Domestic tender notification for the procurement of "640-core high performance compute nodes" (Last date: 15th March 2023 by 5:00 pm)

Dear Sir/Madam,

This is an open domestic tender (see Annexure 2 for eligibility criteria) in order to satisfy the computational needs of my research group. We plan to expand the 768-core high performance computing (HPC) cluster that we have in our group already, and acquire **high-performance computing nodes comprising a minimum of 640 compute cores**, to augment our existing system. Details of our existing system are described in the table below.

Existing cluster

#	Heading	Specifications
1	Form factor	2U for master and all compute nodes.
2	Make	Master node: Fusionstor i610 Purley series. Compute nodes: 4 Fusionstor i610 Purley series, 2 Fusionstor Invento i610 Purley series. Total nodes: 1 master node + 6 compute nodes.
3	Processor	Master node: 2xAMD EPYC 7452 (32 cores, 64 threads). Compute nodes: 2xAMD EPYC 7742 (64 cores, 128 threads).
4	Memory	Master node: 4x32 GB DDR4 2933 MHz in balanced mode. Compute nodes: 16x64 GB DDR4 2933 MHz in balanced mode.
5	Storage	Compute nodes: 512 GB SSD.
6	High speed interconnect	1 Dual port 100 Gbps EDR infiniband card on master and all computes.
7	Primary Interconnect switch	Mellanox Infiniband EDR 100 Gbps 36 SFP port switch with passive copper cables.
8	Management Interconnect switch	Netgear 48 port 1 GbE BaseT managed switch.
8	Power Supply	1600 W @96%.
9	OS	CentOS version 7 on master and all computes.
10	Rack	42 U x 1000 mm x 600 mm mild steel with perforated single doors (with locks) on front and rear.

In the following, we list the minimum specifications that we insist upon in the solution to be provided against this tender. We insist that the solution has to be based on AMD processors, so that the new nodes are compatible with our existing cluster and integration is easier.

Compute Node

#	Heading	Specifications
1	Form factor	2U, Rack Mountable Chassis. Note: Dense solutions that satisfy other requirements are acceptable.
2	Processor	Latest AMD server-model processor. Minimum clock speed: 2.25 GHz. Minimum number of cores: 64C/128T per socket. AMD 7742 EPYC processors or better are preferred. Denser solutions that satisfy other requirements will be acceptable.
3	Mother board	Dual socket.
4	Memory	Minimum 8 GB/core. Solution should use 64 GB (or higher) DDR4 ECC RDIMM modules, at 2933 MHz or better, in balanced mode. Additional DIMM slots for future expansion must be available.
5	USB ports per node	Minimum 2 USB 2.0 or better.
6	Video o/p per node	1 onboard VGA port or better.
7	Storage	Minimum 512 GB SSD Enterprise-class.
8	High speed interconnect	Dual port 100 Gbps EDR Infiniband card.
9	Power Supply	i) Redundant power supply of 80 Plus Platinum level or better. ii) The minimum PSU Wattages should be suitable for the provided solution. iii) A supporting calculation of the power utilization and PSU efficiency must be provided.
10	OS Support	The system should support CentOS version 7.

Interconnect cables

#	Heading	Specifications
1	Infiniband cables	Passive Copper Cable EDR up to 100 Gbps – number of cables as required by the solution.

#	Heading	Specifications
		Each cable should be minimum 2m in length. The cables should be compatible with Mellanox Infiniband® EDR 100 Gbps 36 SFP port primary interconnect switch that is already installed.
2	Ethernet cables	1 Gigabit Ethernet cables that are compatible with existing Netgear management switch – number of cables as required by the solution.

Ethernet network switch

#	Heading	Specifications
1	Ethernet switch	48 port 1 Gigabit Ethernet network switch that is rack mountable by Netgear brand or similar. Include ethernet cables for this switch as needed by the solution. The ethernet switch and cables are required for IPMI access of all nodes.

Power distribution unit in rack enclosure

The existing master, compute nodes, primary interconnect switch, and management interconnect switch are mounted on the 42U rack that we possess. An additional machine (a fileserver of 2U form) is also mounted on the same rack. The new compute nodes purchased through this tender will have to be mounted on the same rack as well, so that integration is easier. Note that the current PDUs on the rack have an insufficient number of sockets and require replacement, as specified below. The power supply to the rack comes from the bottom inlet. Current PDUs have a maximum current rating of 32 A.

#	Heading	Specifications
1	PDU	48 C-13 socket PDU, distributed on both sides of the rack, compatible with 3-phase power supply, with single MCB no-cable. Thus, there can be two 24 C-13 socket PDUs attached to each side of the rack, forming a total of 48 sockets. Currently, the rack has two 15 C-13 socket PDUs attached, but there are not enough open sockets for the new nodes. So the existing PDUs have to be removed and the new ones installed.

Software installation

#	Heading	Specifications
1	The software listed in the specifications column should be	i) OS installation (CentOS version 7) in all new compute nodes.

	installed on all the new compute nodes	ii)	Mounting of three NFS partitions from existing master node, namely /home1, /scratch, and /apps on all new compute nodes. The existing compute nodes are bound to the master via the NIS binding system, so the new nodes have to be bound via the same system. Existing users should appear as users on the new computes after mounting+binding. Existing install softwares should be able to run on the new computes.
		iii)	Note that the installation of new nodes should avoid, as much as possible, any changes to the compiled software or partition mounting on the existing nodes.
2.	IPMI		The new computes need to be made available on an IPMI system that is accessible within the Institute's network via a web interface. Relevant IP addresses will be provided for all nodes. The existing nodes and master are available on the IPMI system designed by Supermicro and can be accessed via any web browser within the Institute's network. The new nodes do not need to have the same IPMI system, but should have similar functionalities.
3.	PBS queuing system		The current compute nodes are added to a PBS queuing system that is managed by the master node. The new nodes have to be added to the existing queuing system, without disrupting existing nodes.

Other requirements
1. Minimum three years warranty on all components should be included in the quoted cost.
2. OS installation, mounting of partitions, binding the new nodes to existing master, and adding the new nodes to the existing PBS queuing system.
3. Detailed instructions on installing nodes (including reinstallation in case of node failure), operating the system, and powering up/down the nodes.

Scope of work
- Delivery of all physical equipment at the Department of Materials Engineering, IISc campus
- Physical installation of the new compute nodes, powering on all the new nodes
- Physical installation of new PDUs
- Software installation, from operating system to binding of new nodes
- Verifying that existing users and software executables are available on the new nodes
- Testing to ensure that all installed software work as intended on the new nodes
- Testing to ensure that the PBS queuing system is working with the new nodes as intended
- Verifying that the new nodes have an IPMI system installed and can be managed via a web interface from within the Institute network
- Testing and verification of Infiniband state and rate of data transfer on the new nodes

In case of a price conflict, the vendor with the following options will be preferred in the following order of priority:
1. More computational cores per node
2. Higher clock speed CPUs per node
3. Higher memory at a minimum of 2933 MHz per node
4. Newer generation CPUs per node
5. Extra SSD storage per node

Terms and conditions

1. The vendors quoting should be registered with IISc. The quote should carry your Vendor Registration Number and/or your Vendor ID in the Technical bid.
2. Two-bid system (separate technical and financial bids) in two sealed envelopes. Unpriced bill of materials (BOM) should be included in the technical bid.
3. The technical bid must clearly specify the prescribed technical specifications without including the prices. Please provide in detail the specifications, namely full details of the chassis, motherboard, Infiniband cards, under each subhead and bullet point. Unique characteristics may be highlighted.
4. Technical bid should be page numbered with a table of contents.
5. Vendors who include price information in the technical bids will be automatically disqualified.
6. At least 3 independent reference letters/completion certificates from completed installations within academic institutions in India with a minimum number of 400 cores in the recent past, i.e., 2019-20 and 2020-21 financial years or later. IISc may contact more users for obtaining independent references. The committee will have right to reject a bid based on reference letters.
7. Indicate tentative delivery period in the technical bid.
8. Technical bids will be opened first. IISc may seek clarifications after opening of technical bids and may ask vendors to provide some performance benchmarks, such as LINPACK 100, LINPACK 1000, and LAPACK for the CPUs and performance tests for the Infiniband adapters. Vendors may be required to give presentations detailing technical specifications and demonstrating performance. A satisfactory presentation will be required if a vendor is asked for a demonstration.
9. Financial bids from vendors will be considered only if they qualify the technical bid. Order will be placed from the L1-bidder who is technically qualified.
10. Indicate the total cost of a minimum of 640 compute cores in the financial bid.
11. Please mention per compute node cost in the BOM in the financial bid. Indicate the Infiniband card and cables as line items within each compute node.
12. The cost of power distributions units (as specified in the requirement), and ethernet switch (as specified in the requirement) should be included as separate items in the financial bid. Include cost of any ethernet cables as a line item within the ethernet switch.
13. The L1 will be determined on the cost of total solution divided by total number of compute cores offered by the solution, i.e., cost of (all nodes including all infiniband components + power distribution unit + ethernet switch and cables)/(total compute cores in solution)
14. As per budgetary constraints for procurement, compute nodes may be added or removed from the solution provided by the L1, at the same cost per compute node mentioned in the L1 financial bid.
15. Prices should be quoted in adequate detail with relation to packing details to cover insurance compensation in case of damage to any specific modules.
16. Delivery and installation of the supply shall be full responsibility of the vendor.
17. Prices must be quoted in INR only + 18% GST on all components. Quotes should be submitted by Indian Original Equipment Manufacturer (OEM) or their authorized Indian distributor. The quotations should be on FOR-IISc Bengaluru basis, in INR only.
18. The total solution as per the agreed BOM has to be supplied within 6-8 weeks after receiving a firm PO from IISc and the installation to be complete within a week after supply of the equipment.

19. Payment will be processed only after successful installation of the machine (both hardware and software).

20. IISc also reserves the right to cancel the tender at any time without assigning any reason whatsoever.

21. The tender documents can be sent at the following address not later than 15th March 2023, 5:00 pm:

> The Chairman
> Department of Materials Engineering
> Indian Institute of Science
> Bangalore 560012
> Karnataka, India
> Attn: Prof. Sai Gautam Gopalakrishnan

Annexure 2: Eligibility Criteria

Prequalification criteria:

1. The Bidder should belong to either class 1 or class 2 supplier distinguished by their "local content" as defined by recent edits to GFR. They should mention clearly which class they belong to in the cover letter.
   a. Class 1 supplier: Goods and services should have local content of equal to or more than 50%.
   b. Class 2 supplier: Goods and services should have local content of equal to or more than 20 % and less than 50%.
2. Purchase preference as defined by the recent edits to GFR (within the "margin of purchase preference") will be given to Class-1 supplier.
3. MSME can seek exemption to some qualification criteria. IISc follows GFR2017 for such details.
4. The Bidder must not be blacklisted/banned/suspended or have a record of any service-related dispute with any organization in India or elsewhere.
5. Original Invoice, Original Warranty Certificate, Original Test Reports should be produced for all imported items from OEM (Original Equipment Manufacturer) at the time of supply of the equipments.
6. Details of experienced service engineer including contact detail should be provided in tender document.
7. Bidder shall have to submit audited accounts (balance sheet profit and loss account) of financial years 2019-20, 2020-21 and 2021-22. Audited statement must be signed and stamped by qualified chartered accounted.
8. Bidder must submit Income Tax return for assessment year – 2019-20, 2020-21 and 2021-22.
9. Bidder must submit up-to-date sales tax or GST clearance certificate.