# Request for Proposal for High End Computer Cluster

## Domestic Tender

The group led by Dr. Ranjan Laha at Centre for High Energy Physics intends to purchase a high performance computational cluster (HPC) for research in theoretical physics. It is expected that the HPC will have a sustained performance of approximately 10 teraflops (double precision floating point) for the compute only nodes. There should be at least 4 compute nodes. The compute nodes should have a rack mount 4U form factor. Server chassis/ enclosure based solutions with redundant power supplies, and getting mounted on standard 4U rack is required. The system should be configured such that each of the server node can be individually serviced without affecting the other server nodes. The servers should be managed by a single network at 1 GBPS or higher. The cluster should be installed with the necessary schedulers, drivers, connectors, state of the art database systems, etc.

The item-wise requirements are listed below. Please note that we mention only the core components. The bidders must quote and supply various unlisted accessories like LAN, Rail, Software, etc. which will be used to set up the HPC in a fully working condition.

Proposals are invited, in two-cover format, from bidders for high-end Computer Cluster with the following specifications.

### Technical Specifications:

**1. Master Node:** A HPC Cluster with 1 Head/ Master node and at least 4 rack-mountable compute nodes, with a High Performance interconnect with the following (or very similar/ better) specification.
Compute Nodes and Head Node

- 2 Intel Xeon Gold/Platinum Cascade Lake Processors each with 24 Cores or more at 2.2 GHz or higher **(or)**
  2 AMD EPYC 74xx or 75xx Processors each with 24 Cores or more at 2 GHz or higher

  Some features which the Master Node can support:
  (i) 8-Channel RDIMM/LRDIMM DDR4 per processor, 32 x DIMMs
  (ii) 2.8GHz 64M L3 cache
  (iii) 2 x 1Gb/s LAN ports
  (iv) 1 x Dedicated management port
  (v) 12 x 3.5" and 2 x 2.5" SATA hot-swappable HDD/SSD bays
  (vi) Ultra-Fast M.2 with PCIe Gen3 x4 interface
  (vii) 8 x PCIe Gen4 x16 and x8 expansion slots
  (viii) 1 x OCP 3.0 Gen4 x16 mezzanine slot
  (ix) 1 x OCP 2.0 Gen3 x8 mezzanine slot
  (x) IPMI / Remote management features
  (xi) Platinum level efficiency redundant power supply

  - A description of the specifications required in the Master Node:

  (i) 2.8 GHz 64M L3 cache: quantities 2
  (ii) 8 GB DDR4-3200 ECC Reg RoHS: quantities 16
  (iii) 6 TB 3.5” 6Gb/s 7.2K RPM Enterprise SATA HDD (36TB RAW): quantities 6
  (iv) 480 GB 2.5” 6Gb/s Enterprise SATA SSD: quantities 2
  (v) 8-Port RAID Controller – LSI 3108: quantity 1
  (vi) On-board Dual 1Gb/s LAN ports + dual 2m CAT6 patch cable: quantity 1
  (vii) Dedicated Management Port: quantity 1
  (viii) 2 USB 3.0 (front) & 2 USB 3.0 (rear): quantity 1

(ix) Rack mount Rail Kit: quantity 1

**2. CPU + GPU Compute Node:** 4 quantities (minimum)

Some features which the Master Node can support:

(i) Up to 4 x NVIDIA PCIe Gen4 GPU cards
(ii) Dual Single AMD 70xx series/ Intel Xeon processor family
(iii) 8-Channel RDIMM/LRDIMM DDR4 per processor, 8 x DIMMs
(iv) 1 x dedicated management port
(v) 4 x SATA 3.5" hot-swappable HDD/SSD bays in front side
(vi) 2 x 2.5" Gen4 U.2/SAS/SATA hot-swappable HDD/SSD bays in rear side
(vii) 2 x low profile PCIe Gen4 expansion slots
(viii) 1 x OCP 3.0 Gen4 x16 mezzanine slot
(ix) Redundant Power Supplies- Titanium level efficiency

- A description of the specifications required in the Compute Node:

(i) 2.25 GHz 256M L3 cache: quantity 2
(ii) 64 core compute nodes will be preferred --- per processor 64 cores
(iii) 32 GB DDR4-3200 ECC Reg RoHS quantities: 8
(iv) 480 GB 2.5” 6Gb/s SATA 7mm SSD: quantity 1
(v) Add-on Dual 1Gb/s Intel i350-AM2 LAN ports
(vi) dual 2m CAT6 patch cable: quantity 1
(vii) Dedicated Management Port: quantity 1
(viii) Infiniband adapters with necessary cables
(ix) 1 USB 3.0 (Front) & 2 USB 3.0 (rear)
(x) Rack mount Rail Kit
(xi) Inclusion and support for up to 4 A100 Tensor Core 40GB HBM2 GPU’s. Alternatively, two A100 80Gb for now to be installed. Two additional slots should be free for future upgrades.

**3. Network/ Interconnect:**

(i) Infiniband switch with 1:1 non-blocking architecture with sufficient ports for the proposed cluster with 25% additional capacity for future expansion or DLINK DGS 1024C 24-Port Gigabit Unmanaged switch: quantities 2
(ii) A separate 1G network should be provided for management and administration of the cluster. Higher speeds will be preferred.
(iii) All network cables should be listed and supplied.
(iv) 42U rack with PDUs and other accessories must be quoted.

The Master node and compute nodes will be part of the same cluster. One can include Gigabit networking as the default, and separately mention the option of upgrading to the Infiniband adapters.

4. For AMD based solutions, AOCC is required to be installed and support with regular updates and patches (as and when released by AMD) must be provided by the bidder.

**5. Other software:**

(i) Latest version Cent-OS operating system
(ii) Open-source compilers and cluster management tools
(iii) Various application packages should be installed and demonstrated on the HPC cluster. A complete list of packages is provided below. The listed software packages are to be installed properly and tested to satisfaction for performance and efficiency for the payment to be done.
(iv) CUDA tools should be installed and CUDA enabled applications provided by IISc should be installed and demonstrated.
(v) Various softwares need to be installed: Python 3/ 3.5 - with numba, numpy, scipy, matplotlib, Matlab, BLAS and LAPACK (licence can be obtained from institute), R, opencv-python, opencv contrib-python, pandas 17, Anaconda package manager, OpenCL and PyopenCL, FreeSurfer ANTs, BrainSuite.
(vi) Compilers: OpenMPI, Intel & Intel MPI, GNU compilers, Mpicc, Cmake, keras, tensorflow-gpu, CUDNN, AOCC(In case of AMD based solutions can be proposed and installed on the cluster), GSL.

(vii) A queuing system such as PBS Torque or SLURM.

## 6. General specifications:

(i) All of the components must be compatible with Indian electrical standards.
(ii) The bidder needs to do the racking, stacking, installation, commissioning, and cabling of all components (hardware and software).
(iii) The HPC cluster solution must be housed in a suitable chassis. Dense computing platform with extensibility option is preferred.
(iv) The bidder should provide manufacturing authorization form (certificate from OEM for quoting the requirement).
(v) The bidder/OEM must provide three reference sites 50 TF or above (CPU only) where they have carried out the installations in the last 3 years. The purchase committee will independently obtain inputs from referees before making the final decision on the bid. PO copies and installation reports must be submitted along with the Technical Bid.
(vi) The lowest commercial bid and/or the most agreeable technical bid must have the option for further negotiations.
(vii) If there is any delay in delivery, replacement, or rectification, the warranty period should be correspondingly extended.
(viii) The cost per node must be mentioned in the bid. Any additional nodes must be supplied at the same cost quoted in the original bid.
(ix) In addition to the warranty for 3 years, the vendor must provide an annual maintenance contract for two more years.

## 7. Eligibility criteria:

(i) The quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.
(ii) The bidder/ OEM should have set up at least 3 or more HPCs in the last 3 years with at least one cluster with 512 cores and Infiniband interconnect. Purchase order copies of previous installations are required.
(iii) The bidder should be in HPC/IT business for at least 10 years. Documents supporting this should be submitted.
(iv) The bidder should have an annual turnover of Rs. 50 Crores or above in the last 3 Financial Years. Audited Balance sheets should be submitted.
(v) The bidder should have a sales and service office in Bengaluru.
(vi) The OEM should have a registered office in India with service center facilities in Bengaluru. Details of HPC engineers of bidder and OEM should be provided.
(vii) The OEM should give an undertaking that warranty will be directly provided by the OEM. The OEM should give an undertaking to provide necessary Technical support in case the bidder fails to provide such a service to IISc.
(viii) Bidder/OEM with poor service track record at IISc will not be considered.
(ix) The Bidder should not be currently blacklisted by any institution or bank in India.
(x) Bidder/OEM has to quote exactly as per mentioned specifications for entire solution. Partial offers will not be accepted.
(xi) **Domestic bidders should follow the terms and conditions as per the notification No. P45021/2/2017-PP (BE-II) dated 16th Sep, 2020.**

## Instructions to the Bidders:

The quotation should comprise of **Two-cover format – a Technical part and a Commercial part**.

## Technical Bid

The technical bid should contain the following:

- Un-priced bill of material with quantities of each line item.

- Datasheet for product/model suggested.
- The technical bid should not contain any price information. Non-conformance will result in disqualification.

## Commercial Bid

- The Commercial bid should contain details of the prices for each one of the subsystems of the total offer giving clearly the rate and the quantity. Bundling of the prices is not acceptable.
- Optional items must be quoted as a separate line item.
- Installation and Commissioning charges, if any, must be quoted as a separate line item.
- Bidders proposing multiple options must quote for each of the configurations separately including the necessary data-centre requirement as self-contained bids and this is a mandatory requirement.

Covers containing the technical and commercial bids must be individually sealed, and superscribed respectively as **"CHEP/ranjanlaha/2022 – Technical Bid"** and **"CHEP/ranjanlaha/2022 – Commercial Bid"**. The two covers must be put in a larger envelope, sealed, superscribed as "**Compute Server (CS) - CHEP/ranjanlaha/2022**" and sent to/ submitted in **Centre for High Energy Physics Office, IISc, Bangalore 560 012**, on or before the deadline. All the covers should bear the name and address of the bidder. Non-conformance of any of the above can result in disqualification.

## Additional Guidelines:

1. Quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.
2. The total solution as per the agreed bill of materials has to be supplied within 4 weeks after receiving a firm PO from IISc and the installation to be complete within a week after supply of the equipment.
3. The vendors are requested to submit the following declaration if they participate in the local tender and if the item is not manufactured in India: "We hereby declare that ..... is a class 1/2 local supplier in accordance and manner as specified in Order No. P45021/2/2017-PP (BE-II) dated: 04th June 2020 and OM No. P-45021/102/2019-BE-II-Part(1) (E-50310) dated 04.03.2021 issued by DIPP, Ministry of Commerce and Industries, GoI."
4. The offer has to clearly explicitly state the supply part, F & I, I & C, Warranty services and any other charges separately.
5. A copy of the masked Commercial bid has to be given in the technical offer.
6. Delayed and/or incomplete tenders are liable to rejection.
7. The technical bid and the commercial bid should be duly signed by the authorized representative of the bidder.
8. The Technical Bid and the Commercial Bid should be bound separately as complete volumes.
9. No prices information should be mentioned in the Technical Bid.
10. The Director, IISc reserves the right to modify the technical specifications or the required quantity at any time.
11. The Director, IISc reserves the right to accept or reject any proposal, in full or in part, without assigning any reason.
12. The bidders are requested to go through the Terms and Conditions detailed in this document, before filling out the tender. Agreeing to the terms and conditions of the tender document (by signing all pages of the copy of a tender document) is a mandatory requirement.
13. A tender, not complying with any of the above conditions is liable to rejection. Incomplete proposals are liable to be rejected.

## Commercial Terms and Conditions:

- The commercial bid should contain among other things, payment terms, warranty, installation, and commissioning charges. These charges will be paid only after successful supply, installation and acceptance.
- The quotations should be on FOR-IISc Bangalore basis in INR only.
- Price should be quoted per unit and the total amount for the required quantity.
- Offer should be valid for 60 days from the date of submission.
- IISc will place the purchase order only on the successful bidder.

## Evaluation of Bids:

1. The technical bids will be evaluated first. Technical bids not meeting the tender requirements will be disqualified.
2. The commercial bids of technically qualified bidders will be opened subsequently. The date and time of opening of the commercial bids will be intimated to the technically qualified bidders.
3. The lowest bid will be identified as the successful bid. In computing the commercial offer, the cost of the servers, software, Installation and Commissioning charges (if any), agency charges (if any), warranty charges for 3 years, and annual maintenance charges for 2 years will be included. Pricing of optional items will not be considered in the cost.

## Payment Terms:

The conditions regarding payment terms are as follows:

1. The total project cost will consists of two parts: (a) Equipment supply part (Supply), and (b) Installation, commissioning, warranty and maintenance services part (shortly referred as services), if applicable.
2. The total cost of the system (Supply part) will be paid through SIGHT DRAFT/NEFT on delivery.
3. Installation charges, if any, payable only in Indian Rupees, will be paid after acceptance of the system.

The procedure is as follows: On delivery complete inventory checks mandates confirmation of systems to have been delivered with the ordered configuration. Post this system will be installed with CentOS/ Fedora latest version OS or any other open source linux that is provided, and subjected to 48 hours of burn-in test. The burn-in test includes running of hardware diagnostics on all components continuously for a period of 48 hours to eliminate possibility of any hardware failures. The successful completion of the acceptance test results in payment.

## Warranty terms:

- Warranty services for the system supplied by the successful bidder should be valid for a period of 3 years from the date of acceptance of the equipment.
- During the warranty period, the bidder shall be fully responsible for the manufacturer's warranty in respect of proper design, quality and workmanship of all the systems supplied.
- During the warranty period, the bidder shall attend to all the hardware problems on site and shall replace the defective parts at no extra cost to the purchaser.
- During the warranty period, the preventive maintenance and repairs of the components supplied by the bidder are the responsibilities of the bidder.
- The terms and conditions for the annual maintenance for the 2 extra years (beyond the 3 year warranty service period) should be similar to that applicable during the warranty period.

## Important Dates (Tentative):

August 1, 2022: Enquiry letter sent to Vendors/ Put it on IISc webpage
August 15, 2022: Clarifications/ queries, if any, to be sent by email to ranjanlaha@iisc.ac.in
August 22, 2022: Last date for submission.