



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

Ref No. 100051921

RFX No. 610002660

TECHNICAL SPECIFICATION FOR HPC CLUSTER SYSTEM

1. Compute Nodes - (Qty 5 Nos.)

S.N.	Item Description	Detailed Technical Specification	Technical Compliance (YES/NO)	Additional Information (If any)
1	CPU	Dual CPU based processor (Total 64 Cores): 2 x Intel Xeon Gold (64 cores; 4 th or 5 th generation or higher) Each CPU with minimum 32 cores and 2.1 GHz or higher Each CPU should have minimum 2.15 TF(TeraFLOPS) theoretical peak performance System should be able to support highest TDP processor		
2	Memory	16x16GB 5600MHz 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 GB SATA SSD 2.5" SSD with hardware RAID. Server to support up to minimum of 4 x 3.5-inch or 8 x 2.5-inch hot-swap drive bays		
6	Networking Adapter	Quad port 1G RJ45 adapter or equivalent		
7	Infiniband Interconnect & PCIe slots	1 x Nvidia ConnectX-7 Single Port NDR200 VPI/200GbE OSFP PCIe Adapter or substantially equivalent. Server should support upto 5 x PCIe 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	Hot plug and redundant power supply with min 94% efficiency		
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 or equivalent NIST 800-131A or FIPS 140-2 compliant cryptographic standards or equivalent		
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 or equivalent. Should provide effective protection, reliable detection & rapid recovery using silicon-based Hardware Root of Trust, signed firmware updates, secure default passwords, configuration and firmware drift detection, persistent event logging including user activity, secure alerting, automatic BIOS recovery, rapid OS recovery, system erase.		
15	System Environment	System should support ISO 7779 and ISO 9296		
16	Warranty	Server Warranty includes 3-Year onsite warranty with advanced replacement of parts. 3-Year Onsite labour and support with next business day response.		

2. Primary Interconnect Network - (Qty 1 No.)

1	Infiniband Switch (1 Qty)	400 Gbps InfiniBand/Mellanox NDR Infiniband Switch in 1U rack mountable form factor with 64 x 400 G interconnect (via 32 x OSFP connectors) and with redundant Power Supply		
2	Cables (4 Qty)	Nvidia Passive copper splitter cable, 800 (2x400) Gbps to 4x200Gbps, OSFP to 4xOSFP, 3m or substantially equivalent.		
3	Adapter Cards (8 Qty)	Nvidia ConnectX-7 Single Port NDR200 VPI/200GbE OSFP PCIe Adapter or substantially equivalent. Note- Infiniband Adapter Cards for existing Dell servers in 8 existing Compute Node/Servers.		

3. Additional AMC beyond 3 years - (Qty 1 No.)

1	Additional Warranty (1 Year)	Comprehensive AMC of provided compute nodes (5 Qty) per year beyond 3 years warranty period for two additional years		
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4. Software

Commercial Software with Support from it's OEM's

1	Cluster Management Software and Job scheduler	Proposed cluster management tool to be fully supported by it's OEM.	
		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, Microsoft Windows Server with Hyper-V, SUSE Linux Enterprise Server (SLES) and Canonical Ubuntu Server LTS	
		Should allow HPC management console to be accessible from any system in the network.	

	Should support role-based access to the HPC system.	
	System should support Encryption of the data	
	Should provide profile-based and fully automated provisioning features.	
	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.	
	Bidder should propose a job scheduler which is fully supported by them.	
	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.	

5. SCOPE OF WORK		
1	Rack Mounting & Cabling for HPC Server Nodes and all other hardware components. Integration and support of the existing Dell Server System with this HPC cluster.	
2	Network design and integrating hardware. Head Node Installation and Configuration, Compute Nodes Installation and Configuration.	
3	Operating System Installation and Configuration.	
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.	
5	Cluster Benchmarking.	
6	Acceptance Test and fine tuning the performance as per expectation.	
7	One video recorded training sessions of two-three hours on cluster usage to admin as well as research students. Video recording and clear documentation to be provided after the training session to the admin for future use.	

6. GENERAL COMPLIANCE - TERMS & CONDITIONS		Compliance
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.	
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.	
3	The bidder must have experience of supplying 2 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 2 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.	

4	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.	
5	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.	
6	Compliance to eligibility criteria must be attached along with unpriced technical bid.	
7	Bidder must be an ISO certified System Integrator.	
8	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.	
9	The bidder must submit the product catalogues, literature of the proposed product in solution.	
10	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.	
11	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.	
12	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	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.	
14	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.	
15	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.	
16	OEM must be financially sound with min. 10 years in HPC server business.	
17	Price should be quoted based on 24x7 response against call log by IITB to the Bidder/OEM.	
18	The bidder must submit NOC from OEM to provide the support on 24x7 basis.	