gigabit ports and 2 Infiniband ports

**Annexure-5****Nodal Contact**

<b>C-DAC</b>	<b>Grid Partner</b>
Shri Ganga Prasad G.L Senior Director C-DAC Knowledge Park # 1, Old Madras Road Byappanahalli Bangalore-560 038 Tel : 080-25246357, 66166345 Fax: 080-25247724 email: gpr@cdac.in	

Additional information can be found at [www.garudaindia.in](http://www.garudaindia.in)



**Details of Compute Resources made available through GARUDA**

**Details of Scientific Instruments made available through GARUDA**