Department of Physics
Indian Institute of Science
Bangalore, India, PIN 560012

Domestic Tender

Dear Madam/Sir,

Subject: Request for quotation for a high performance computing cluster FOR-IISc Bangalore basis in INR only

The Sumantra Sarkar group at the Department of Physics intends to purchase a high performance computational cluster (HPC) that has a **sustained performance of approximately 10 teraflops (double precision floating point) for the compute only nodes. The overall compute only nodes should be populated with a minimum of 2 TB of memory with no less than 4 compute nodes. The compute nodes should have a rackmount 4U form factor and should have the option to add GPU cards in the future.** During the evaluation, preference will be given to system with higher extensibility (ease of adding new nodes to the cluster in future). Server chassis/ enclosure-based solutions, with redundant power supplies, and capable of getting mounted on standard 42U (19") rack is desirable. Also, each of the server nodes should be individually serviceable without shutting down the other server nodes. Proposed servers should be preferably managed by single network at 1 GBPS or higher speed. The cluster should be installed with the necessary schedulers, drivers, and connectors for running and monitoring container-based jobs, Spark with HDFS based jobs and MPI based jobs, thin client environment, state of the art database systems like Postgre SQL or equivalent. Virtualization and aggregation compatibility should be made available.

Following are item wise specifications. Only core components are cited below and the bidders are expected to also quote for and supply the necessary unlisted accessories (e.g. LAN, Rail, Software etc.) that will be required for setting up the complete solution.

1. **Master Node:** A separate master node with the following specifications.
    a. **Dual** x86 Processors, with **minimum** 24 core per processor and 2.6 GHz base frequency
    b. Minimum 8 GB, 3200 MHz, balanced memory configuration **per core**.
    c. 50 TB of total storage.
    d. Dual gigabit LAN ports
    e. RAID Card with min 1 GB cache with RAID 5 support
    f. Infiniband Adapter, 100 GBPS with necessary cables
    g. IPMI / Remote management features

Phone: (80) 2293 3764 Email: sumantra@iisc.ac.in

h. Redundant power supplies, Titanium level efficiency

2. **Compute Nodes:** Cluster with minimum **4 nodes** with the following specifications per node:
    a. **Dual** x86 processors, with minimum 32 core per processor and 2.8 GHz base frequency
    b. Minimum 8GB, 3200 MHz, balanced memory configuration **per core**.
    c. 960 GB SSD
    d. Dual gigabit LAN ports
    e. Infiniband adapters with necessary cables
    f. Redundant Power Supplies- Titanium level efficiency
    g. IPMI/Remote management features
    h. Ports for GPUs (2x NVIDIA GeForce RTX 3070 or higher config GPU)
    i. GPU is not needed. So, price for GPU should not be included in the quotation.
    j. 4U rackmount form factor

3. **Network/Interconnect:**
    a. Infiniband switch with 1:1 non-blocking architecture with sufficient ports for the proposed cluster with 25% additional capacity for future expansion.
    b. A separate 1G network should be provided for management and administration of the cluster.
    c. All network cables should be listed and supplied.
    d. 42U rack with PDUs and other accessories must be quoted.

4. **In case of AMD based solutions, AOCC need to be installed and the bidder need to support with regular updates and patches (As and when released by AMD).**

5. **Other software:**
    a. CentOS operating system, latest version

    b. Open source cluster management tools such as Rocks, Ganglia

    c. Application packages provided by IISc should be installed and demonstrated on the HPC cluster. A complete list of packages is provided below. Unless the listed software packages are installed properly and tested to satisfaction for performance and efficiency, the payment will not be done.

    d. CUDA tools should be installed and CUDA enabled applications provided by IISc should be installed and demonstrated.

    e. The following packages need to be installed and tested. Vendor may be requested to also test software not mentioned in the list. For more information on the software packages, please send an email to Dr. Sumantra Sarkar

(sumantra@iisc.ac.in) with specific questions.

i. Molecular Dynamic Simulation Packages: GROMACS (patched with plumed) - with mpi, LAMMPS - with mpi, NAMD - with mpi and VMD, AMBER, VOTCA (with gromacs), MDAnalysis GAUSSIAN (licence can be obtained from institute) (academic license is available for all).

ii. Generic day-to-day Softwares: Python3/3.5 - 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.

iii. 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,.

iv. Biomolecule Analysis Software: Rosetta , Modeller-IMP, FastQC ,Trim Galore, Cutadapt, Bowtie2,TopHat, Samtools, Htseq-count, Cufflinks, IGVTools, Depth, EMBOSS, AutoDock, ClustalX, Packpred, OpenMPI, CCP4, Phenix, FoldX

General Specification:

a. All the equipment must be compatible with Indian electrical standards/codes

b. The bidder must carry out Racking, stacking, installation, commissioning and cabling of all supplied hardware components and software.

c. The HPC cluster solution must be housed in suitable chassis. Dense computing platform with extensibility option is preferred.

d. The bidder should provide manufacturing authorization form (certificate from OEM for quoting the requirement)

e. Also, bidder/OEM must provide at least 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.

f. The lowest commercial bid and/or the most agreeable technical bid should have the option for further negotiations.

g. In case of any delay in delivery, replacement, or rectification, the warranty period should be correspondingly extended.

h. Please mention per node cost in the bid. Any additional nodes have to be supplied at the same cost quoted in the original bid.

Eligibility Criteria:

a. Quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.

b. 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.

c. The bidder should be in HPC/IT business for at least 10 years. Support documents should be submitted.

d. 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.

e. The bidder should have a sales and service office in Bangalore.

f. The OEM should have a registered office in India with service center facilities in Bangalore. Details of HPC engineers of bidder and OEM should be provided.

g. The OEM should give an undertaking that warranty will be directly provided by the OEM. Also the OEM should give an undertaking to provide necessary Technical support in case the bidder fails to provide such a service to IISC.

h. Bidder/OEM with poor service track record at IISC will not be considered.

i. The Bidder should not be currently blacklisted by any institution, bank in India

j. Bidder/OEM has to quote exactly as per mentioned specifications for entire solution, partial offers will not be accepted.

k. **Domestic bidders should follow the terms and conditions as per the notification No. P-45021/2/2017-PP (BE-II) dated 16th Sep, 2020.**

The quotation should be in two parts:

Part I (Technical bid) and Part II (Commercial bid)

Part I should be put in a sealed cover and superscripted “Technical Bid”. Part II should be put in a separate sealed cover and superscripted “Commercial Bid”. Technical bid should be exactly same as commercial bid **except that prices are not shown in technical bid**. Any bidder found in violation of this requirement will be automatically disqualified. Technical bid should have item wise compliance report of all specifications. The above covers should be put in another cover. This cover should be sealed and subscripted “Bid for Sumantra Sarkar group High Performance Computing Cluster for Dr. Sumantra Sarkar”.

The Technical bid should not have any details about pricing. **The commercial bid should have pricing for each of the configuration quoted in the technical bid.** The last day for submitting the bid is **May 27, 2022**. The offer should be valid for a period of at least 60 days from the last date for submission of quotes. Prices quoted should be inclusive of all taxes / duties. The prices quoted should be inclusive of delivery of the items to the site and installation at site and **should include only INR quotes**. Both technical and commercial bid will be negotiable for the lowest costing commercial bid and most desirable technical bid. While evaluating the technical bid, weightage will be given for extendibility, performance and adherence to specifications and references from past customers. The purchase committee may want to contact past customers and the vendors are requested to provide references that can be contacted for the same.

Payment will be made after satisfactory supply and installation. The system supplied may be tested/certified by us through an identified person/committee. Three year on-site warranty should be provided for the hardware. **The warranty period will commence from the date of acceptance of the equipment.**

Important Dates:

Date of release of the enquiry	:	May 2, 2022
Pre-bid clarification	:	11th and 12th May, 2022 (2 PM to 5 PM)
Date of submission of Quote	:	27th May , 2022, 5:30 PM. Physics office

Sincerely,

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