INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai 400076.

Ref. PR No. 1000051809 RFx. No. 6100002580

Master Node Server

1. Management Node (Qty 1 No.)				
Sr.No.	**Item Description**	**Detailed Technical Description**	**Technical Compliance (Yes/No)**	**Additional Information (If Any)**
1	CPU	2 x Intel Xeon Silver 4410Y 12C 150W 2.0GHz Processor System should be able to support highest TDP processor		
2	Memory	4x16GB 4800MHz with capability to scale upto 8TB		
3	Memory Dimms	Should have 32 memory DIMM slots		
4	Memory Correction	ECC detection/correction Bounded Fault detection/correction SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description) ADDDC (for 10x4-based memory DIMMs, not supported with 9x4 DIMMs) Memory mirroring		
5	HDD	2 x 1TB SATA drive for OS and 3x12TB SATA Drive for date with RAID card supporting RAID 5. Server to support Up to 20x 3.5-inch or 40x 2.5-inch hot-swap drive bays		
6	Networking Adapter	Quad port 1G RJ45 adapter		
7	PCIe Slots	Server should support upto 12xPCIe Gen 4.0 x8/x16 slots		
8	Ports	1 x VGA port, 5 x USB 3.2 G1, 1 x RJ45 for management		
9	Power supply	Redundant Hot swap power supplies		
10	Fan	Redundant (N+1) hot swap fans		
11	Form Factor	Maximum 2U		
12	Diagnostics	The light path diagnostics feature uses LEDs should lead the technician to failed (or failing) components.		

13	Security	TPM 2.0 with secure boot NIST 800-131A or FIPS 140-2 compliant cryptographic standards		
14	System management	It should monitor all vital components of systems and trigger alerts. Service data can be saved to USB keys or remote CIFS for troubleshooting. It should be able to boot video capture and crash video capture Mounting remote ISO image via HTTP, SFTP, CIFS, NFS SNMP 3.0 System management with all available features including all required license		
15	System Environment	System should support ISO7779 and ISO 9296		
16	Mobile management	Should connect to mobile via USB for server management		
17	Mobile Management	Server should be connected to smartphone or tablet (Android or IOS) via USB and check server status and error logs.		
18	Warranty	3 years onsite warranty with advanced replacement of parts.		
19	GPU	System should have supports for upto 8 single wide GPUs		

2. Compute Nodes CPU only – (Qty 4 Nos.)				
Sr.No.	**Item Description**	**Detailed Technical Description**	**Technical Compliance (Yes/No)**	**Additional Information (If Any)**
1	CPU	2 x Intel Xeon Gold 6430 32C 270W 2.1GHz Processor System should be able to support highest TDP processor		
2	Memory	16x16GB 4800MHz with capability to scale upto 8TB		
3	Memory Dimms	Should have 32 memory DIMM slots		
4	Memory Correction	ECC detection/correction Bounded Fault detection/correction SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description) ADDDC (for 10x4-based memory DIMMs, not supported with 9x4 DIMMs) Memory mirroring		
5	HDD	2 x 480GB SSD with hardware RAID. Server to support Up to 4x 3.5-inch or 12x 2.5-inch hot-swap drive bays		

6	Networking Adapter	Quad port 1G RJ45 adapter		
7	PCIe Slots	Server should support upto 5xPCIe Gen 4.0 x8/x16 slots		
8	Ports	1 x VGA port, 4 x USB 3.2 G1, 1 x RJ45 for management		
9	Power supply	Redundant Hot swap power supplies		
10	Fan	Redundant (N+1) hot swap fans		
11	Form Factor	1U		
12	Diagnostics	The light path diagnostics feature uses LEDs should lead the technician to failed (or failing) components.		
13	Security	TPM 2.0 with secure boot NIST 800-131A or FIPS 140-2 compliant cryptographic standards		
14	System management	It should monitor all vital components of systems and trigger alerts. Service data can be saved to USB keys or remote CIFS for troubleshooting. It should be able to boot video capture and crash video capture Mounting remote ISO image via HTTP, SFTP, CIFS, NFS SNMP 3.0 System management with all available features including all required license		
15	System Environment	System should support ISO7779 and ISO 9296		
16	Mobile management	Should connect to mobile via USB for server management		
17	Mobile Management	Server should be connected to smartphone or tablet (Android or IOS) via USB and check server status and error logs.		
18	Warranty	3 years onsite warranty with advanced replacement of parts.		
19	GPU	System should have supports for upto 3 single wide GPUs		

3. Compute Nodes CPU+GPU – (Qty 1 No.)				
Sr.No.	**Components**	**Detailed Technical Description**	**Technical Compliance (Yes/No)**	**Additional Information (If Any)**
1	CPU	2 x Intel Xeon 6520P 24C 210W 2.4GHz Processor		
2	Memory	8x 32GB TruDDR5 5200MHz or higher RDIMM scalable upto 8TB		
3	Chipset	Chipset must be Integrated into the processor		

4	Memory Correction	ECC detection/correction Bounded Fault detection/correction SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description) ADDDC (for 10x4-based memory DIMMs, not supported with 9x4 DIMMs), Memory mirroring		
5	HDD	2 x 480GB SSD with hardware RAID. System should have capability: Front: Up to 8x 2.5” SAS/SATA/NVMe, 8x E3.S NVMe drives		
6	GPU	1 **x NVIDIA H200 NVL** 141GB PCIe GPU Gen5 Passive GPU System must support up to 8x single-width GPUs or 4x double-width GPUs		
7	Networking Adapter	Dual/Quad port 1G RJ45 adapter		
8	PCIe Slots	Up to 14x PCIe Gen5 slots, 2x OCP 3.0 slots for flexible networking options		
9	Ports	2x USB 3.0 G1, 1x VGA, 1x 1GbE RJ-45 dedicated management port, 2x USB 3.0		
10	Video	Embedded graphics with 16 MB memory with 2D hardware accelerator, integrated into the Controller 3 management controller. Two video ports; both should be used simultaneously if required. Resolution is 1920x1200 32bpp at 60Hz.		
11	Power supply	2x Hot-Swap Power Supply. All AC power supplies should support 230V power		
12	Fan	Redundant (N+1) hot swap fans		
13	Cooling	Fans should be N+1 redundant, tolerating a single-rotor failure. Min. one fan should be integrated in each power supply.		
14	Form Factor	2U		
15	Diagnostics	The light path diagnostics feature uses LEDs should lead the technician to failed (or failing) components.		
16	Security	Chassis intrusion switch, Power-on password, administrator's password, Root of Trust module supporting TPM 2.0 and Platform Firmware Resiliency (PFR).		
17	OS Support	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi, Ubuntu Server.		
18	System management	Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. Clarity Controller 3 embedded management based on the ASPEED AST2600 baseboard management controller (BMC) and Open BMC.		
19	System Environment	System should support ISO7779 and ISO 9296		
20	Mobile management	Should connect to mobile via USB for server management		

21	Mobile Management	Server should be connected to smartphone or tablet (Android or IOS) via USB and check server status and error logs.		
22	Warranty	3 years onsite warranty with advanced replacement of parts.		

4. Management Communication Network - (Qty 1 No.)				
5.1	Ethernet Switch	L2 managed 24 ports Gigabit Ethernet switch with sufficient no of ports to connect supplied servers for management network with required no. of cables and rack mounting kit.		

5. Console (Qty 1 Set)			
6.1	Display	Min. 18 Inch Display Monitor with required cables.	
6.2	Input Device	1 Keyboard along with a Mouse	

6. UPS System (Qty 1 Set)				
7.1	UPS System	Min. 30 kVA 3ph -3ph UPS System with 30x26 Ah Exide NXT Batteries to provide sufficient battery backup on current full load as per the BOM of this tender. Accessories like rack and interlink cables must also be included.		
7.2	Rack and Interlink	Rack and Interlinks along with the required cables to mount the rack and batteries.		

7. Server Rack (Qty 1 No.)				
Sr.No.	**Item Description**	**Detailed Technical Description**	**Technical compliance (Yes/No)**	**Additional information (if any)**
8.1	Server Rack	42U 600x800 mm or better Dual Perforated Server Rack to house the rack mountable IT hardware.		
8.2	PDU	Dual PDUs with Min. 25 Ports C13-14 in each and 6 Ports Indian Socket in each, 32A Industrial Plug, 3 Mtr PDU input power cable 6Sq mm 3 core multi strand copper (FRLS).		
8.3	Others	Other standard accessories with keylock feature. Cable dressing must be done through a professional cable dresser for better air ventilation and neat and clean look.		

8. SOFTWARE - 1 Set.
Commercial Software with Support from it's OEM's

9.1	Cluster Management Software	Proposed cluster management tool to be fully supported by it's OEM.		
		Proposed cluster management tool should have web based graphical remote access interface.		
		Should be compatible to work on RHEL 5.x to RHEL 9.x / CentOS 5.x to CentOS 9.x/ Fedora 9.x / Rocky Linux 8.x/9.x		
		Should be able to provision above operating systems to compute nodes. Should be able to auto-provision applications to compute nodes		
		Should allow HPC management console to be accessible from any system in the network.		
		Should support role-based access to the HPC system.		
		Every role should be able to be remotely managed using the Graphic User Interface.		
		Should provide profile-based and fully automated provisioning features.		
		Proposed cluster management tool should have a graphic user interface.		
		Should support Add/Modify/Delete compute nodes from GUI window.		
		GUI (Web) based monitoring feature to be part of proposed solution.		
		Should support major power management modules like bullpap, wti, apc_snmp, ether_wake, ipmilan, drac, ipmitool,		

		ilo, rsa, lpar, bladecente as per the hardware proposed.		
9.2	Job scheduler:	Bidder should propose a job scheduler which is fully supported by them. Job Scheduler proposed should only be OGE / Torque / Open PBS or Licensed and supported version of PBS Pro. No other scheduler to be proposed.		
9.3	Libraries, MPI and Compilers	Bidder should propose GNU Compilers & Intel Cluster Studio minimum single user perpetual license with one year support.		
		Bidder should implement Open MP and MPI network.		
		Bidder should set up the Cluster for MPI Communication over IB/GigE		
		Vendor specific InfiniBand stack on Linux OS, if available, should be supplied.		
		Vendor specific MPI implementation on Linux OS should be supplied.		
		Open-source software/platforms like Python, Perl, Abaqus, Matlab, Comsol, OpenFOAM should be integrated with the cluster. Integration of NAMD will be a major plus.		
		IIT Bombay also has licenses from Abaqus, Matlab, Comsol, ANSYS, Erdas etc. These also to be integrated with the cluster.		
9.4	Jobs Submission Portal:	Bidder should propose for ISV supported GUI Based Job submission portal.		

		Proposed GUI Based job submission portal should be in production mode with at least 3 organizations in India of which 2 have to be Govt/research organization. At least 1 location from the same to be in production mode for last 3 years.		
		Proposed portal should be integrated with existing LDAP or NIS authentication. Integration of NAMD into the cluster will be a major plus.		
		Proposed job submission Portal should be fully integrated with proposed Cluster management tool and Scheduler		
9.5	Operating System	Linux 64 bit		
		Scheduler – Scheduler proposed should be compatible with hardware and software infrastructure proposed and to be supported by bidder.		

9. BENCHMARK REQUIREMENT	Compliance

Benchmark Rules for Bidder: The benchmark data/input files will be made available to bidders. Each bidder must provide the purchaser with the timings and results of the program using the proposed system. If same system is not used for benchmark, bidder MUST submit the actual result along with the estimated completion time on the proposed system.

1. VASP
- **Use v6.2.1 or higher version for this benchmark.**
- **4x4x4 alpha W test input file**
- **Get the scaling result for 8,16,32,64 cores (single node)**

2. HPL (Linpack)
- **Sustained performance: Rmax (To be demonstrated on single compute node only to ensure best performance)**

3. Stream
- **Sustained memory bandwidth: Triad MB/s**

The bidders should provide the single node benchmark result. The benchmark should run by the OEM only. Benchmark submitted by any third party will not be accepted.

Bidders must submit benchmark results with the runtime configuration & software environment used. Bidders are also required to provide all the original output & log files for verification. If required, bidder must give remote access to the purchaser for verification.

During evaluation, it is necessary that the benchmark program run correctly and producing results within the estimated time. A tolerance limit of 5% deviation on the estimated time shall be granted.

Non-compliance to any of these conditions may result in disqualification.

10. EVALUATION CRITERIA

The Evaluation of bid would be based on two criteria's: Technical as well a Commercial. Both criteria's would be governed by it's respective scoring.

Bid Evaluation

1. The Evaluation process to identify the successful bidder is based on the combined techno-commercial evaluation. The bids received from the bidders will be evaluated by the Technical Committee constituted by the Institute. The decision of the technical committee is final and binding on all bidders.
2. The technical bids are evaluated first. The mandatory conditions mentioned elsewhere must be adhered to and failure of the same will result in disqualification of the bid.
3. Each bidder has to obtain the minimum score under each category of the Technical Evaluation to qualify for opening of the commercial tender.

S.N.	Description	Max Score	Min Score
	Technical Bid Evaluation		
1	Solution Superiority	30	10
2	Operation Cost	30	10
3	Benchmark Performance	90	30
4	Bidders strength/experience in HPC in India (In terms of market shares/installation base across	30	10

	industries) + Clarity and quality of RFP response document		
Commercial Bid Evaluation			
1	Price Evaluation	120	Negative marks may also be awarded. No minimum marks to qualify.
	TOTAL MARKS	**300**	

Technical Bid Evaluation:

Solution Superiority: Solutions meeting the technical requirement of the tender will be given 10 marks. Additional marks are given if the proposed solution has advantages of superior interconnect, higher reliability of product such as redundant power supplies, hot swappable fans, hot swappable power supplies, hot swappable compute blades etc. Kindly state clearly the superiority of the solution in your bid separately.

Operational Cost: Lower operating cost will attract higher marks. This is evaluated using the sum of rated IT load of the proposed HPC solution by the bidder. The bidder with the lowest requirement of IT load will receive full 30 marks.
m = 30-(x-xmin)*0.8
where, x = kw of power consumed by given bidder
xmin = the lowest quoted value in kw among all bidders
m = marks obtained for the operation cost by the specific bidder

Benchmark performance:
Bidder MUST submit the actual result along with the estimated completion time on the proposed system.

Total time required in seconds is computed as $T = \Sigma np * t$ where,
np = no. of cores over which the run was made
t = CPU time for that run
The summation is over all the runs that are successful. A run is said to be successful if the output reproduces the results. If a run is successful, then it automatically gets certain number of marks. Additional marks are allotted depending on the time it takes to run. Shorter the time taken to run or better the performance throughput report by the workload, larger the score (m).
m = [90 + (j – 1) * 180]/3
where j = lowest time taken amongst all vendors / time taken for a given vendor. The time taken is computed with equal weightage for each of the benchmark datasets/programs.
All the submitted benchmark timings will be normalized with respect to number of cores and clock rate of the processor.

Bidders strength/experience in HPC in India (In terms of market shares/installation base across industries) along with Clarity and quality of the RFP response document: Large, difficult-to-read documents where the important information is hidden deep within will attract less marks. Clear, concise documents with all details of important information will obtain more marks. Information should not be scattered but should all be at one place for a particular item. Bidders should have maximum nos. of installation in India to show it's strength. The bidder who has largest market share in HPC market will attract more marks.

Commercial Bid Evaluation:

Price Evaluation: Marks will be calculated based on the total cost of ownership (TCO). This is the sum of the cost of the proposed solution which includes HPC cluster, storage, interconnect, software etc., In addition to these, cost of service level agreement (SLA) is added.
The marks for this is calculated as:
m=100 - [TCO(bidder) – TCO(lowest)]/2
where, TCO is in lakhs and TCO (bidder) is TCO of the bidder and TCO (lowest) is the lowest TCO amongst all the bidders.

11. SCOPE OF WORK	
12.1	Rack Mounting & Cabling for HPC Server Nodes and all other hardware components. Integration and support of the existing GPU System with this HPC cluster.
12.2	Network design and integrating hardware. Head Node Installation and Configuration, Compute Nodes Installation and Configuration.
12.3	Operating System Installation and Configuration.
12.4	Installation of all the middleware software along with the user sought applications. Cluster Tool Kit installation and Configuration, Scheduler Installation and Configuration, Job Submission Portal Installation and configuration, Application installation and configuration.
12.5	Cluster Benchmarking.
12.6	Acceptance Test and fine tuning the performance as per expectation.
12.7	Training on cluster usage to admin as well as research students.
13.8	3 Years of onsite comprehensive warranty and support.

12. GENERAL COMPLIANCE - TERMS & CONDITIONS		**Compliance**
13.1	Bidder to provide complete details about Schematic Diagram, Rack layout, Power & Cooling requirement, Electrical infrastructure requirement and anything else required at IIT Bombay. Special instructions for site preparation if any, should be clearly mentioned in the technical bid apart from what is mentioned in the tender.	
13.2	All products quoted should be with 3 years of warranty and support. Any new version available of the software proposed in the respective domain should be provided and implemented at no extra cost for entire contract period.	
13.3	The bidder must have experience of supplying 3 similar orders of HPC within the last 3 financial years for any Govt. organization preferably to Educational and R&D organizations. The documentary evidence in this regard must be attached. Contact details of the concerned person of institutions where installation have been made by the bidder should also be enclosed. Bidder should have at least 3 HPC cluster Installations in India in last 3 years, 15 Teraflop each & PO with Installation report should be in Bidders Name. This applies even if bidder is one of the Server OEMs. Bidder must have provided at least one HPC cluster with 500TF in last 5 years.	

13.5	Bidder should have executed at least 2 orders of HPC System having a min. of 100 nodes in past and more than 500TB PFS based Storage as part of the same HPC Cluster.	
13.6	OEM must have supplied and deployed min. 2 HPC clusters of 200TF and one of these must be at least with 600TB PFS based on Infiniband. The documentary evidences must be submitted along with the technical bid. Failed to do that, will disqualify the bidder.	
13.7	The bidder must not be blacklisted any other university/institution/Government department. An undertaking to this effect must be submitted.	
13.8	Compliance to eligibility criteria must be attached along with unpriced technical bid.	
13.9	Bidder must have a min. 5 installations/entries in latest list of India's Supercomputing List. OEM must also have a min. 20 entries in Top500 supercomputing list.	
13.10	Bidder must be an ISO certified System Integrator.	
13.11	Server OEM should have direct local sales & support office in Mumbai. The OEM should have direct presence in India. i.e. OEM office & spare depots should be present in India. A letter confirming same from OEM is to be submitted.	
13.12	The bidder must submit the product catalogues, literature of the proposed product in solution.	
13.13	The firms are required to quote Servers of the branded make only. OEM can quote either directly or through an authorized partner or service provider. In case of partner, MAF is compulsory. The bidder must be authorized by the manufacturer to supply, install and maintain the system. The specific authorization by the manufacturer for participating in this tender should be enclosed, otherwise quotation may be rejected.	
13.14	Point by point compliance to all the above-mentioned features should be provided by the firm. There should not be any deviation and if any, should be stated clearly.	
13.15	Full Server configuration as listed above should be tested and integrated at OEM manufacturing plant which include all major components, power supply, cooling fan cabinet etc. No local site integration of server components will be allowed. No rebranded product /OEM would be considered. The OEM must be manufacturing the products and not just the assembling. The same might be asked to prove during the technical evaluation.	.
13.16	The bidder must agree to install and configure the user sought operating systems, mostly open-source Linux versions, MPI libraries, Job schedulers plus cluster management tools and demonstrate its running in parallel as part of the system acceptance. Installation and maintenance during warranty period, should be mentioned separately along with training on cluster usage to it's users.	
13.17	Vendor must provide the Bill of Material with manufacturer's part numbers for the items proposed to meet the complete solution. Vendor should verify and certify that the items proposed are sufficient to integrate the proposed solution into a production mode.	
13.18	The Supply, installation and commissioning of the system should be completed within 8 weeks from the date of purchase order. The project / activity must be completed on turnkey basis, integrating hardware, system software and application software by a single vendor / system integrator.	
13.19	OEM must be financially sound with min. 10 years in HPC server business.	

13.20	Vendor should provide minimum Three years' comprehensive On-site support warranty for all the deliverables, Hardware and software at no additional charges.	
13.21	Price should be quoted based on 24x7 response against call log by IITB to the Bidder/OEM.	
13.22	The bidder must have a NOC to provide the support on 24x7 basis.	